WHITE PAPER ON LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM IN JAPAN, 2016



Ministry of Land, Infrastructure, Transport and Tourism

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* Maps used in this white paper may not necessarily indicate Japanese territory comprehensively.

Preface

Innovation does not refer simply to technological innovations and the development of new technologies. It signifies the ongoing creation of new values by reforming and renovating social systems and institutions as a whole.

Through innovation, humanity has to date created new technologies and services which have brought significant changes to people's lifestyles, economy, and society. Particularly in recent years, innovation is occurring at a striking pace throughout the world, and technologies and services are daily evolving and producing a succession of new values.

When turning our eyes to history, we see, for example, that the Industrial Revolution continuing since the latter half of the 18th century could be said to represent a history of innovation that has prompted the development of various industries, including the light industries, heavy industries, and information and communication industries. Today, this trend has evolved into the Fourth Industrial Revolution, characterized by the interconnection of various "things" and technologies beyond industrial borders.

Japan today faces numerous challenges, such as a declining and rapidly aging population, disasters that are increasing in severity, an accelerated aging of infrastructure, and a difficult fiscal situation. However, in a positive light, this situation could be taken as an ideal opportunity to innovate and lead the world by generating new social systems that could draw a path to overcoming imminent issues and realizing sustainable economic growth.

In this context, the administration is expected to play two important roles: to become actively involved and contribute to the creation of innovation in coordination with the private sector, industry, and academia by effectively distributing limited resources, and to achieve a balance in deciding how to accept into Japanese society the steady stream of innovations that are being created throughout the world.

Based on an awareness of the above-mentioned background and issues, part I of *the White Paper on Land, Infrastructure, Transport and Tourism in Japan, 2016* discusses "the Opening of a New Era in Land, Infrastructure, Transport and Tourism Administration through Innovation" as its main theme. More specifically, it introduces the initiatives of land, infrastructure, transport and tourism administration in promoting innovation as the key to overcoming the challenges that Japan faces and achieving sustainable economic growth. It also analyzes and introduces the present status of issues and future expectations, also with regard to relevant industries, and presents a future vision born from innovation, with reference to the results of a national opinion survey.

Part II provides a report on the progress of fiscal 2016 MLIT administration in each sector, separated by policy issue.

Part I

The Opening of a New Era in Land, Infrastructure, Transport and Tourism Administration through Innovation

Chapter 1 Development and Innovation in Japan

Based on the premises of discussions to follow in Chapter 2 and later sections, Chapter 1, "Development and Innovation in Japan," looks at the importance of innovation-driven economic growth, with an awareness of the difficult circumstances of the Japanese economy and the challenges it faces.

Japan is an "advanced nation" when it comes to facing a variety of challenges, including a falling birthrate and aging population as well as a severe fiscal situation. Given that background, Section 1, "The Environment and Socioeconomic Situation Surrounding Japan," outlines the need for innovation and the fact that, if this need is taken in a positive way, it is a chance for innovation-driven progress and development.

Next, Section 2, "The State of Innovation in Japan," reviews Japan's innovation policy to date and Japan's strengths and weaknesses with regard to innovation, focusing on the Basic Act on Science and Technology and the Science and Technology Basic Plan.

Section 3, "The History of Innovation," first looks at the Industrial Revolution as an example that brought major changes in living, the economy, and society. It then surveys the history of development in the field of transportation, which is deeply relevant to the fields of land, infrastructure, transport, and tourism. It then looks back on the history of the diverse cases of innovation in the world in recent years and cases of innovation that were advanced by Japan.

Section 1 The Environment and Socioeconomic Situation Surrounding Japan

1 Japan's Socioeconomic Situationx

(1) An Aging Society with a Declining Birthrate and Population Decline

As its birthrate declines and its population ages, Japan's total population has been falling, after peaking in 2008, with the productive-age population also decreasing after peaking in 1995. According to a projection by the National Institute of Population and Social Security Research (median projection for birth/death), the total population is projected to decline to 88,080,000 in 2065, with the productive-age population (15 - 64 years of age) projected to decline to 45,290,000 in 2065 (Figure 1-1-1).



Source) "National Census Report" by the Statistics Bureau of the Ministry of Internal Affairs and Communications (MIC) for dates up to 2010, "Basic Complete Tabulation on Population and Households of the 2015 Population Census" by Statistics Bureau of MIC for 2015 data; estimates are calculated by the MLIT from the median estimates of birth (median estimates of death) in "Japan's future population estimates" (estimates from 2017) by the National Institute of Population and Social Security Research (IPSS).

Looking at fields related to the Ministry of Land, Infrastructure, Transport and Tourism, in the construction field, workers aged 55 and older account for around a third of the approximately 3,260,000 skilled workers at construction sites (as of 2016). This is one example of the aging of workers (Figure 1-1-2).

Furthermore, in the face of the possibility of older workers leaving the workforce in large numbers in the future, there are concerns that a labor shortage will occur in the medium- to long-term.

In the traffic and transportation field as well, there are concerns over a shortage of skilled workers and the succession of skills in different areas such as rail, automobiles, shipbuilding, marine transport, ports and harbors, aviation, and logistics.



In order to overcome these kinds of supply restrictions and labor shortages associated with a declining population, there is a need to increase productivity through innovation, in addition to further training workers.

(2) A Decelerating Growth Rate

GDP movement in FY2016 was solid, with positive growth rates for both nominal and real GDP. Looking at the medium- to long-term, the GDP growth rate in recent years has transitioned generally around 0 - 2% since the 1990s (Figure 1-1-3).



(3) Substantial Progress in Science and Technology

Science and technology has achieved substantial progress in a variety of fields in the 21st century. Progress in information and communications technology (ICT) has been especially remarkable, and we have entered an era where all kinds of things, including people, information, goods, and capital, are connected and affect each other instantaneously in a global environment. On the back of progress in ICT, robots and AI^{Note 1} are now used in industry and all kinds of life situations, including in familiar products and services, and it is hoped that this will lead to improved productivity and a resolution of labor shortages. Also, advances such as IoT^{Note 2}, which connects various kinds of information and goods through the Internet, are also taking place (Figure 1-1-4).



On the other hand, the rapid progress of ICT has been accompanied by increasing and increasingly sophisticated cyber attacks, threatening the lives of all citizens and socioeconomic activity (Figure 1-1-5).



Source) Prepared by the MLIT based on "Condition of Threats Surrounding Cyberspace in 2016" by the National Police Agency

Given this situation, the Japan Revitalization Strategy 2016 stated that "The 'fourth industrial revolution,' which uses the technological breakthrough of IoT (Internet of things), big data, artificial intelligence and robot sensors is the most important key to leading a future revolution in productivity." In addition, the Fifth Science and Technology Basic Plan sets out a vision of a "super smart society" (Society 5.0)^{Note 3} by extending the flow of transformation to society (Figure 1-1-6).



2 Issues Facing Japan

(1) Imminent Massive Earthquakes and Increasingly Severe Weather Disasters

Due to such features as its geographic, topographic, and climatic conditions, Japan has undergone numerous disasters since ancient times. In recent years as well, it has experienced frequent disasters including earthquakes, tsunamis, volcanic eruptions, typhoons, floods, torrential rain and heavy snowfall (Figure 1-1-7).

The imminence of major earthquakes has been pointed out, including a Tokyo Inland Earthquake, which would strike the capital region directly, and a mega earthquake in the Nankai Trough, such as a Tokai, Tonankai, or Nankai earthquake, which could cause strong shaking and large tsunamis, mainly along the Pacific coast from Eastern Japan to Kyushu. During the Kumamoto Earthquake of April 2016, a maximum seismic intensity of 7 was recorded on the 14th and the 16th (Figure 1-1-8), causing a sediment-related disaster due to extensive slope failure and damage due to the collapse of buildings.

Also, Japan is one of the world's few volcanic countries, and once an eruption occurs, there is concern that the damage could be prolonged and that it could have a tremendous effect on the lives of residents and on socioeconomic activity. In 2014, the eruption of Mt. Ontake took the lives of over 50 people.



Great East Japan Earthquake of 2011

- Torrential rain (sediment-related disaster) in Hiroshima in August 2014
- Mt. Ontake eruption on September 27, 2014
 Torrential rain (Kinugawa River breach) in Kanto and Tohoku regions in September 2015
- Kumamoto Earthquake of 2016

Source) MLIT



Looking at the weather, rain has become more localized, concentrated, and intense with climate change in recent years such that, for example, the number of incidents of severe rain in a short period (rainfall of 80 mm or more per hour) has increased by 1.5 times over the past 30 years. In August 2014, a local downpour in a short period caused a large-scale sedi-

Note 3 According to the Fifth Science and Technology Basic Plan, a super smart society is "a society in which the various needs of society are finely differentiated and met by providing the necessary products and services in the required amounts to the people who need them when they need them, and in which all the people can receive high-quality services and live a comfortable, vigorous life that makes allowances for their various differences such as age, sex, region, or language." Also, Society 5.0 "has the meaning of science, technology, and innovation ushering in transformations that create a new kind of society to follow on from hunting-and-gathering society, agrarian society, industrial society, and information-oriented society."

ment-related disaster in Hiroshima. During torrential rain in the Kanto and Tohoku regions in September 2015, a levee on the Kinugawa River was breached, causing major damage in Ibaraki (Figure 1-1-9). Rainstorms and torrential rain from June to September 2016 caused major damage in the Hokkaido, Tohoku, and Kyushu regions.



Present Status of Aging Social Infrastructures

(2) Accelerating Aging of Social Infrastructure

Japan's social infrastructure, which was intensively developed during and after the period of high economic growth, is aging. Assuming that the maintenance conditions achieved using current technology and arrangements continue generally as-is, the maintenance and renewal expenses for social infrastructure under the jurisdiction of the MLIT are calculated to increase from approximately 3.6 trillion yen in FY2013 to around 4.6 - 5.5 trillion yen 20 years later (Figure 1-1-10). There is a need to balance securing the safety of existing social infrastructure with reduction and leveling of total costs for maintenance and renewal.

Figure 1-1-10 Maintenance and Renewal Expenses and Aging of Social Infrastructure

Estimated Costs of Maintenance/ Management and Renewal

Management and Renewal		< <percentage 50="" infrastructure="" of="" old="" over="" ratios="" social="" years="">></percentage>						
Fiscal year	Estimated result		March	March	March			
FY2013	About 3.6 trillion yen		2013	2023	2033			
FY2023 (In 10 years' time)	About 4.3-5.1 trillion yen	Highway bridges						
FY2033 (In 20 years' time)	About 4.6-5.5 trillion yen	[About 400 thousand bridges ^{Note 1)} (of 700	About 18%	About 43%	About 67%			
*1. The number of facilities in each of the 10 fields of social infrastructures (roads, flood control, sewer systems, ports and harbors, public housing, parks, coasts, airports, aids to navigation, governmental facilities) over which the MLIT has jurisdiction and that are managed by the state, local public entities, Regional Road Public Corporations or Japan Water Agency, or an incorporated administrative agency, has been checked by year of initial construction for estimation, with records of their maintenance/		Tunnel [About 10 thousand tunnels ^{Note 2}]	About 20%	About 34%	About 50%			
		River management facilities (such as sluices) [About 10 thousand facilities ^{Note 3}]	About 25%	About 43%	About 64%			
		Sewage pipes [Total length: about 450 thousand km ^{Note 4}]	About 2%	About 9%	About 24%			
		Harbor quays [About 5 thousand facilities ^{Note 5)} (at least 4.5 m in water depth)]	About 8%	About 32%	About 58%			
management, renewal, e	etc. taken into account.							
*2. New construction and r	emoval are not considered	Note 1) About 300,000 bridges whose year of o	construction	is unknown	have been			
*3 Regarding functional im	provements when renewing	excluded from the ratio calculations. Note 2) About 250 tunnels whose year of construction is unknown are excluded from the calculation of ratios.						
facilities, the assumption	on is to renew with similar							
functions (however, imp	rovements to meet quake-	Note 3) Government-managed facilities only, ind	cluding abou	it 1,000 facil	ities whose			
resistance standards and	d the like are included).	year of construction is unknown. (Since the facilities developed within the last 50						
*4. Does not include the la	nd cost and compensation	years generally have a documented history, the facilities whose year of						
cost, natural disaster rei	ad ronowal unit cost and	Construction is unknown have been sorted a	as being 50 y	ears or older	.) Instruction is			
renewal timing vary amo	ong social infrastructure for	unknown (since pines laid within the past 30 years generally have records, pines						
such reasons as diffe	erences in the degree of	whose year of construction is unknown ar	e treated as	those aged	30 years or			
damage stemming fro	m conditions in different	over and their length proportionally distrib	outed in the	ratio of cons	struction by			
locations, the estimation	is are shown as ranges.	documented number of years elapsed.)						
		from the calculation of ratios.	onstruction is	s unknown a	re excluded			

Source) MLIT

7

(3) Exhaustion of the Countryside

As Japan transitions into a society whose population is in serious decline on a nationwide level, population decline will become especially noticeable in the countryside. According to medium- to long-term demographic forecasts, the populations of around 60% of regions across the country will drop to less than half in 2050, creating the crisis of a vanishing countryside. The envisioned effects of continued population decline include the reduction in services related to daily living; fewer employment opportunities; declines in the level of government-provided services due to lower tax revenues; withdrawal/reduction in regional public transportation; increase in the number of vacant houses, vacant stores, old factory sites, parcels of deserted arable land; and a decline in the functioning of local communities. It is thought that the different effects of population decline could create a vicious cycle that leads to further population decline through a drop in the convenience of everyday living and a drop in a community's attractiveness (Figure 1-1-11).



(4) Financial Situation

Outstanding debt as a percentage of GDP is an indicator of the size of a nation's debt compared to the size of its economy. As such, it is an important indicator of fiscal health. Compared to other countries, outstanding debt as a percentage of GDP for Japan's national and local governments combined is in the severest situation. Going forward, the country will need to cope with the various challenges mentioned above while efficiently allocating limited fiscal resources (Figure 1-1-12).



3 Need for Innovation

As we have seen thus far, Japan must prepare for imminent and increasingly severe disasters, cope with the accelerating aging of infrastructure, revitalize its regions, and develop competitive conditions for beating fierce international competition all under the constraints of a decreasing population, a declining birthrate with an aging population, plus an associated falling productive-age population, and a severe financial situation.

Within this situation, a fourth industrial revolution, typified by such things as IoT, big data, AI, and robot sensors, has been moving ahead globally in recent years. The socioeconomic modality, including ways of working and lifestyle, not just economic activity in the form of production and consumption, is on the verge of major changes. Japan needs to seize on this global trend, create innovation, and implement the innovations created throughout the world, including Japan, in society so as to exponentially increase productivity, overcome a multitude of challenges, and achieve continued economic growth.

(1) Solving Issues through Innovation

As the maxim "Necessity is the mother of invention" goes, the existence of a challenge is thought to become an impetus for the creation of innovation.

In the construction, traffic and transportation fields, for instance, there are concerns about a future labor shortage, but this can also be taken as a good opportunity to create a construction industry and a traffic and transportation industry with extremely high productivity ahead of the rest of the world by creating innovation that makes use of things such as AI and IoT, which are undergoing dramatic evolution.

Furthermore, thinking broadly about the falling birthrate and aging population, the potential market size of the silver economy is quite large, with potential demand for such things as nursing-care robots, self-driving cars, practical use of AI, and application of big data to medical care. Also, demand for services and products designed for an aging society is anticipated to increase around the world. It is therefore conceivable that the international expansion of new products and

services created in Japan could lead to continued growth of the Japanese economy.

In order for created innovation to be embraced by society, people's worries about new technologies and services must be dispelled. In Japan, while there are those who regard the safety of self-driving cars, for example, with apprehension, there are also people looking forward to major effects such as the securing of transportation in daily life for mobility-impaired persons and the reduction of congestion and traffic accidents. Given that Japan is an "advanced nation" when it comes to facing challenges, it could also have an environment conducive to fostering social acceptance of innovation.

(2) Economic Effects of Innovation

Below, we look at the economic effects of innovation in terms of supply and demand.

(Innovation's effect on demand generation)

Demand generation, such as through the provision of new goods and services and a decline in prices, can be expected as an economic effect of innovation.

For example, according to the "2016 White Paper: Information and Communications in Japan" by the Ministry of Internal Affairs and Communications^{Note 4}, the demand generation effect has been estimated for new ICT services (Figure 1-1-13). The area with an especially large demand generation effect is that of service robots, with a maximum effect of approximately 560 billion yen. This is followed by smart homes (with monitoring features and energy features), with estimated effects of about 190 billion yen and 160 billion yen, respectively, and connected cars (with automated driving functions), with an estimated effect of approximately 120 billion yen. A large demand generation effect is also anticipated for new services related to the fields of land, infrastructure, transport, and tourism.

Figure 1-1-13 Estimated Economic Effects										
		Potential users*1		Percentage intending to use paid services*2		Amount willing to pay (monthly, in yen)*3		Ecor (direct imp	nomic eff act, billio	ect ns of yen)
Connected cars (with insu	rance telematics)	51.84 million households	×	13.4% - 13.7%	×	661 - 692	=	56.3	-	57.7
Connected cars (with auto	mated driving functions)	51.84 million households	×	18.3% – 19.1%	×	918 – 1,030	=	104.5	- <	119.8
Smart homes (with energy	features)	51.84 million households	×	12.2% - 13.0%	×	1,732 – 1,913	=	131.4	- <	154.7
Smart homes (with monito	ring features)	51.84 million households	×	17.1% – 18.1%	×	1,685 - 1,734	=	183.4	- <	189.9
Wearable devices		47.18 million	×	13.4% – 13.5%	×	613 - 617	=	46.5	-	47.1
Service robots		33.28 million house- holds (households owning smartphones)	×	10.9% – 15.5%	×	16,693 - 16,995	=	377.1	- <	564.9
Personal or household IC1	education services	33.28 million house- holds (households owning smartphones)	×	15.7% - 15.6%	×	448 – 468	=	28.1	-	30.4
Personal or household ICT medical services		33.28 million house- holds (households owning smartphones)	×	15.7% - 16.5%	×	1,085 – 1,159	=	71.5	-	72.7
Personal ICT financial services		47.18 million (smartphones users)	×	9.9% - 13.3%	×	645 - 797	=	42.6	-	48.6
Ultra HD video streaming	services	51.84 million households	×	17.3% – 18.5%	×	337 – 359	=	38.5	-	38.8
Sharing services		47.18 million (smartphones users)	×	8.8% - 12.8%	×	300	=	14.9	-	21.7

*1: This column shows the potential user base (households / individuals) according to the nature of the service or application. When services and applications are expected to work with smartphones or other devices, the potential user base is limited to those users.

*2: These figures are based on a survey given to consumers. (The upper and lower figures are the result of multiple functions presented to the respondents.)

*3: These figures are based on a survey given to consumers. For connected cars, ICT education, ICT medical, and ultra HD video streaming services, respondents were asked by what percentage their expenditures would increase from their current household expenditures on the same service or application. The figures here were calculated by multiplying expenditures by this percentage. Source) Prepared by the MLIT based on "Study Report on a Structural Analysis of the ICT Industry in the IoT Era and Verification of ICT's Multifaceted Contributions to Economic Growth" (2016) by MIC

Note 4 In the "2016 White Paper: Information and Communications in Japan" by MIC, the demand generation effect was calculated by seeking the percentage with an intention to use and the amount willing to pay for new ICT services based on the results of a consumer survey. The survey asked about new services and applications envisioned to be available by 2020 across the whole breadth of ICT.

Considering the impact of innovation in terms of supply, it is expected to contribute to the improvement of productivity through the routes of increasing the operating rate of existing equipment, streamlining operations, and improving capital productivity^{Note 5}. According to a report by the Council on Economic and Fiscal Policy, Expert Panel, Committee for Japan's Future, an approximately 1% difference in real GDP growth rates appears between the scenarios of increasing productivity versus a slowdown in productivity with population decline (Figure 1-1-14). It is thought that going forward, economic growth is achievable even with a declining population, as long as increased productivity can compensate for the negative factor of a declining workforce.



Column Economic Cycles and Innovation

Schumpeter attempted to explain Kondratieff's theory of long-wave cycles in terms of the concept of innovation. Kondratieff's first wave lasted from the end of the 1780s to the beginning of the 1850s, the second from the beginning of the 1850s to the 1890s, and the third from the 1890s to approximately the 1920s. As Schumpeter explains, these phenomena can be understood in terms of the first wave being based on the industrial revolution and the process of its spread, the second being based on the construction of railroads centered on steam engines and the age of steel; and the third being the age of electricity, chemistry, and automobiles, brought about by the second industrial revolution. In other words, it is believed that significant inventions prevailed over previous technologies and were incorporated into businesses, spreading from one sector to another, attracting new investment, and causing clusters of new business management techniques and new industries to spring up, and bringing about long-term growth.

There are also those who believe that we are currently in a fourth wave and that in the future, nanotechnology, the life sciences, big data, robotics, and artificial intelligence will drive the rise of a fifth wave.

Note 5 According to "Japanese Economy 2016-2017" (January 2017) by the Cabinet Office, the first is the rise in productivity from increasing the operating rate of existing equipment. Such things as accurate ascertainment of the operational status of equipment, refinement of demand forecasting using big data, and improvement in the matching of users (consumers) and providers (suppliers) using sharing services are all thought to lead to higher productivity through increases in the operating rate of equipment. The second is the rise of productivity from the streamlining of operations by making use of such things as big data and AI. It is possible that the use of AI could be substituted for brainwork, which is regarded as a high skill, not just for back office work and some unskilled labor, increasing labor productivity as a result. The third is the possibility that the use of the Cloud and the establishment of distributed systems could produce capital investment savings, thereby improving capital productivity. Particularly with regard to financial services, such things as the introduction of block chain technology could make it easier to establish means of settlement and ensure safety without making enormous systems investment in existing equipment.



Section 2 The State of Innovation in Japan

Innovation Policy in Japan to Date

(1) Council for Science, Technology and Innovation

(Council for Science, Technology and Innovation)

The Council for Science and Technology Policy was set up in the Cabinet Office as one of the councils for key policies during a reorganization of government ministries and agencies in January 2001. It was reorganized into the Council for Science, Technology and Innovation^{Note 6} in May 2014 to strengthen the functions related to the creation of innovation. Under the leadership of the Prime Minister and the Minister of STI Policy^{Note 7}, the Council for Science, Technology and Innovation of STI policy; it overlooks all of the nation's science and technology, formulates comprehensive and basic policies, and conducts their overall coordination.

(CSTI's roles)

- The roles of the CSTI are as follows:
- (i) Investigate and discuss basic policies concerning science and technology
- "The Science and Technology Basic Plan" (every five years), "Comprehensive Strategy on Science, Technology and Innovation" (annually)
- (ii) Investigate and discuss science and technology budgets and the allocation of human resources
- "Comprehensive Strategy on Science, Technology and Innovation" (annually)
- (iii) Assess nationally important research and development

Evaluation and follow-up of large-scale R&D, "General Guidelines for Evaluating Government Funded R&D"

(iv) Decide other key issues surrounding the promotion of science and technology Decision-making regarding such programs as the "Strategic Innovation Promotion Program" (SIP^{Note 8}) and the "Impulsing Paradigm Change through Disruptive Technologies Program" (ImPACT^{Note 9})

Note 6 CSTI

Note 7 Officially the Minister of State for Science and Technology Policy

Note 8 Cross-ministerial Strategic Innovation Promotion Program

Note 9 Impulsing Paradigm Change through Disruptive Technologies Program

(2) The Science and Technology Basic Plan

Under the Basic Act on Science and Technology, which was enacted in 1995, Japan has formulated a science and technology strategy, with a long-range outlook, in a Science and Technology Basic Plan (Basic Plan) every five years^{Note 10} and has made efforts to promote science and technology.

Given a context including economic slowdown, intensification of international competition, and increasingly serious global issues, expectations have mounted since the latter half of the 2000s for innovation creation that could produce new value through unprecedented frameworks. In that sense, the 3rd Basic Plan talked about "creating scientific development and persistent innovation."

The 4th Basic Plan highlighted the "integrated development of S&T and innovation policies" as a basic plan of action. Under this basic principle, a Comprehensive Strategy on Science, Technology and Innovation has been formulated every year since 2013 with the purpose of promoting innovation comprehensively.

The 5th Basic Plan, which is the first plan devised by the CSTI, says that STI policy will be promoted forcefully. The plan is positioned as one to be implemented by a wide spectrum of parties—including the government, academia, industry, and citizens—working together. The plan says that it will guide Japan toward becoming "the most innovation-friendly country in the world."

Surveying the status of innovation policies in other countries over the past 20 years, we see that countries such as the U.S., the U.K., and France, have positioned STI policy as key national polices since the latter half of the 1990s, and have continued to strengthen them since then (Figure 1-2-1).

Note 10 The past Basic Plans formulated were the 1st (FY1996 – FY2000), the 2nd (FY2001 – FY2005), the 3rd (FY2006 – FY2010), and the 4th (FY2011 – FY2015). The Cabinet approved the 5th Basic Plan (FY2016 – FY2020) on January 22, 2016.

Figure 1-2-1 Changes and Trends in STI Policies in Major Countries						
	U.S.	U.K.	Germany	France	China	South Korea
Back- ground and features of S&T policies	S&T power strengthened through military demand	Although traditionally focused on S&T, in light of attrition of the research base, national R&D investment was maintained while annual expenditure overall was on the decrease.	Authority is not central- ized, but distributed to research institutions. Pri- vate R&D is also active.	Public research institu- tions led promotion of fields such as space, nuclear, aviation and railroad during the Cold War, so as to be a nation independent of other nations.	Rapid growth of S&T accompanied rapid economic growth.	After the war, the govern- ment led the aggressive introduction of technol- ogy in industries such as textiles, shipbuilding, iron manufacturing, and electronics.
 The Clinton Administration (inaugurated in 1992) promoted enhancement of hightech comparitiveness, subsidies for private companies, and support of small business R&D (e.g., SBIR). In 1999, the concept of industry "clusters" as a source of innovation was greated 		 In the early 90s, policy was changed to invest- ment in basic research. In the late 90s, inno- vation was promoted in light of the failure to commercialize R&D results. 	 Under a tight budget due to reunification (1990), basic research was emphasized even as priority was given to the reconstruction of the former East Germany. 	 Collaboration of companies, public research institutions and universi- ties became common. The need for prioritized science policies and cre- ation of innovation and employment in small and mid-sized enterprises was recognized. 	 A policy to build the nation based on science and technology and ed- ucation was announced (1995). 	 The "Long-term Vision for S&T Development Toward 2025" was established in 1999 to ensure world-class S&T competitiveness. Expansion of R&D investment and devel- opment of S&T human resources was especially emphasized.
In the 2000s	 Debate about strength- ening U.S. economic competitiveness increased in response to the rise of emerging countries and rapid progress in information and communication technology. As a result, the Bush Ad- ministration (inaugurated in 2001) enacted the America COMPETES Act (2007) to improve basic research capabilities. 	 It was decided to make a large increase in science research investment through the "Science and Innovation Investment Framework 2004-2014" (2004). 	 Policies were implemented based on the "High-tech Strategy" (2006) to achieve future employment and quality of life improvements through innovation. Investment in S&T has increased since Chancel- lor Merkel took office (2005). 	 The Sarkozy Adminis- tration (2007) changed the direction of research from a focus on public research institutions to universities. 	 The "Medium- to Long- term National S&T Devel- opment Plan" (2006) was announced as a 15-year program. Independent innovation capabilities were en- hanced through increas- es in total R&D budget and reinforcement of prioritized areas. 	 The Framework Act on Science and Technology was enacted in 2001, and the 1st Basic Plan on S&T was established in 2002. Investment in S&T was expanded drastically, especially in the IT field.
In the 2010s	 The Obama Administration (inaugurated 2009) followed the America COMPETES Act and promoted policies based on the "United States Innovation Strategy" (2011) aimed at investment in innovation infrastructure. As the overall budget declined, the basic research budget was maintained at the status quo or increased. 	 The "Innovation and Research Strategy for Growth" (2011) focused on the promotion of the R&D industry. The "Growth Plan: Science and Innovation" (2014) set out a direction for the U.K. to be the most science- and business-friendly nation in the world. 	The "High-Tech Strategy 2020" (2010) was an- nounced and cross-sec- tional "Future-oriented Projects" were planned. "Industrie 4.0" was proposed (2011) as a future-oriented project to upgrade the manufactur- ing industry.	 The basic strategy "France Europe 2020" (2013) was established, focusing on social issues and technology transfer. Major organizational changes were made to the government's S&T planning system. 	 The "12th Five-year Plan for Economic and Social Development" (2011), which sets national guidelines, called for the creation of "strategic new industries" as future industry. 	 With the change of president in 2013, there was extensive government reorganization, creating the new Ministry of Science, ICT and Future Planning. In 2013, the 3rd Basic Plan on S&T was established, seeking advancement in five strategic areas ("High 5 Strategy").

(3) Comprehensive Strategy on Science, Technology and Innovation

With the goal having been set to become the "world's most innovation-friendly country" and with the medium- to longterm direction pointed out by the Basic Plan, a Comprehensive Strategy on Science, Technology and Innovation has been established annually since FY2013 to identify especially crucial measures for that year in light of changes in the situation each year. Based on this comprehensive strategy, the CSTI serves as the headquarters for such things as the realization of an annual PDCA cycle directly connected to the budget, implementation of initiatives aimed at solving important issues, the creation of the "Strategic Innovation Promotion Program" (SIP), which targets everything from basic research to commercialization through cross-ministerial promotion, and creation of the "Impulsing Paradigm Change through Disruptive Technologies Program" (ImPACT), aims to create high-risk/high-impact innovation.

Given that FY2016 is the first year of the 5th Basic Plan, the Comprehensive Strategy on Science, Technology and Innovation 2016 (approved by the Cabinet on May 24, 2016) sets out measures to work on from FY2016 to FY2017 based on the 5th Basic Plan. Among those, the following five are given as items to be studied more thoroughly and levered into concrete action. Forcefully promote the concept of Society 5.0, which was first introduced in the 5th Basic Plan, from the first fiscal year and achieve both strong industrial competitiveness for Japan and resolution of social issues.

- (ii) Strengthen human resources capability, including that of young people
- (iii) Promote university reform and finance reform in an integrated manner

Strengthen the education of young people and university reform, which require immediate attention, and respond with flexibility and precision in an age of great change when it is difficult to make forecasts about the future.

(iv) Establish a virtuous-cycle system of human resources, knowledge, and capital through promotion of open innovation

Through regular coordination among industry, academia, and government as well as strengthened creation of venture companies, establish a system that creates a succession of Japan-originated innovations that lead the world.

 $\left(v\right)$ Strengthen the STI promotion function

Strengthen the STI promotion function, including reinforcing the headquarters function, and effectively and flexibly implement the policies and measures set out in the Basic Plan and this Comprehensive Strategy.

(4) Achievements and Challenges in 20 Years of Science and Technology Basic Plans

It has been 20 years since the 1st Basic Plan was established based on the Science and Technology Basic Law. The following table organizes the achievements and challenges in 20 years of Basic Plans as described in the 5th Basic Plan (Figure 1-2-2).

Figure 1-2-2	Achievements and Challenges in 20 Years of Basic Plans			
Achie	evements	Challenges		
 Enhancement of interna (steady development of as by increasing the nu published papers) 	ational competitiveness f the R&D environment, such mbers of researchers and	 "Fundamental strength" has declined (as demonstrated by a drop in the quality and quantity of papers by international standards, delays in establishing international research networks, and the difficulty of young researchers to demonstrate their abilities). 		
 Practical application of Development of human cation to regenerative n 	LED lighting iPS cells for practical appli- nedicine	 Industry-government-academia partnerships have failed to develop fully. (Most industry-academia partnerships are small- scale and there is low mobility of human resources beyond organizations and sectors.) 		
Japan produced the se Nobel Prize winners in t	cond-highest number of the natural sciences.	 Growth in government R&D investment has stalled. Japan's international standing is on a declining trend. 		
Source) Prepared by the MLIT based on the Outline of the Fifth Science and Technology Basic Plan by the Cabine Office				

2 Competitive Environment Related to and Public Awareness of Innovation

According to the Japan Revitalization Strategy 2016, "The 'fourth industrial revolution,' which uses the technological breakthrough of IoT (Internet of things), big data, artificial intelligence and robot sensors, is the most important key to leading a future revolution in productivity." Below, we analyze Japan's strengths and weaknesses regarding innovation from this perspective.

(1) Global Innovation Ranking

Every year the Global Competitiveness Report published by the World Economic Forum (WEF) evaluates leading countries' competitiveness, which is a determinant of productivity, based on the Global Competitive Index^{Note 11}. Japan used to be in fourth or fifth place until last year, but it slipped down to eighth place in the 2016-2017 report (Figure 1-2-3).

The Japan Revitalization Strategy 2016 (Short- to Mid-term Progress Schedule) states that "Japan will be in the top three in the World Economic Forum's global competitiveness ranking by 2020" as a KPI.

Figure 1-2-3	Trei
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nd in Innovation Rankings Over Time

	WEF's annual Global Competitiveness Report						
Ranking	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17
1	U.S. (5.85)	Switzerland (5.77)	Switzerland (5.78)	Finland (5.79)	Finland (5.78)	Switzerland (5.76)	Switzerland (5.80)
2	Switzerland	Sweden	Finland	Switzerland	Switzerland	Finland	Israel
	(5.60)	(5.76)	(5.75)	(5.70)	(5.70)	(5.73)	(5.73)
3	Finland	Finland	Israel	Israel	Israel	Israel	Finland
	(5.56)	(5.72)	(5.57)	(5.58)	(5.56)	(5.65)	(5.68)
4	Japan	Japan	Sweden	Germany	Japan	U.S.	U.S.
	(5.52)	(5.59)	(5.56)	(5.50)	(5.54)	(5.58)	(5.64)
5	Sweden	U.S.	Japan	Japan	U.S.	Japan	Germany
	(5.45)	(5.57)	(5.54)	(5.49)	(5.49)	(5 ,54)	(5.58)
6	Israel	Israel	U.S.	Sweden	Germany	Germany	Sweden
	(5.30)	(5.53)	(5.50)	(5.43)	(5.47)	(5.51)	(5.49)
7	Taiwan	Germany	Germany	U.S.	Sweden	Sweden	Netherlands
	(5.29)	(5.39)	(5.42)	(5.37)	(5.37)	(5.46)	(5.44)
8	Germany	Singapore	Singapore	Taiwan	Netherlands	Netherlands	Japan
	(5.19)	(5.33)	(5.39)	(5.25)	(5.25)	(5.37)	(5.43)
9	Singapore	Taiwan	Netherlands	Singapore	Singapore	Singapore	Singapore
	(5.04)	(5.27)	(5.31)	(5.19)	(5.18)	(5.24)	(5.33)
10	Denmark	Denmark	U.K.	Netherlands	Taiwan	Denmark	Denmark
	(4.89)	(5.10)	(5.17)	(5.16)	(5.10)	(5.11)	(5.13)

(Note) Innovation rankings for each year in the WEF's "Global Competitiveness Report." Figures in parentheses denote the score. Source) Prepared by the MLIT based on the "Analysis of the Current Innovation Rankings in the World Economic Forum's (WEF) Global Competitiveness Report" by the Cabinet Office

(2) Features of Japanese Innovation (Strengths)

After World War II, Japan aimed to catch up with industry in the countries of Europe and America. Building on a foundation of technology from the countries that preceded it, Japan improved its production efficiency and developed manufacturing and applied technologies to create refined products, thereby achieving rapid growth. Given this history of development since the war, Japan has competitive power in the field of manufacturing. Moreover, the fact that Japan has world-class technical capabilities in the individual fields of the technologies in the fourth industrial revolution, such as IoT, big data, AI, and robot sensors, is a major strength.

(Field of robotics)

As of 2012, Japan's shipment of industrial robots was valued at approximately 340 billion yen, accounting for around 50% of the global share^{Note 12}. Furthermore, as of the end of 2014, Japan had about 300,000 industrial robots in operation (stock basis), accounting for approximately 20 percent of the global share and putting Japan in the top position (Figure 1-2-4).

Note 12 Subsection 1 "Japan as a robotics superpower," Section 1, Chapter 1, Part 1, "Japan's Robot Strategy" by the Japan Economic Revitalization Taskforce (February 2015)



(Communications network infrastructure)

Japan's Internet and broadband diffusion rates are high even by global standards (Figure 1-2-5) and its optical communications technology, including the size of its transmission capacity, its large multicore fiber manufacturing and element technology, and its practical application of 100 Gbps signal processing lines, are at a world-class level^{Note 13}.



Note 13 "The Ideal State of New Information and Communications Technology Strategy" interim report by the Information and Communications Council (July 28, 2015)

(Possession of big data (real data))

The diffusion rate of IC cards in Japan has broadened to 58.7%. Since transportation (JR) types of electronic money are most common and account for more than half of users, it is thought that there is a considerable amount of big data (real data) accumulated by individual IC cards (Figure 1-2-6).



(Supercomputers)

Supercomputers demonstrate their power in the analysis of big data. Japan's supercomputer 'K computer' has a computational performance that is among the best in the world, including first place in performance analyzing large and complex data^{Note 14}.

(3) Features of Japanese Innovation (Weaknesses)

Japan has high technical capabilities in the individual fields of the key technologies in the fourth industrial revolution. On the other hand, it lags behind the U.S. and other leading industrialized nations in using those technologies to quickly establish new business models and roll them out globally. Below, we examine the main factors for that in terms of the characteristics of human resources and companies.

(Human resources)

Given the context of progressing ICT, there are movements such as the creation of data-based industrial services and the rise of platforms in the U.S. and other leading industrialized nations^{Note 15}. The need for human resources proficient in such things as the processing technology needed for data analysis, data visualization, and data analysis methods (i.e., data scientists) is forecast to increase worldwide in the future. But there is a shortage of such human resources. In 2008, Japan

- Note 14 According to the Riken Advanced Institute for Computational Science and to Fujitsu Ltd., "The supercomputer 'K computer' took first place in the world in the HPCG benchmark, an international ranking of processing speed using the conjugate gradient method, which is used in actual industrial applications" (November 16, 2016). Also, according to an international collaborative research group consisting of Kyushu University, the Tokyo Institute of Technology, Riken, Spain's Barcelona Supercomputing Center, and Fujitsu Ltd., "The supercomputer 'K computer' took first place for the fourth time in a row (fifth time total) following June 2016, based on analysis results, in Graph 500, an international performance ranking for supercomputers related to big data processing (big graph analysis)" (November 18, 2016).
- Note 15 According to the "White Paper on Science and Technology 2016" by the Ministry of Education, Culture, Sports, Science and Technology, there is movement to venture into other business domains and roll out business through new combinations of business domains, with the aim of meeting customer needs that were not fully understood and met before. With that development, the barriers between existing industries could become lower and those industries could be reorganized into new markets and industrial groupings originating with customer needs. The reference here is to the entities causing this kind of reform in industrial structures.

graduated 3,400 people with experience of advanced training in statistics and machine learning and who have aptitude in data analysis (Figure 1-2-7, left). Also, whereas the number of human resources with aptitude in data analysis was rising in other countries during the five years from 2004 to 2008, it was on a declining trend in Japan (Figure 1-2-7, right).



In order to maximize the potential for the creation of innovation in Japan, there is a need to encourage the active participation of diverse human resources, including women and foreigners, and to advance the integration of knowledge and the social implementation of research results in a global environment with mobility of human resources across barriers such as field, organization, sector, and national borders.

Looking at the movement of researchers between sectors in Japan, we see that movement is low overall and is especially low from universities to the corporate sector and from universities to public research institutions (Figure 1-2-8). Also, looking at the cross-border movement of human resources, we see that that percentage is low compared to other countries and that there is a high percentage of people who remain within Japan (Figure 1-2-9).



ministrative corporations as well as the number of dispatched researchers (medium- to long-term). Source) "Interim Report (Reference Materials on Initiatives to Promote Innovation)" by the R&D and Innovation Working Group of the Subcommittee on Industrial Science and Technology Policy and Environment under the Industrial Structure Council (May 13, 2016)

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(Companies)

Figure 1-2-

R&D investment stuck in an "in-house" mindset

While corporate R&D is carried out actively in Japan, it is lagging behind in freeing itself from an "in-house" mindset. R&D investment is not always connected to commercialization and corporate earnings. There is a need to establish an innovation system leading from business conceptualization through R&D to market acquisition/development (Figure 1-2-10).

10	R&D Investment Stuck in an "In-house" Mindse
10	nad investment Stuck in an in-nouse minuse

<percentage a="" basis="" collaboration="" in="" of="" on="" outside="" project="" r&d=""> (Overall: N =</percentage>	178, unit: %)
Development wholly in-house	62.2
Collaboration with group companies	8.3
Collaboration with other companies in same field in Japan (horizontal collaboration)	3.4
Collaboration with other companies in same value chain in Japan (vertical collaboration)	5.3
Collaboration with other companies in Japan (cross-industry collaboration)	4.2
Universities in Japan	7.8
Collaboration with public research institutions in Japan (e.g., former national research and development agencies)	3.1
Collaboration with venture companies in Japan	0.8
Collaboration with universities outside Japan	0.9
Collaboration with public research institutions outside Japan	0.2
Collaboration with foreign companies (excluding venture companies)	1.5
Collaboration with venture companies outside Japan	0.4
Commission from other companies, etc.	1.9

<handling and="" ideas="" of="" technology="" th="" that="" we<=""><th>e not commercialized: Overall: N = 1)</th><th>> 74, unit: %</th></handling>	e not commercialized: Overall: N = 1)	> 74, unit: %
Implemented by a group company		11
Used by another company		5
Employees / Organizational spin-off		2
Continue considering behind the scenes		19
Allow to lapse		63

Source) Prepared by the MLIT based on "FY2015 Commissioned Industrial Economic Research Project (Study of Propensity for Corporate R&D Investment)" by METI

Short-termism

Due to the intensification of international competition, companies around the world are tending to divert much of their R&D expenditure into short-term research. In Japan as well, awareness of medium- to long-term R&D investment that takes more than three to five years until commercialization could be low as a trend in private sector R&D investment. There is a greater need for the national government to support medium- to long-term R&D (Figure 1-2-11).



(Creation of SMEs and venture companies)

It is important to further encourage companies to take on the challenge of assuming risk to create new value and to develop an environment that fosters strings of diverse endeavors. Venture capital investment is increasing markedly more for overseas projects than for projects in Japan (Figure 1-2-12). Moreover, the number of venture company startups in Japan is not growing (Figure 1-2-13). This is a difficult situation for the creation of innovation by SMEs and venture companies.





4 The fiscal year of establishment is from April of that year until March of the following year. Companies for which the month of establishment is unknown were aggregated as if established in April or later. 5 The performance up to FY2009 included nine companies with unknown years of establishment, but they were removed from the totals.

Source) Prepared by the MLIT based on "Status of Industry-Academia Collaboration in Universities in FY2015" by MEXT

(Awareness of innovation)

In order to promote innovation going forward and realize social implementation, there is a need to deepen activities related to innovation in society and for diverse parties concerned to collaborate closely. We will therefore take an overview of awareness of innovation at such places as universities, public research institutes, and private companies.

First, we will look at the awareness of the national government's innovation policy. On a survey of researchers and experts in industry, academia, and government, the predominate result was "strongly insufficient" in response to the questions: "Are explanations provided about STI and the content of STI policy, as well as their effects and limitations, sufficient?" and "Are the national government's efforts to obtain broad public participation when planning and promoting STI policy sufficient?" (Figure 1-2-14).



* "Universities" and "public research institutions" refer to the heads, faculty members, and researchers of universities / colleges and public research institutions. "Innovation overview" refers to industry and other experts and people acting as a bridge between R&D and innovation. Source) Prepared by MEXT based on "Analytical Report for 2013 NISTEP Expert Survey on Japanese S&T and Innovation System" NISTEP REPORT NO. 157 (April 2014) by the National Institute of Science and Technology Policy (NISTEP)

Next, we look at the situation surrounding dialogue between researchers and the public. According to a survey of the actual condition and awareness of science communication activities by researchers^{Note 16}, many researchers cite such reasons as "There is no time," "There is too much paperwork involved," and "It is not evaluated as an accomplishment" as obstacles to scientific communication activities (Figure 1-2-15).

Note 16 Refers to activities with the aim of researchers (professionals) and non-researchers engaging in two-way communication of information and opinions about science and technology and social issues so as to share them as larger problems in society. Accordingly, the form of activities includes a broad range of activities from outreach to participation in policy-making, across all academic fields, including physical sciences, agriculture, engineering, medicine, dentistry, and pharmacology as well as the humanities and social sciences.



Finally, we will look at corporate awareness. As we have seen thus far, the use of IoT, big data, and AI has gained attention globally. The application of IoT, big data, and AI at Japanese companies is low in all industries, at around 20-30 percent, combining the replies "Using" and "Considering use" (Figure 1-2-16).



Furthermore, recognition of the importance of investing in information systems in Japanese companies is low compared to that in the United States, with 75.3% of American companies overall replying that it is "extremely important," whereas only 15.7% of Japanese companies made the same reply (Figure 1-2-17).



Source) Prepared by the MLIT based on "Analysis of the Difference between Japanese and American Companies regarding Management using IT" (October 2013) by the Japan Electronics and Information Technology Industries Association (JEITA) and IDC Japan.

Section 3 History of Innovation

History of Diverse Innovation in the World

(1) History of the Industrial Revolution

Looking back at the history of the Industrial Revolution, we find that the first Industrial Revolution acquired coal energy as a power source for light industry. The second Industrial Revolution was then marked by innovation as the power source shifted from coal energy to petroleum energy, bringing development of heavy industry. In the third Industrial Revolution, computers became the focus and the information and telecommunications technology industry expanded. Notions of the coming fourth Industrial Revolution describe it as follows: In the future, IoT will enable us to connect everything via the Internet, through which the so-called "Big Data" is collected and accumulated. Big Data is analyzed by artificial intelligence and more and more products and services that have previously been unimaginable will appear in the world using the analysis results, robots, information terminals, etc.^{Note 17} (Figure 1-3-1).



(2) History of the Development of Transportation and Innovation

Transportation is the movement of people and goods through a spatial dimension. Through exchanges of people and through trade in goods, people have enriched the knowledge, technology, and other components that make up culture and so have contributed to the prosperity of humankind. In this sense, people take transportation as more than just a means of

movement. It can be described rather as a fount of vital energy that enables people to keep on living cultured and creative lives. When moving people and goods, today it is possible to choose from among various means apart from walking. These means of transportation may be taken for granted in the present, but the people of past times developed technology in the effort to increase efficiency and convenience, and they borrowed the technology developed in other sectors in order to create new means of transportation. They then improved the infrastructure to support those new means and developed related industries. These activities have had a tremendous influence on people's lives, as well as on societies and economies.

(Development and expansion of transportation in ancient times)

The wheel is said to have been produced by the Sumerians around 3,000 BCE, and carts drawn by horses, donkeys, oxen, and so on, were in use by around 2,500 BCE. During the era of the Roman Empire, "iron tires" appeared, made of wooden wheels with iron rings shrunk to fit around the rims. Stone-paved roads were also developed, giving rise to the saying that all roads lead to Rome. These were developed as roads upon which carriages could travel back and forth out of political, military, and administrative necessity, and these roads contributed to the formation of Europe's road network. In Japan, a system of five highways was built on main routes made up of highways characteristic of the Edo period (17th-19th century). The roads were rough and narrow, however, so the appearance of carriages was greatly delayed. The use of carriages did not become widespread until such vehicles were brought into Japan by foreigners in the mid-19th century.

There is also transportation by water, which began with people using objects they found around them for flotation, relying on those objects to hold them up. They then made rafts out of trees and so on, and turned rafts into boats and ships for their use. A ceramic flower vase excavated from a tomb in Egypt is said to date from around 4,000 BCE, and it is decorated with the image of a sailing boat. The Phoenicians, who were traders in the Mediterranean, built large sailing ships to use as trading ships, and would load their cargo on the Nile River in Egypt. Sailing ships basically navigate using their sails, showing a change from human power to wind power as their motive energy. The Phoenicians sailed from bases of their own along the eastern edge of the Mediterranean, in what is now Syria, Lebanon, and Israel, and ventured out toward northern Europe and the west coast of Africa. Sailing ships evolved, so that during the Age of Exploration, from the 15th century to the mid-17th century, the European nations used the ocean-going technology of large sailing ships and compasses to venture out across the globe. As to water transport in Japan, it had flourished since ancient times, given the natural conditions of this island country. The earliest written histories of Japan, the Record of Ancient Matters (Kojiki) and the Chronicles of Japan (Nihon Shoki) from the early 8th century, contain numerous accounts of boats and ships. Diplomatic relations with the Sui Dynasty of China (6th-7th centuries) were begun, for instance, as people traveled back and forth and trade was conducted with foreign countries, and the Edo Period brought the development of light cargo vessels that plied scheduled coastal routes. The emergence of scheduled routes navigated by shipping agents' vessels made it unnecessary for the merchants who were cargo owners to own and operate their own ships. This led to a separation between cargo owners and the shipping industry, which made it possible to have goods transported by payment of the fare.

The division of cargo owner and ship owner roles led to emergence of the idea of insurance. In the 14th century, merchants in Italy conceived an arrangement by which, when a voyage was a failure, financial traders would pay the cost of the cargo, and when a voyage was successful, the financial traders would be paid a fee. This is said to have developed into marine insurance. In order to apportion the risks of transport by sea, the Dutch created the East India Company in the early 17th century, and this is said to mark the creation of the world's first corporation. The Kameyama Company, founded by the prominent 19th-century figure Sakamoto Ryoma and others, has been called the origin of Japan's trading houses. Marine transportation and trade gave rise to enterprises operating by various different business methods.

(Motive energy and the appearance of transportation modes)

Land transportation

The first Industrial Revolution was accompanied by increases in the long distance movement of people and goods, and there was development of canals and toll roads. Production in factories was expanding, and there was growing demand for high volume, high speed, and regularly scheduled transportation. Canal transport operators tended to respond to the expanding demand by imposing higher fares, and users, including people in commerce and industry, were showing a growing dissatisfaction with conventional means of transportation. Attention turned to railroads as a new means of transport

portation, and in England, the Stockton and Darlington Railway (opened in 1825) linked a coal mining region, while the Liverpool and Manchester Railway (opened in 1830), linked the port city with the center of the cotton industry and machine industry. After that, railroad construction advanced in every region during the 1830s, in what is referred to as the first railroad boom, and railroads operated on trunk routes linking together major cities. During the 1840s, the construction of branch lines off the trunk routes brought the second railroad boom. The development of railroads advanced in every region. Fares on railroads were high at first, and use was limited to the upper classes. In 1844, however, the railroad laws made it mandatory for railroad companies to operate third class covered rail cars at low fares, and railroad use by the masses accelerated.

High speed and comfortable movement by railroad enlarged peoples' spheres of activity and simplified the movement of a variety of different commodities. The increasing speed of movement was accompanied by popularization of tourism and leisure activities, and as it became possible to transport massive numbers of spectators, horse racing, sports, and other such spectator events grew popular. With the appearance of railroads that charged low fares, the practice of laborers commuting to their workplaces grew widespread. There was also increasingly active movement of commodities, so that fresh food products produced in rural regions became available on city residents' dining tables. Fish and chips, sometimes called the food loved by all the English, became available for eating everywhere in England.

The first railroad in Japan was opened for service by the government between Shinbashi (in Tokyo) and Yokohama in 1872. Government funds gradually grew tighter because of the Satsuma Rebellion in 1877 and other events, and thereafter the construction of private railroads using private sector capital was promoted. The mid-1880s saw the start of a private railroad boom. With the arrival of the Showa Era (1926-1989), advancing urbanization was accompanied by the development of suburban electric rail networks, and Japan's first subway opened in Tokyo between Asakusa and Ueno in 1927. Under conditions of fiscal constraint, priority was given to the development of railroads, and the Tokaido Main Line, linking Shinbashi in Tokyo with Kobe, was opened in 1889.

As to motor vehicles, a device using steam as its source of motive energy was created in 1769, and after that, vehicles using gasoline, electricity, and diesel fuel were invented in that order. Lenoir succeeded in practical application of the internal combustion engine (with thermal efficiency approximately three times that of steam engines) in France in 1860, and in 1862, an automobile using this engine was successfully test driven. The German Otto succeeded in developing a two-cycle engine in 1863 and a four-cycle engine in 1876. In 1886, Daimler (four-wheel vehicles) and Benz (three-wheel vehicle) in Germany completed a gasoline engine that is generally the same as present-day gasoline engines. As though that had opened the way, vehicles with gasoline engines that might be usable in today's cars entered production in France, England, the United States, and other countries. In the late 19th century, a variety of gasoline motor vehicles, electric motor vehicles, and steam motor vehicles were developed, but it was the 1901 discovery of Texas oil fields and other such factors that accelerated the spread of the gasoline engine.

Motor vehicles were initially objects for the nobility and privileged classes. In the United States, production was being carried out by approximately 500 motor vehicle manufacturers on a made-to-order production system. The United States is a vast land, however, and there was demand for motor vehicles as a means of transportation to replace horse-drawn carriages. The mass-produced Model T Ford automobile, a product of the pursuit of practicality, appeared in 1908. The vision of Henry Ford, founder of the Ford Motor Company, was to build a low-priced vehicle for the masses, and eventually to build vehicles not just for residents of urban areas but also for farmers. His objective therefore was to build sturdy, inexpensive, easy-to-handle vehicles, and the result was to introduce the conceptual approaches of parts processing and non-expert workers, cost reduction by mass production, simplification of driving, and so on. With a hint said to have come in 1913 from the conveyor belts in a meat processing plant, the world's first conveyor belt line manufacturing method was completed. In conventional motor vehicle production, the chassis (undercarriage) is fixed in place and numerous people gather around it to do the work. In the manufacturing method with a conveyor belt line, however, a moving assembly line is installed. The chassis is moved down the line to the people, who remain in their places. With the introduction of this method, the production time per vehicle went from 12.5 hours by fixed assembly to approximately 1.5 hours, shortening the time to one-eighth.

Due to mass production and sales of the inexpensive Model T Ford (Figure 1-3-2), motor vehicles penetrated the mass popular market. This made it possible for farmers to enjoy the same modern lifestyle as people living in the cities.

Motor vehicles were brought into Japan from overseas in 1898. The Yamaba steam-powered motor vehicle was com-

pleted in 1904, the first such vehicle to be made in Japan. In Europe, where carriages had been widely used, there were straight, stone-paved roads such as the Appian Way, and vehicles could run on those roads that existed from the past. In Japan, road surfacing consisted of no more than some stone paving on steep roads for people and horses, and some gravel-surfaced roads for the use of carriages. At the same time that the Road Act was instituted in 1919, plans for trunk roads centered on major cities such as Tokyo and Osaka were formulated, and full-scale construction of roads with asphalt surfacing was begun.



Marine transportation

As to marine transportation, the creation of a steamboat by Fulton in the United States in 1807 was followed by increases in transportation efficiency that led to sailing ships being replaced by steamships during the last half of the 19th century. During the same period that saw widespread adoption of steamships, there was also a transition to ironclad ships and then to steel ships. Changes in motive power, such as the introduction of turbines and diesel engines, were accompanied by increases in ship speeds around the beginning of the 20th century.

In Japan, steamships surpassed Japanese-style ships in the mid-1880s. Networks of coastal shipping routes were formed around the routes serviced regularly by steamships. At the start of the 1910s, a network of railroad trunk routes had been formed that included the Japan Sea coast. The process of shifting transport functions from marine transport to railroads converged in the formation of a comprehensive domestic transportation network that combined the coastal shipping network with the railroad network.

Air transportation

In 1903, the Wright brothers became the first in the world to successfully engage in manned powered flight by means of an airplane. Scheduled airlines were established after the First World War. A man in Japan is also said to have discovered the principle of flight by observing how crows glide. There is a model of his "Jewel Beetle Flying Machine" on exhibit at the Royal Aeronautical Society in England, with an explanation that Ninomiya Chuhachi had discovered the principles of the airplane even before the Wright brothers. A military airfield was established at Tokorozawa in Saitama Prefecture in 1911, and the first airport in the country was built there. Tokyo Airfield (later Haneda Airport) opened in 1931 as an airport operated by the government exclusively for civil aviation, and Osaka Itami Airfield was completed in 1939.

(Evolution of traffic and transportation)

Land transportation

The development of expressways and roads exclusively for motor vehicles progressed in the United States, where motorization was advanced, and in other locations worldwide. During the Second World War, the concept of a national people's car was proclaimed by Hitler in Germany, where the Autobahn was also built as a national government policy. The Volkswagen made its appearance in 1938. In the United States, a motor vehicle civilization developed at a rapid rate, partly because the American mainland had not become a battlefield. General Motors, Ford, and Chrysler took the lead in this movement. Toll expressways were built around the 1940s as a way of resolving congestion.
In Japan, a period of high economic growth began. In 1964, the Shinkansen made its appearance as a means of resolving the shortage of transportation capacity between Tokyo and Osaka. The bullet train running on this line made it possible for people to take a business trip between these cities and return the same day. The number of bullet train users grew, so that when the Osaka Expo was held in 1970, for example, it attracted 64 million visitors, of which 10 million used the Shinkansen. Movement from the Kanto Region to the Kansai Region and other such domestic travel became an increasingly familiar pos-



sibility for people (Figure 1-3-3). Europe and America had come to view railroads as antiquated technology, but due to the success of the Shinkansen, they were moved to reevaluate rail as a system of high speed intercity transportation. The development of high speed railroads therefore advanced in countries around the world.

On the roads, networks of expressways were also developed, and electronic toll collection (ETC) was adopted. The ETC system that entered general use in March 2001 involves insertion of an ETC card in a vehicle's on-board ETC unit, which communicates by radio with roadside antennas installed at toll plazas on the toll road so that the vehicle can pay the toll and pass through without stopping. The ETC system has realized smooth toll payment in this way, and in 2015, the ETC 2.0^{Note 18} system began providing new driving support services in addition to toll payment, such as congestion avoidance support and safe driving support. At present, measures are being promoted to collect data on vehicle speed, routes, travel time, and so on using ETC 2.0, and to utilize this diverse and detailed body of big data for smart tolls that reduce congestion and accidents and provide highly productive smart logistics management and other such intelligent road use.

Marine transportation

In the area of transportation by sea, the rapid economic growth Japan experienced after the Second World War brought issues of increased freight volumes together with shortages of longshoremen. Delays in cargo handling due to manpower shortages also had repercussions on the efficiency of land transportation modes. Malcolm McLean, an American who ran a land transportation company, had originally been a truck driver, so he had the idea that using common transport units across different modes of transportation would be a key to rationalizing logistics. He bought a used freighter and experimented with loading entire truck trailers on board. In order to improve loading efficiency, however, McLean separated the driver's cab and vehicle portions from the trailer, and separated the trailer into the chassis and container portions, and developed a cell guide system that would hold the container portion in place on board the ship (Figure 1-3-4).



Note 18 ETC 2.0 provides driving support services (congestion avoidance, safe driving support) by means of the world's first road-vehicle collaboration system capable of high speed, high volume, bidirectional communication between vehicle on-board units and communication spots consisting of roadside antennas. When vehicles equipped with ETC 2.0 travel through toll plazas using ETC radio communication, they receive toll discounts on toll road sections near major urban areas. Where high volume, high frequency discounts occur, the road is treated as a road subject to discount (ordinary toll road). After success was achieved in integrated sea-land transportation in 1957, international standardization was achieved in 1961, and port and harbor development was carried forward in every country during the 1960s (Figure 1-3-5). In 1967, Japan's first container ship entered service. The strength of the containers themselves was increased after that so that they could be stacked in multiple layers, and this also contributed to progressive containerization around the world during the 1970s. The volume of trade by container increased. At present, approximately 90% or more of foreign trade by scheduled ship transportation is said to be containerized. Containers have been growing larger in recent years, with the introduction of 45 foot containers and so on. This kind of innovation related to containers can be considered to have contributed greatly to the high volume transportation society that is following the Third Industrial Revolution (Figure 1-3-6).





Air transportation

Aircraft made a nearly complete shift to jet engines at the end of the 1950s. In the case of passenger aircraft, this shift began in the 1950s and extended throughout air transportation as a whole during the 1960s. In Japan, the first scheduled domestic air service since the end of the Second World War started in 1951. The number of passengers increased significantly in conjunction with the liberalization of overseas travel in 1964, during the period of high economic growth, and the jumbo jet made its appearance during the 1970s. Access to the airport was also improved in various ways in 1964, the year of the Tokyo Olympics. Tokyo Metropolitan Expressway Route 1 to Haneda was opened as far as the Airport West Exit, for example, and the Tokyo Monorail opened from Hamamatsu-cho to Haneda (now Tenkubashi). Low-cost carriers (LCC) made their appearance in 2012, and more recently, efforts are being made for smart use of air transportation. The number of arrival and departure slots at airports has been expanded, for example, and research is being pursued in new materials that can support lighter air frames, greater durability, and so on. Contributions from Japan's technical capabili-

ties are anticipated in such areas.

The development of aviation networks has brought popularization of travel by airplane. This is increasing exchanges between Japan and other countries, through business travel, tourism, and other such contact, and this is having a major influence on Japanese people's lives.

Column _E

Ensuring Innovation and Safety

The automobile was invented, and as power performance increased with productivity and efficiency due to improving automobile manufacturing, various auto-related infrastructures were put into place. Many people acquired cars and began using them freely, and this can be called one of the modern innovations in land-based transportation. In Japan, the use of automobiles has increased from year to year, and as of 2016, Japanese people owned a combined total of over eighty million cars.

On the other hand, the number of deaths in traffic accidents has increased along with the increase in the number of vehicles. There was even an era known as the "traffic war," in which, for example, over ten thousand people died in traffic accidents in 1959. In recent years, however, continued efforts by concerned parties, including improvements in automobile safety performance, safety features in the infrastructure, and non-structural measures, such as beefing up driver safety education, have yielded results. By 2016, traffic deaths had fallen below four thousand per year.

Another example is the way in which various products and services have come to be distributed over the Internet. People accept the convenience, but currently, absolute levels of security cannot be guaranteed on the Internet, and as threats increase day to day, security measures are rapidly improving and evolving.

Looking back at history, we can see that there have been many cases in which it is difficult to guarantee absolute safety while in the process of implementing innovations in society. Society is currently weighing the convenience and dangers of these kinds of innovations, and making choices about whether to accept them.

It is anticipated that all sorts of innovations will be created throughout the world in the future, but it should be said that the people involved with them will need to make continual efforts to accept advantages to the greatest possible extent and minimize disadvantages so that society can develop greater affluence.

(3) Recent Diversity of Innovation in the World

Smartphones

Smartphones have expanded the functionality of mobile phones from the conventional telephone, e-mail, and so on, and also enable the collection of various kinds of information by browsing websites intended for use on personal computers. Users are now able to freely select and download for themselves a wide variety of applications (apps) from sites (markets) on the Internet. This makes it possible for users to customize their own data terminals so that they can use the terminals more conveniently and in ways suiting their own needs. In 2007, Apple put its iPhone on sale as the world's first touch panel mobile phone, greatly advancing the spread of smartphones. These phones came on the market In Japan in 2008, and the App Store also put in place a market for the sale of apps. By the end of 2015, the smartphone penetration rate had reached approximately 72%, and that rate has been rising every year (Figure 1-3-7).

In 2016, Apple had captured an approximately 80% share of global smartphone profits^{Note 19} and the company built networks of services using its iPod, iPhone, iPad, and other such products. In the case of the iPhone, in particular, Apple created a new platform by introducing its updating system and publicly disclosing its app development arrangements. Apple develops its equipment and operating system in-house, keeping them closed^{Note 20}. However, it has made its app development specifications open, taking an open innovation strategy that allows third parties to take part in content development.

Note 19 From Strategy Analytics.

Note 20 Apple is slated to start operation at its first development center outside the United States when it opens the Tsunashima Technical Development Center (TDC), situated on the site of a former Panasonic plant located between Tsunashima Station and Hiyoshi Station.

Apple has made a software development kit publicly available for app developers, it has distributed programs and documentation required to develop apps, and it has set up a clearly defined distribution of revenue for app developers who have passed review. This has broadened the base of support for app developers so that apps are now also being developed by individual programmers, university students, and so on. Apple also takes steps in-house to create an organization that can more readily produce innovative products and services. When the company is commercializing a new product, for example, it puts together teams that are separate from the existing organization so that commercialization can proceeded while incorporating ideas from designers, engineers, and others involved.

As described above, it is possible to add various different functions to smartphones by using apps. The Ministry of Internal Affairs and Communications report on "Contracting Survey Research Relating to the Impact of ICT Evolution on Society" (March 2014) describes the impact on the frequency of utilization of other services using other terminals after the purchase of smartphones in Japan. For instance, paper maps were 41.6% replaced, digital cameras were 37.5% replaced, personal computers were 34.8% replaced, and so on^{Note 21} (Figure 1-3-8). Also, practically all university





students think that personal computer skills are necessary, but some 70% of students have no confidence in their personal computer skills, while a private sector study shows that some newly hired employees are convinced that the cursor on a screen is not moved with a mouse but by touching the screen^{Note 22}. The widespread adoption of smartphones thus has an impact on the use of existing services and is bringing about major changes in the lives of people in Japan.

Note 21 This is the total of "Practically all replaced by smartphones" and "Largely replaced" and "Slightly replaced" responses.
 Note 22 From NEC Personal Computers, Ltd., "Questionnaire Survey of University Students (1st to 3rd Year Students), People with Job-Seeking Experience (4th Year University Students), and Personnel Hiring Managers Regarding Personal Computers."

An additional point is that the widespread adoption of smartphones has contributed to the creation and growth of smartphone-related industries. The market for the app industry was approximately 8.4 billion dollars in 2012, and this is expected to grow to approximately 35.3 billion dollars in 2016 (Figure 1-3-9). Super Mario Run and Pokémon Go are smartphone games that emerged from beginnings in Japanese games, and in 2016, these had risen to place among the top 10 downloads at app stores worldwide. They had become globally popular services. Games such as these are displaying an expanded range of use in attracting tourism and other such community development measures, sales

promotions for the retail and restaurant business, and so on.

There are also other examples of services largely using smartphones that have expanded in recent years. In car sharing, there are studies showing that services that had fewer than 2,000 members in 2006 had grown to approximately 840,000 members in 2016^{Note 23}, and that when using these services, approximately 80% of people searched for and reserved cars using smartphones^{Note 24}. This suggests that the widespread adoption of smartphones has contributed significantly to expansion of car-sharing services (Figure 1-3-10).

As this shows, the widespread adoption of smartphones is bringing about great changes in the lives of the Japanese people, as well as having a major impact on other industries, such as the creation of new industries. Japan's society and economy are experiencing major changes.





Note 23 From the website of the Foundation for Promoting Personal Mobility and Ecological Transportation.

Note 24 According to a questionnaire survey of members conducted by the Careco Car-sharing Club in 2015, smartphone apps account for the largest share at 48.7%, followed by smartphone sites at 29.7%, showing that approximately 80% of the total use car sharing by means of smartphones.

Electronic commerce

Due to the expanding use of the Internet, the electronic commerce market reached approximately 1.7 trillion dollars in 2015, and is projected to expand to approximately double that size, or 3.5 trillion dollars, by 2019 (Figure 1-3-11). The market has made it possible not only to purchase goods, but also to purchase and download books, music, movies, and other such content to one's own terminal. The Internet is exerting a major influence on people's buying behavior.

Amazon has provided various services, such as a personalization function that infers customer inclinations from past purchase history and other such information, customer reviews that allow people to free-



ly post and view opinions and impressions of goods on the Amazon site, a recommendation function that displays recommended goods, and so on. Amazon uses technology it develops in-house for these kinds of website functions and its supply chain. Technology in the form of a new algorithm was developed for the recommendation function, for example, and according to a 2011 analysis by McKinsey & Company, 35% of Amazon's sales can be attributed to recommended goods. The development of this algorithm has contributed greatly to sales.

The core business of Amazon was book sales, and the decision to follow the strategy of computerizing that business was made in the context of Apple's rising share of the digital music market. The Kindle^{Note 25} could have been termed a product that would destroy the company's existing book business, but in addition to offering large numbers of books, the company built a network that users could access at no charge and made it easy to download books.

There is also the point that Amazon has unlimited sales space by comparison with brick-and-mortar stores. This means it can make more types of merchandise available and follow a strategy of not running out of inventory (long-tail strategy). When users view merchandise on the site, Amazon also checks whether it is in stock or not using an indicator called the in-stock ratio. It uses these systems to prevent customer opportunity loss.

In the supply chain area, Amazon bought Kiva Systems LLC (now Amazon Robotics LLC), the robot manufacturer that realizes the automation of logistics, and introduced self-propelled robots to its distribution centers. In Japan as well, Amazon has started operation of a robot inventory management system (Amazon Robotics) that it introduced in its new logistics base, the Amazon Kawasaki Fulfillment Center (FC) in Kawasaki City, Kanagawa Prefecture. Introduced first in the United States and Europe, this system has robots that can move around in the warehouse and carry merchandise, and the idea is that it can help to augment worker shortages in warehouses and distribution centers.

Note 25 The electronic book reader sold by Amazon. Sales started in 2007.

When the rate of online shopping utilization by households in Japan is viewed by age of the head of household, it is apparent that utilization has increased in all age groups over the past decade or so (Figure 1-3-12). The average individual utilization rate for all age groups exceeds 70%, and seen by age group, the rate of utilization by ages 60 and over somewhat exceeds the figures for people in their 30s and people in their 20s or younger (Figure 1-3-13).

The number of online shopping users is growing year by year, and the purchasing methods used by the Japanese people are undergoing change. It is possible that

the advantage of not having to go to a brick-and-mortar store could provide a solution to the issue of elderly people and other "shopping refugees" who are searching for places to buy the goods they need. Further increasing use can therefore be expected. Meanwhile, the increase in users has recently been bringing dramatic rises in the number of items handled by home delivery services, but the logistics industry is facing an increasingly serious shortage of truck drivers. The burden on home delivery service operators has been growing. In the context of innovations being made in the process by which consumers obtain access to goods and services, make purchasing decisions, and settle their accounts, the situation as it is now demands the understanding and cooperation of merchants and service users with regard





to the logistics capability that should be in place to actually deliver goods to the consumer.

Search and retrieval engines

As the Internet has become a familiar presence, time spent online by the Japanese people in their daily lives has been increasing (Figure 1-3-14). It used to be almost entirely through the mass media that the Japanese people had opportunities to come in contact with information. Now, however, there are growing opportunities to obtain direct access to information of various kinds through the Internet. When doing so, people most often use search and retrieval engines to look for information. The global share of search and retrieval engines is largely taken exclusively by Google (Figure 1-3-15).





Search engine companies obtain a large part of their revenue from the advertisements that are displayed after a search. At Google, approximately 90% of all company revenue^{Note 26} is from search-linked advertising based on advertising programs called AdWords and AdSense. In 1995, two Stanford University students created a search engine (then known as BackRub) that ranked web pages by importance using their links. This was the beginning of the present-day Google.

Google's search algorithms are updated 500 or more times in the course of a year. Algorithms are combined to determine a unique search order, and in order to assure that "Democracy on the web works"^{Note 27} in those results, research and development are pursued in order to continue making changes. The developed functions include universal search, which simultaneously displays multiple instances of digital content in a mix of different types; knowledge graphs, which provide a concise display of related information matched to the phenomenon searched for; Google Instant, which displays search results even while the person searching is entering search terms; and Google Suggest, which predicts search terms themselves.

Google enforces a "20% rule" in order to generate innovation. The rule is that all employees are given 20% of their working hours to engage in projects they want to pursue apart from their regular duties. As long as it does not interfere with their regular duties, employees have complete freedom in deciding when to exercise the 20% rule.

Immediately after the Great East Japan Earthquake struck, Google employees in countries around the world invoked this "20% rule" to develop disaster assistance tools using digital technology and to engage in other such crisis response activities. The manager of the Crisis Response team^{Note 28} contacted the Tokyo office and asked it to launch the Person Finder^{Note 29}, the company's service to find people and confirm their status after a disaster. This led volunteers to start gathering independently, and the company's crisis response got underway. One hour and 46 minutes after the disaster hit, they had put up a special Crisis Response site that provided as one of its public services a Japanese language version of the Person Finder. Seven and a half hours later, the Person Finder that had only been usable by personal computer was now configured for use on mobile phones as well.

Another service said to have been produced in a similar way by the 20% rule is Google Maps. Up until 2005, Google Maps had been fee-based, but then the external interface providing the service was made openly accessible at no fee. It became possible for other companies to provide a combination of their information with map information, and numerous location-based services were established. By combining existing technologies, it became possible to move maps in a browser and change their size without having to reload the maps multiple times. Systems became further able to display search results on maps, so that when combined with GPS, they allowed users to find the distance from their current posi-

Note 26 From Alphabet Annual Report for FY2015.

Note 27 One of the "Ten things we know to be true" that state Google's stance. This arrangement is said to treat the quality and number of links to a page, and other such factors, as "votes" that are analyzed using a proprietary algorithm to determine the page's importance, so that items that rank higher appear at the top of the search results.

Note 28 This is a team that is permanently in place to respond to natural disasters in every country in the world. It is made up of employees whose duty is disaster response.

Note 29 This is a service introduced by Crisis Response after the Haiti earthquake in January 2010. Enter a name to search for, and the service checks for information about whether or not that person is safe.

tion to the search result as well as the route and travel time to that location, and other such information.

Google services are not just for searching websites. Operating in coordination with smartphones and the widespread adoption of GPS, they are also having a major impact on emergency information and confirmation of people's whereabouts during disasters, on enhancement of people's mobility, on people's actions during sightseeing, and so on.

Column The First Industrial Revolution and the Luddite Movement

During the first Industrial Revolution, technological innovation brought about mass production, cost reductions, stable quality, and had other fortunate effects on society as a whole. Then again, some workers experienced the disadvantageous, dark underside of the Industrial Revolution, and one of the events arising out of the underside was the Luddite movement.^{Note}

Before the first Industrial Revolution, hand-operated looms were introduced in England's textile producing regions, and large numbers of workers earned their living as weavers. The first Industrial Revolution brought about the increasing mechanization of looms, and spinning machines powered by water or steam began to appear. These developments caused a great many workers to lose their livelihoods. Technological innovations led to mechanization, which led to unemployment among highly paid, skilled workers, and the working environment deteriorated for unskilled workers, who now faced abusive conditions, work shifts that lasted far into the night, and other unfortunate changes. Workers who saw technology as the cause of their problems began destroying machinery and factory buildings. Yet the Luddite movement went beyond mere destruction. It can be called a form of collective negotiation between workers seeking improvements in the working environment, and their managers.

The British government enacted laws that decreed punishment, including death, for such actions, but since the Luddite movement enjoyed popular support, these laws were unable to stop the destruction, and it continued for a long time, resulting in the damage to factories and machines from 1811 to 1817, as well as large numbers of casualties and arrests.

Nowadays, the evolution of information and communication technology (ICT) has brought us to a time when people can receive many kinds of services without human intervention. With ICT automating many types of work that were once done by humans, there is some anxiety that these developments are gradually taking away opportunities for individual employment. For this reason, some advocate impeding development or refraining from using automated services in what we might call a "Neo-Luddite" movement, harking back to the Luddites of the past.

Note The movement is said to have been named after Ned Ludd, a youth who destroyed mechanical looms.

2 Innovation Evolved by Japan

This part introduces some cases of the major changes taking place in the lives of the people, the society, and the economy of Japan due to various innovations.

Convenience stores

During the 1970s, supermarkets surpassed department stores in sales and ended up accounting for the largest share of the retail industry. In 1973, the Small and Medium-sized Retail Business Promotion Act was enacted to improve the management capabilities of small and medium-sized business operators and to optimize the operations of specified chain businesses, including franchises. The Large-Scale Retail Stores Law was also enacted at that time to regulate the locations and hours of operation of large-scale chain stores. In that industry environment, convenience stores introduced the franchise system and pursued their own mode of business, operating for long hours and staying open all year round. By doing so, these stores responded to changes in the structure of Japanese society, such as the increasing number of single-person households and the aging of the population (Figure 1-3-16). By pursuing active measures such as the introduction of various services, these stores have been increasing in number (Figure 1-3-17).



(Note) Numbers of convenience stores are figures for the fiscal year while numbers of single-person nousenolds are figures for the calendar year.
Source) Prepared by the MLIT from the Japan Franchise Association's "Convenience Store Statistics," and the Ministry of Internal Affairs and Communications' "2015 National Census"

Figure 1-3-17	Enhancement of Convenience Store Services
Mid-1970s and on	Start 24-hour operation
Early 1980s	Start home delivery intermediary service
Late 1980s and after	Start business of handling collection of electric and other utility charge payments
Early 1990s	Start banking operations (ATM installation)
Late 1990s to early 2000s	Start ticket sales using multimedia terminals, etc.
Mid-2000s and on	Introduce electronic money
Early 2010s and on	Start mobile sales (shopping assistance) Sales of coffee, baked sweets, other distinctive goods

(Note) Times for launch of some services are given as typical times.

Source) Prepared by the MLIT from information on convenience store companies' websites

Convenience stores are said to have originated in retail stores selling ice in the state of Texas in the United States in 1927. At that time, electric refrigerators had not penetrated to every household, so the ice for ice boxes was an everyday necessity. The Southland Ice Company (now 7-Eleven, Inc.)^{Note 30} was established in that year. John Jefferson Green, who was in charge of a retail shop selling ice of that company, was asked by customers to handle food and other items in addition to ice, and the response ended up inaugurating the convenience store business. In 1946, the store chain changed its name to 7-Eleven to reflect their hours of business from 7:00 am to 11:00 pm every day^{Note 31}.

In Japan, the large supermarket Ito-Yokado was accelerating the rate of store openings in the Tokyo metropolitan area around 1971. With a corporate philosophy of taking steps for mutual coexistence and mutual benefit with local shopping areas, the company decided on a business tie-up with the convenience store business that had already begun in the United States. The Ito-Yokado thinking was that a way to achieve growth with small to medium-sized retail stores would be sure to open up, regardless of the size of the business, if the personnel were hired, productivity was improved, and customer needs were met in a finely tailored manner. The first 7-Eleven^{Note 32} store in Japan opened in Toyosu, Koto City, in Tokyo in May 1974. It started 24-hour operation from the following year.

In 1982, 7-Eleven Japan became the first in the world to take the POS system^{Note 33} in marketing, which had already been in use in the United States. The POS system can identify not just the total paid, but also when and what items were bought and in what quantities, so the past sales data of a store can be accumulated. For example, the sales data for a holiday in the same month of the previous year can be linked with weather or other such information and can be used to decide (hypothesis) items and quantities to be ordered. Afterward, the actual sales results can be considered (verification), and the conclusions can be reflected in the next orders. This cycle was realized in an arrangement for hypothesis-testing ordering. POS systems resulted in the emergence of ordering systems of this kind, and the company created inventory management methods that minimize stock-out items and excess inventory, and create efficient logistics systems. Joint delivery in which goods from different manufacturers are delivered in the same vehicle was also realized for the first time in Japan in 1980, and new arrangements such as joint delivery and small-lot delivery, and the concept of logistics by specific temperature range emerged from this business. This kind of finely tailored individual item management and ordering responded to changing customer needs while efficiently deploying products even within small stores.

Note 30 In 1991, Seven-Eleven Japan acquired the shares of the Southland Company in the United States, and in 2005 made Southland a subsidiary.

Note 31 In 1971, most 7-Eleven stores began effectively operating on a 24-hour basis.

Note 32 In 1973, the York-Seven Co., Ltd. (which in 1978 was renamed Seven-Eleven Japan) was established. In 2005, Seven & i Holdings Co., Ltd. was established as a holding company with Seven-Eleven Japan Co., Ltd., Ito-Yokado, and other companies as subsidiaries.

Note 33 Point of sale (POS) systems make use of sales records to determine merchandise procurement. These began to be introduced by companies that were expanding their retail business outlets in the United States, and the systems were developed there during the 1970s. The purpose was to make it easier to calculate figures for goods and services sold by each store and to prevent fraud by sales personnel at the cash registers, sales of goods at incorrect prices, and other such problems. POS systems were first introduced at 7-Eleven in 1978.

By providing sales in small quantities of goods oriented to single people, handling the collection of utility charges and other such payments, providing banking services, introducing electronic money, accepting home delivery and postal service items, and other services in a wide range, convenience stores have established themselves not just for retail sales of merchandise, but as stores that have become an established presence for people and local communities. Their functions in society are increasing. Furthermore, those functions are taking on increasing importance as stores remain open for business during disasters, pursue community watch programs, and so on (Figure 1-3-18).



CVCC engine

In the mid-1960s, Japan was entering an era of motorization, and the air pollution caused by the exhaust gases from motor vehicles had become a serious problem in society. This had also become an urgent issue demanding government response, and in 1966, what was then the Ministry of Transport specified emissions standards for the noxious exhaust gases from motor vehicles. The Basic Act for the Prevention of Pollution was enacted the next year, and the Air Pollution Control Act was enacted in 1968. In 1971, the Environment Agency was established. This was a period of worldwide calls for measures against pollution, and the Muskie Act^{Note 34} passed in the United States in 1970 was one response. With the oil shock of 1973, gasoline prices skyrocketed, and there were calls to reduce the fuel consumption of motor vehicles.

In 1966, the Japan Automobile Manufacturers Association organized a research group to observe the current situation of motor vehicle pollution in the United States. The group went to the United States, and among the participants were researchers from the Honda R&D of Honda Motor Co., Ltd. After the group's return, three employees who had been explaining the necessity for air pollution research for some time made an appeal to the director of the Honda R&D Company, and the Air Pollution Research Group (commonly called the AP Lab) was instituted with about 30 personnel. Their work started with research on methods and equipment to measure nitrogen oxides and other such substances. Soichiro Honda, then president of Honda Motor Co., Ltd., took this up as a challenge and pressed the research forward, declaring that "for Honda Motor Co., Ltd., which is the latest manufacturer to enter the automobile industry, this is the perfect opportunity to stand on the same line, engineering-wise, as the other companies." Since it was not possible for Honda to make wholesale changes to production facilities, the company adopted the motto of doing what they could to address the issue with the gasoline engine, and they went through repeated trial-and-error attempts of various kinds. Reasoning that they could hard-ly catch up with the leading manufacturers by doing the same research as them, Honda decided to take on the challenge of what the other companies were not doing. They aimed for lean combustion using an engine with a subsidiary combustion chamber, something that was not used in conventional gasoline engines.

Note 34 An exhaust gas control law considered at the time to be the most rigorous in the world, and impossible to satisfy. It would not permit the sale of cars that did not reduce the carbon monoxide and hydrocarbons that cause air pollution to one-tenth their previous level by 1975, and nitrogen oxides likewise by 1976.

At that time, the Honda Motor Company did not have water-cooled engines to use in automobile test vehicles, so it had to use engines made by other companies. As a result, Honda was able to collect research data that was more universally applicable. When they reached a stage at which there was hope of reducing toxic components to some extent, President Honda declared in February 1972 that the company expected to clear the Muskie Act requirements, and he publicly presented an overview of a product that he announced would be marketed in 1973. He is said to have told the employees: "If I ask you, you are never going to say it's complete now, no matter how long I wait. If we just wait around for that, the company will collapse first." The patent was still in process, and the company devised a name, Compound Vortex Controlled Combustion (CVCC), that would not allow anyone to identify the mechanism from the name. A full announcement of the product was made in October of that year. It had the appeal of various advantages. It could be used with engines from other manufacturers, for example, and it would enable wide-ranging steps to lower pollution. Since its combustion took place inside the engine, it did not require catalytic converters or other devices to purify the exhaust gases, and there was no risk of secondary pollution. In December of that same year, this product became the first in the world to meet the Muskie Act requirements.

With the momentum from this technology, numerous other emissions reduction techniques were devised, and Japan's emissions reduction technology was raised to the highest level in the world. Now, three-way catalytic devices, electronic fuel injection mechanisms, and other such means have evolved to the point that the CVCC engine has disappeared from the market. It was, however, among the earliest versions of the lean combustion approach that is still being pursued in the present.

Automatic ticket gate

Automatic ticket gates were first introduced in Japan in 1927 on the Tokyo Underground Railway (today the Tokyo Metro Ginza Line). These were originally brought in from the New York subway system. When a 10-sen coin was inserted, a lock was unlocked so that a cross arm could be pushed out of the way and just one passenger could pass through the gate. These could be adopted on lines where all the fares were the same. The conventional system was to have a person visually check the information printed or written on a piece of paper and process it accordingly. Subsequently this changed with the appearance of systems that were capable of recognizing the information. Ticket gate operations were made more efficient and more certain. Trials of such systems started in London in 1963, and research was pursued in Japan, as well.

In the 1960s, the Japanese economy was developing and the population was rapidly moving from farm villages into urban areas. The infrastructure was unable to keep up in various respects, the railroads were terribly crowded during morning and evening commuter rush hours, and this spectacle was dire enough that newspapers around the world reported it as 'morning commuter hell' and other such terms. Long queues formed at the ticket gates, and there was discussion of ways to relieve this congestion in the stations by building machines to carry out ticket gate operations in place of people. In 1964, the Kinki Nippon Railway Co., Ltd., started on joint research with Osaka University, and that same year also called on the equipment manufacturer Tateishi Electric Manufacturing Company (now known as Omron Corporation) to move forward with development. At that time, approximately 80% of passengers used commuter passes, so the work began with development of automatic ticket gates exclusively for commuter passes. In a first step, the idea was conceived of making the machine in a long, narrow shape so that passengers could get back their commuter passes without having to stop and stand waiting. In order to make the system processing speed faster than that of station personnel, the conveyor belt mechanism used in factories was further developed to transport commuter passes through the machine. In order to read the information from the commuter passes, a punch coding system^{Note 35} was adopted. A gate bar was installed to block attempts to pass through the ticket gate fraudulently, while at the same time distinguishing between luggage and people. Automatic ticket gates on the same basic pattern used today were completed in 1966. In conjunction with the opening of Senri New Town to new residents and in preparation for the Osaka Expo to follow in three years, the Hankyu Railway opened an extension of its line between Minami-Senri and Kita-Senri. Dual use automatic ticket gates that accepted both commuter passes and regular tickets were installed at Kita-Senri Station, accomplishing the first unmanned ticket gate system in the world. With the way opened, all the major private railways in the Kansai Region and the Osaka Metropolitan

Note 35 This is a method that punches holes about 3 mm in diameter in commuter passes in an arrangement that records information, and that information is read by the ticket gate machine.

Subway adopted automatic ticket gates by the end of 1975.

IC card tickets have also made their appearance in recent years. These IC card tickets are expected to provide faster processing through automatic ticket gates than magnetic card tickets^{Note 36}. Trials were done while making changes, such as switching from holding cards above a sensor to touching the card to the sensor, with the result that the IC card ticket performance was improved. Introduction of these tickets has moved forward since 2000.

Automating and speeding up station operations in these ways rationalized railroad management and made it possible for the people of Japan to travel in greater speed and comfort.

Management techniques of railroad companies in Japan

Railroad companies in Japan engage in a variety of businesses other than the railroad business, such as real estate, retailing, and so on. The foundation for the management techniques followed by these railroad companies in Japan today are said to have been created by Hankyu Railway, and this portion will review that company and its founder, Ichizo Kobayashi. When Hankaku Railway Co., Ltd., was nationalized, there were sales of property that Ichizo Kobayashi was connected with because he was a banker. When the proceeds from sale of the railroad were used to fund the Minoo Arima Electric Tramway Co., Ltd., he then became involved in the establishment of that company.

The Minoo Arima Electric Tramway followed a suburban route^{Note 37} that joined the center of Osaka (at Umeda) with tourist destinations (Minoo, Arima, and so on) in the rural region outside the city. Projections were that the company could not expect very many customers and would face difficulty breaking even. A garden city plan was therefore devised to develop Minoo, which was a famous destination for maple leaf viewing, and its waterfall, Arima, which was famous as a hot spring resort, and other suburban locations. This was a very creative idea for the Japan of that era. The housing situation in Osaka was very poor at that time, with rents rising rapidly, and Kobayashi reasoned that if the population concentrated in Osaka could be moved out to communities along the railway line, a new group of customers would be created that would provide stable revenues from the sale of commuter passes. He also anticipated profit from real estate sales, and started a real estate business in communities along the railway line, selling properties by means of installment loans, which were rare at that time. In this way, Kobayashi started with housing management in areas adjacent to the railway. He then took a series of steps to see that people would also use the railway on holidays by running a zoo, founding a hot spring resort business, building a baseball stadium, and so on. For the inaugural meeting of shareholders in 1908, Kobayashi created a public relations pamphlet titled "The Railway with the Greatest Prospects" (said to be the first such PR pamphlet in Japan). He pursued PR for the railway, and in 1909 created a pamphlet titled "What Kind of Land to Choose and What Kind of House to Live in" as part of his promotion of housing along the railway line. This multifaceted approach to management increased the railroad operator's profitability and contributed to establishing a stable railroad business. At the terminal stations, Kobayashi also built department stores that found customers in the people who took the trains from communities along the train lines. This business was conducted with its targets in a different population than the existing department store customers. He built zoos, the Takarazuka Revue Company, and other amusement facilities in areas adjacent to the railway, and sometimes Kobayashi himself even wrote scripts for the Takarazuka Review.

Ichizo Kobayashi engaged in efforts to provide services for the general public, and the lifestyle he envisioned, "to live in houses in a convenient location with a good environment, shop at department stores, enjoy going to the theater, and lead an affluent life," is still relevant to people of the present day. Kobayashi can be said to have enacted innovation in the way he took the lead in management strategy for a mass consumer age. Most railroad companies in Japan subsequently copied those management techniques, so his company is also said to have provided the business model for the railroad companies of today.

Note 37 In actuality, the Arima portion was not realized, and the line ended up reaching only as far as Takarazuka.

Note 36 Experiments by the East Japan Railway Company suggest that, since magnetic card tickets are transported automatically by machine, the processing time inside the ticket gate machine was 0.7 seconds. The IC card, however, is moved through the gate while held in a person's hand, and processing occurs by a single touch of the card, so it was necessary to process it in 0.2 seconds (the time taken for processing between the card and the read-write device is in 0.1 second).

Column Shared Housing for Child Rearing

There is a shared housing complex in Tokyo's Daikanyama neighborhood based on the concept of support for child rearing. The concept may be summarized as "a form of child rearing in which parents rely on others, are relied on themselves, and help one another." The main target clientele are single parents and those who want to support child rearing. The objective is create an environment in which residents who have children and residents who do not have children can raise children together as they help one another out.

The owner of the property is Tokyu Corporation, which leased some land and a building that it owns in Shibuya City to be renovated into shared housing.

The common areas includes a living room with a "doodle board," where children can exercise their creativity, full unit baths and mini kitchens on each floor to promote bonds between parents and children, and a rooftop with a wooden deck and a household vegetable garden, in addition to an area where children can play barefoot. These are just some of the ways in which Stylio With Daikanyama has been set up as shared housing equipped with facilities and services that allow working parents to share child rearing duties easily. Furthermore, residents and neighbors can take advantage of AsMama, Inc., a "shared childcare" service, for easily accessible help with concerns about child rearing, and Kids' Security, a children's security service using smart cards from Tokyu Security Co., Ltd. All together, these services create an environment in which single parents can both work and raise their children without undue worry.

Twenty-one households occupy the property, including seven households with children and fourteen households made up of single people.^{Note} Special events are held for residents four times a year, and residents say that bringing up children is no longer a lonely task, that when they come home from work they have people to talk to and people to enjoy themselves with, all of which is very encouraging. The children who live here develop their social and communication skills in everyday life and play.

Shared housing of all types is gaining popularity in our society, but this shared housing complex motivates links between people who are raising children and young people who want to support child rearing. This kind of housing will be increasingly important with the increase in nuclear families and as all generations experience the weakening of personal ties. Fostering an environment in which strangers become a large, extended family, and have contact with nature while sharing child care duties, is an emotionally enriching experience for everyone involved.





Source) Tokyu Corporation

Figure 1-3-20 Household Rooftop Vegetable Garden



Source) Tokyu Corporation

Note Survey as of April 1, 2017

Chapter 2 Present Efforts Toward and Issues Regarding Pilot Projects and Creation of Innovation

In Chapter 2, we provide an overview of the present efforts of various countries toward pilot projects and the creation of innovation, and introduce the state of the efforts of the MLIT regarding pilot projects for new technologies and services, as well as an analysis of issues in innovation in the national land and transport sectors based on various research results, and what will be required of future efforts toward innovations.

Section 1 Efforts of Various Countries Toward Pilot Projects and Creation of Innovation

Given the conditions of foreign countries, each of the major countries considers policies for science, technology and innovation to be major policies for their national development, and has strived to expand investment and otherwise intensify efforts in those areas in recent years. The following is an overview of the development of their efforts.

Development of Science, Technology and Innovation Policy in Foreign Countries

Japan and other major countries are setting research- and development-related investment targets in their policies for science, technology and innovation (Figure 2-1-1).

Figure 2-1-1 Research and Development Investment Targets in Japan and Other Countries					
Country/Region	Public/ Private Total Investment Target as a Percentage of GDP (Target Year)	Government Investment Portion (Target Year)	Private Investment Portion	Plan Duration (Unit: Fiscal Years)	Sources
Japan	4.0% (2015)	Government research and development in- vestment target: 1.0% (based on costs relat- ed to science and technology, not the cost of research and development)		2011-2015	The 4th Science and Technology Basic Plan (2011-2015) (governed by the New Growth Strategy (2010)), the Japan Revitalization Strategy (2014)
U.S.	3.0%	-	-	2009-	Strategy for American Innovation (2009/2011), Transformation and Opportu- nity: The Future of the US Research Enter- prise (PCAST) (2012)
EU	3.0% (2020)	A total of 77 billion EUR is listed as the EU bud- get under programs related to research and development/innovation (plans in progress)	-	2010-2020 (Public/private to- tals of member countries) 2014-2020 (EU budget)	Public/private total: Europe 2020 (2010-2020) EU budget: Horizon 2020 (2014-2020)
U.K.	_	Department for Business, Innovation & Skills (BIS) Scientific Research Budget: Maintain resource budget of 4.7 billion GBP from pre- vious plan (2011-2014) in FY2015.*1 Research Infrastructure: Invest a total of 5.9 billion GBP in research infrastructure from FY2016 to FY2020.	_	2015 (BIS scientific research budget) 2014- (Research infrastructure)	BIS Scientific Research Budget: Science Research Budget Allocations 2015/16 (2014) Research Infrastructure: Our Plan for Growth: Science and Innovation (2014)
France	3.0% (2020)	_	-	~2020	2011 National Reform Programme*2
Germany	3.0% (2020)	1.0% (written as "1/3") (2020)	2.0% (written as "2/3")	2005-2015 (public/private total) by 2015 (public/private indi- vidual)	Public/private total: 2005 National Reform Programme, Qualification Initiative (2008), 2011 National Reform Programme Public/private individual: National Reform Programme (2011-)
Finland	4.0% (2020)	Real annual increase of 2% (policy guide- lines developed in 2011 set out a target of 1.2% of GDP by 2020)		2015~2020	Government target: Reformative Finland: Research and innovation policy review 2015-2020 (2014) Research and Innovation Policy Guidelines for 2011-2015 Public/private total: 2011 National Reform Programme
Israel	-	-	-	-	(No national strategy exists for these sectors)
China	2.2% (2015) 2.5% (2020)	-	-	2011-2015 2006-2020	12th Five-Year Plan for Energy Science and Technology Development (2011-2015) National Medium- to Long-Term Plan for the Development of Science and Technol- ogy (2006-2020)
South Korea	-	Invest 92.4 trillion KRW during the plan, which is 24.4 trillion KRW more than the Lee Myung-bak administration invested	-	2013-2017	3rd Science and Technology Basic Plan (2013-2017)

*1 A resource budget is a budget allocated for research expenses and personnel expenses, and accounts for most of the budget for research and development (Source: JST/CRDS Science and Technology and Innovation Trend Report: U.K., 2015)
 *2 The National Reform Programme is the economic growth strategy that the EU member countries have presented to the European Commission every April since 2011 as part of the Europe 2020 framework.
 Source: Survey Analysis of Investment Targets Regarding Research and Development (Survey Analysis Installment of Policy Issues Regarding the Promotion of "Science for Policy" in Science, Technology and Innovation Policy (5))
 MEXT (survey contracted to the Mitsubishi Research Institute)
 Source) Cabinet Office 5th Science and Technology Basic Plan, Collection of Reference Materials

Among each country's research and development expenditures as a percentage of GDP, the high percentages of South Korea and Israel stand out. In addition, the top five countries in innovation rankings by country^{Note 38} invest at least 2.5% of GDP into research and development (Figure 2-1-2).

(Trends in the U.S.)

Under the 2015 Strategy for American Innovation announced in October 2015, the U.S. is working to ensure a world-leading position as an innovation-creating nation, to respond to national issues such as becoming a healthy and long-lived society and lasting growth, and to further intensify the focus on government support for innovation and upfront investment in future economic growth. The principal elements of the strategy are investment by the federal government, the acceleration of efforts by the private sector, and the development of innovative human resources, and these building blocks are the basis of the government's aims to create quality jobs and lasting economic growth, catalyze breakthroughs to make progress on key national priorities, and develop an innovative government with and for the people (Figure 2-1-3). The goal to invest in the





building blocks of innovation sets out targets such as achieving total research and development expenditures (total private-sector and government research and development expenditures) of 3% of GDP, and emphasizes the strengthening of public-private partnerships and education in science, technology, engineering and mathematics (STEM) to cultivate the bearers of innovation. In addition, the American government has promoted research and development for advanced manufacturing technology with the aim of reviving the manufacturing industry, and considers that revival a priority matter in research and development conducted through intergovernmental cooperation.

Note 38 Trends in innovation rankings through the years (Figure 1-2-3). The five countries are Switzerland, Israel, Finland, the U.S. and Germany.

(Trends in Europe)

In March 2010, the European Union (EU) adopted a new strategy: Europe 2020. The Europe 2020 strategy regarding research, development and innovation is called "Innovation Union," and in December 2013, Horizon 2020 was adopted as a framework program for realizing this strategy. The three priorities of Horizon 2020 are excellent science, ensuring industrial leadership, and tackling societal challenges (Figure 2-1-4), and intensive investment is promoted under this program. The program sets out the target of achieving research and development expenditures of 3% of GDP.

In Germany, the High-Tech Strategy, which was developed in August 2006, is promoted as the basic strategy for science, technology and innovation policy. The strategy was renewed in July 2010 as High-Tech Strategy 2020, and sets out future-oriented projects that involve cross-sectoral efforts in five sectors to which Germany devotes energy: climate/energy, health/nutrition, transport, social safety, and communication/digitization. In November 2011, Industry 4.0, which heralds a fourth industrial revolution, was proposed as a new future-oriented project, and is being promoted as a joint action plan of industry, academia and government toward advancing the manufacturing industry. Germany achieved total research and development expenditures of 3% of GDP in FY2012, and the third New High-Tech Strategy, which was announced in September 2014, explored approaches to the promotion of continued innovation, identified sectors with significant momentum in the promotion of innovation, and conducted research on a

Figure 2-1-4	Societal Challenges in the EU's Horizon 2020	
Societal Challenges	Priorities	
Health, demographic change and well-being	Understanding of diseases, health and welfare, prevention of diseases, treatment and management of illnesses, etc.	
Food security, sustain- able agriculture, etc.	Sustainable agriculture and forestry, food product manufacturing for healthy, safe dietary habits, fishery resources development, etc.	
Secure, clean and efficient energy	Low-cost/eco-friendly power supply, development of alter- native fuels and portable energy resources, etc.	
Smart, green and integrated transport	Green transport, mobility improvement, congestion reduc- tion, safety expansion, global-level leadership for the Euro- pean transport industry, socioeconomic research and multi- faceted investigations for policy formulation, etc.	
Climate action, resource efficiency and raw materials	Challenging and adapting to climate change, sustainable management of natural resources, environmental monitor- ing, etc.	
Inclusive, innovative and reflective societies	Closing the research and innovation gap between European countries, European cultural research, etc.	
Establishment of secure societies	Fighting crime and terrorism, understanding and combating terrorist ideology, cybersecurity, etc.	
Source) Documents of the Center for Research and Development Strategy of the Japan		

purce) Documents of the Center for Research and Development Strategy of the Japan Science and Technology Agency

Figure 2-1-5		Societal/Technological Challenges Ex- tracted from German Policy Documents
Priority Challenges	Technology Noted in Policy Documents	
Action toward digitization	loT, big data, IT security, cloud computing, etc.	
Sustainable en- ergy production, consumption	Power to Gas, thermal storage, efficient energy, solar energy, wind power, biomass, solar thermal energy, energy-optimized buildings, energy conservation, energy systems, etc.	
Innovation- creating labor	Service sector digitization, etc.	
Living healthily	Individual medical care, preventive care, pharmaceutical design, medical care technology, etc.	
Smart traffic, transport	Electric tion, fu	c vehicles, electricity storage, car sharing, car weight reduc- lel cells, aeronautical technology, maritime technology, etc.
Ensuring safety	IT secu	urity, privacy protection, etc.
Source) Documents of the Center for Research and Development Strategy of the Japan Science and Technology Agency		

preferential basis in those sectors (Figure 2-1-5). Policies for strengthening collaboration between industry and academia and for enhancing the power of small and medium-sized enterprises (including incubation) have been identified as guide-lines for resolving these challenges.

In the United Kingdom, Our Plan for Growth: Science and Innovation, a new strategy that was announced in December 2014, sets out six elements to make the U.K. the best country in the world for science and business: deciding priorities, nurturing scientific talent, investing in scientific infrastructure, supporting research, catalyzing innovation and participating in global science and innovation (Figure 2-1-6). In addition, despite the fiscal austerity policy under which the entire government operated, the government decided to increase the level of investment in scientific research to the level of FY2010 by FY2015, and to roughly double the FY2015 budget for facilities, buildings and other science and technology infrastructure compared to the previous year.

France Europe 2020, a basic strategy that emphasizes compliance with Horizon 2020, was developed in France in July 2013. France Europe 2020 was updated in March 2015 to include approaches and priority issues in research and development in light of societal challenges (Figure 2-1-7), and indicates research and development regarding the computerization of the manufacturing industry and the use of IoT and big data among its priority issues. In terms of France's investment targets regarding research and development, France Europe 2020 does not set out any target values for research and development expenditures as a percentage of GDP. However, the National Reform Programme, under which France submits economic growth strategies to the European Commission each year under the European Semester framework, sets out a target value of total public and private research and development expenses of 3% of GDP.

Figure 2-1-6	Societal/Technological Challenges Ex- tracted from U.K. Policy Documents	
Six Elements	Societal/Technological Challenges in the Determination of Priority Sectors	
(1) Deciding priorities	(1) Big data and energy efficient computing	
(2) Nurturing scientific talent	(2) Commercial use of satellites and space	
(3) Investing in scientific infrastructure	(3) Robots and autonomous systems	
(4) Supporting scientific research	(4) Synthetic biology	
(5) Catalyzing innovation	(5) Regenerative medicine	
(6) Participating in global	(6) Agricultural science	
science and innovation	(7) Advanced materials and nanotechnology	
	(8) Energy and its storage	
Source) Documents of the Center for Research and Development Strategy of the Japan Science and Technology Agency		

Figure 2-1-7	Societal Challenges in French Research Strategies	
Societal Challenges	Approaches to Research	
Management of resourc- es and adaptation to climate change	Sustainable management of natural resources, envi- ronmental/climate risk assessment and counteraction, eco-technology/biotechnology, etc.	
Clean energy	Systems for using a diverse array of renewable energies, efficiency improvement, etc.	
Industrial renewal	Factory digitization, new material design, cooperation involving sensors and instrumentation, etc.	
Health and social welfare	Multi-scale analysis of living organisms, establishment of core research centers for research and treatment, etc.	
Food security and popu- lation dynamics	Healthy and sustainable nutritional intake, integration of production systems, etc.	
Sustainable transport and urban systems	Urban observation, proposal of new methods of transport, technology toward sustainable cities, etc.	
Information and commu- nication society	5G network, IoT, big data, human-machine collaboration, etc.	
Innovative, integrative and adaptive societies	Research toward social integration, development of new innovation indicators, etc.	
Space/aeronautics for Europe	Earth observation, data communication/navigation, space observation/exploration technology, etc.	
Freedom and security of European civil society	Prevention/anticipation of risks and threats, integrated approaches to crisis management, etc.	
Source) Documents of the Center for Research and Development Strategy of the Japan Science and Technology Agency		

(Trends in Asia)

In February 2006, the Chinese government announced the National Medium- to Long-Term Plan for the Development of Science and Technology, a 15-year plan that calls for the enhancement of independent innovation capacity through the fulfillment of the target for total research and development expenditures (2.5% of GDP by 2020), the strengthening of priority sectors, and other efforts in pursuit of making China an innovation-driven country with world-class science and technology by 2020. In May 2015, the Chinese government devised Made in China 2025, a road map for the development of its manufacturing industry over the ensuing decade, in light of factors such as the actions of advanced nations toward the advancement of manufacturing industries on the strength of telecommunications technology development, and the condition of the Chinese economy due to the rising cost of domestic labor and other factors. Made in China 2025 sets out goals for the dynamic development of China's manufacturing industry through the advancement of its level of computer-ization for the purpose of streamlining manufacturing and improving quality.

In July 2013, the South Korean government developed the 3rd Science and Technology Basic Plan, which sets out specific measures for advancement in five strategic sectors (the High-Five Strategies) to create new industries through the fusion of science, technology and ICT and improve quality of life for South Korean citizens, among other aims. Numerical targets for investment have been set; investment targets include a five-year target for the government to invest 92.4 trillion KRW in research and development, and for 40% of that government investment in research and development to support fundamental, foundational research.

2 Examples of Efforts toward Innovation Creation in Foreign Countries

(1) Support for Venture Company Creation

Venture companies are playing an increasingly important role in industrial metabolism and the creation of innovation. In the U.S., initial investments built on venture capital (VC) create a large volume of venture companies, namely from universities and research institutes, and some of these grow into massive corporations^{Note 39}.

Among each country's VC investment as a percentage of GDP, the figures for Israel and the U.S. stand out above the other countries. In addition, in the top four countries in innovation rankings by country^{Note 40} since 2015, the proportion of VC investment in the initial stages is higher than Japan's (Figure 2-1-8).



Note 39 "FY2015 Annual Cabinet Report on the Japanese Economy and Public Finance"

Note 40 Trends in innovation rankings through the years (Figure 1-2-3). The four countries are Switzerland, Israel, Finland and the U.S.

SME innovation research program in the U.S.

Many large, innovation-oriented venture companies are founded in the U.S., and they grow rapidly and function as the drivers of economic development. One frequently mentioned factor for their success is the Small Business Innovation Research (SBIR) Program, an innovation research program for SMEs under which the government provides a foundation for their growth. The SBIR Program provides competitive subsidies for commercializing the research outcomes of SMEs with superior technology (products), and government offices with research and development budgets of 100 million USD or greater are obligated to contribute a set proportion (roughly 3%) of their annual budgets to the program. The multi-phase screening method, or "stage gate" process^{Note 41}, serves the important function of bridging the gap between the research phase and commercialization known as the "valley of death," and is widely recognized in the U.S. as a catalyst for innovation.



(2) Collaboration between Industry, Academia and Government

Collaboration between industry, academia and government is one way to create innovation by transferring knowledge created in universities to the industrial sector for the purpose of encouraging sustainable economic growth. The percentage of private-sector responsibility for university research expenditures in the U.K., U.S. and Germany is higher than that of Japan (Figure 2-1-10).



Note 41 A system for specific subsidies and the like that comprises multiple stages, in which investigations and discussions (F/S) regarding research and development and project feasibility are conducted in the first stage, and screening is conducted in ensuing stages under the assumption that entities will be screened and selected as the phases progress.

Selection of innovative clusters in Germany

Germany was home to many excellent universities, public research institutes funded by the federal and state governments (Max Planck, Fraunhofer, etc.) and corporate laboratories, but they suffered heavy damage during World War II. Years later, the unification of East and West Germany spurred the intensification of research in new sectors such as biotechnology and telecommunications, which had lagged during the country's separation, and the government created a Cluster Creation Program under which it designated themes for each region; provided support for collaboration between universities, research institutes, companies and other entities; and promoted regional innovation through this collaboration between industry, academia and government. Using the bio sector as an example, this program encouraged the growth of the world's preeminent bio cluster, and by 1999, Germany was home to more bio companies than any other country in Europe. Presently, several hundred industrial clusters exist throughout Germany, and the federal government is actively involved in ensuring that the regions do not compete against each other by encouraging the formation of industrial clusters in each region that are distinct from others^{Note 42}. Germany's advanced scientific and technological potential and the strong collaboration between industry, academia and government^{Note 43} that underlie it are the foundations of Industry 4.0 (2011-) (Figure 2-1-11).



Note 42 The federal government selects 15 industrial clusters in a competitive format, and promotes innovation through the unified efforts of universities, research institutes, major corporations, small and medium-sized enterprises, financial corporations and others.

Note 43 Regional networks comprised mainly of universities (105 general universities and 211 technical universities) are responsible for helping companies overcome challenges in the technological innovation process.

Column Tsukishima-sõ

A new style of company dormitory complex on Tsukishima is creating a stir. Despite being a dormitory for company employees, the complex incorporates features of shared housing, and instead of being restricted to employees of one company, it has residents from a variety of companies. This makes Tsukishima-sō a place for lively interactions among business people from different industries and differing generations. So what kinds of people live in Tsukishima-sō?

The proprietor is Inui Global Logistics Co., Ltd., which owns real estate in the Tsukishima and Kachidoki areas. Tsukishima-sō was built as a redevelopment project on a parcel of land that was formerly the site of a bowling alley and rental condominiums. Initially, the plan was to build a structure two hundred meters tall and containing luxury rental condominiums, but after investigating actual demand for properties that fulfilled the desire for residences near workplaces, Inui Global Logistics converted these plans into an arrangement for a company dormitory complex designed as shared housing, consisting of three buildings, each twenty-five meters tall. In addition, instead of housing the employees of a single company, Inui Global Logistics entered into corporate contracts with several companies, creating a system in which each company could use up to fifty rooms to house employees.

The complex has a total of 644 individual rooms and common facilities, including a kitchen and dining room, gym, communal baths, a home theater room, study rooms, and meeting rooms. The individual rooms are built along simple lines, but in addition to places for basic activities such as sleeping and changing clothes, there are comfortable, attractive common facilities that encourage sharing. In addition to the shared facilities on the ground floor, each residential floor has a shared living space, based on a concept called "cluster living," allowing the residents to prepare simple meals and spend their leisure time. No more than five employees from any single company can live in a cluster, so interactions with employees of other companies occur easily.

At present, forty-one companies from a wide range of industries are using this dormitory complex, including think tanks, chemical manufacturers, real estate companies, trading companies, and financial services companies; about 80% or more of the residents are in their twenties, with slightly fewer than 70% being male and slightly more than 30% being female. The companies apparently wanted their own employees to increase communication skills through encounters with employees of other companies, and in fact, residents use the kitchen-dining area to hold dinner parties and gather with other residents who have similar interests and hobbies in the common rooms. They also hold lively study sessions in a presentation format, where they share knowledge and experiences connected with their own specialties.

Since the collapse of the bubble economy and continued stagnation of the economy, most companies have given up their employee dormitories, and at present, there is a move away from company-owned company housing to rented company housing. As a result, however, interactions among employees of different workplaces and different age groups are said to have decreased. In these circumstances, company dormitories like Tsukishima-sō, where employees enjoy newer and deeper interactions with employees of other companies and with people of other generations while they are young, may be effective in encouraging open innovation.



Source) Inui Global Logistics Co., Ltd





Source) Inui Global Logistics Co., Ltd.

Section 2 Status of Efforts toward the Social Implementation of New Technologies and Services by the Ministry of Land, Infrastructure, Transport and Tourism

Policies of the Ministry of Land, Infrastructure, Transport and Tourism

Japan is leading the world in the entry to an era of fully fledged population decline, and in order to realize sustainable economic growth against this background, it will be essential for the nation to vigorously pursue a "productivity revolution" that will enable it to overcome the restrictions on supply and the shortfalls in labor power consequent upon a declining population. As indicated in the Japan Revitalization Strategy 2016 (approved by the Cabinet in June 2016), the use of technological breakthroughs encompassing the IoT, AI, big data, and robots and sensors (the "Fourth Industrial Revolution") is one major key toward the realization of this goal. The exploitation of the latest technologies will also be extremely important in realizing effective and efficient implementation of schemes against a background of increasingly stringent fiscal restrictions.

With 2016 set as the year in which Japan's productivity revolution begins, the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) has proceeded with efforts toward the realization of increased productivity, and views the advancement of the social implementation of new technologies as an important perspective to achieve this goal.

Seeking to further increase the effectiveness and efficiency of planning and implementation in the administration of land, infrastructure, transport and tourism toward the realization of a sustainable society, in March 2017, the MLIT established a new Ministry of Land, Infrastructure, Transport and Tourism Technology Basic Plan, covering items including the advancement of technological research and development, the effective use of technology, and the cultivation of human resources to support technology policy.

(1) Productivity Revolution Projects

1

In order to realize sustainable economic growth in an era of population decline, it will be essential to (i) increase the potential growth rate by increasing productivity, and (ii) create and discover new markets. In addition, in order to respond to fears of manpower shortages in numerous industries as a consequence of the decline in the productive population, it will be vital both to secure future workers by promoting innovation in working styles, and to increase productivity to make it possible to realize the same amount of work with less manpower.

Because the MLIT is working at sites throughout the country, engaged in the provision of social capital, and oversees a wide range of industries that support the foundation of the nation's economic activities, in particular the transportation and construction industries, its role in increasing productivity in Japan is necessarily a significant one. Under the leadership of the MLIT Productivity Revolution Headquarters (headed by the Minister of the MLIT), established in March 2016, the Ministry has therefore selected and is promoting 20 advanced projects (Productivity Revolution Projects) as initiatives toward the realization of increased productivity involving the efforts of the Ministry as a whole. Taking the increasing severity of fiscal restrictions into consideration, the selection of Productivity Revolution Projects seeks to realize the maximum possible output from minimal input, and thus focuses on projects that (i) advance the development and social implementation of new technologies, (ii) make comprehensive use of existing stock, and (iii) involve the modification of systems or their operation. With 2017 as the year for the advancement of the productivity revolution, in addition to steadily advancing these Productivity Revolution Projects, the Ministry will work to ensure that the concept that provides the foundation for the productivity revolution, the active exploitation of new technologies, becomes entrenched not only in the area of approaches to the realization of economic growth, but also in the entire range of measures involved in the administration of land, infrastructure, transport and tourism, encompassing the guarantee of safety and security, and the guarantee of a comfortable living space (Figure 2-2-1).

Figure 2-2-1 **MLIT Productivity Revolution Projects** •Pinpoint responses to traffic congestion •Maritime productivity revolution (P61) •Fee structure making intelligent use of expressways (P68) •Productivity revolution in logistics (P60) •Realization of the next generation of cruises •Innovation in road-based logistics •Compact Plus Network Tourism industry innovation •Promotion of optimal use of real estate •Sewage system innovation •Infrastructure maintenance revolution (P64) •Rail productivity revolution •Rehabilitation of dams •Traffic safety measures utilizing Big Data •Air transport infrastructure revolution •Overseas expansion of Quality Infrastructure •Promotion of i-Construction (P55) •Automotive ICT revolution (P59) •New development of residential living industries •Creation of a meteorological business market (P67) Source) MLIT

(2) The MLIT Technology Basic Plan

The Ministry of Land, Infrastructure, Transport and Tourism has formulated the new MLIT Technology Basic Plan (the 4th MLIT Technology Basic Plan), extending to fiscal 2021, as a basic guideline for technology policy, including technological development, in the administration of Japan's land, infrastructure, transport and tourism. The new plan has three pillars – the use of the IoT, AI, and big data, with people as the focus; responses to socioeconomic problems; and the advancement of technology policy that will realize desirable cycles. It seeks to realize a sustainable society by promoting a revolution in productivity and a reform of working styles through the creation of new value.

Making use of open innovation, which is the active incorporation of knowledge and technologies from outside a specific organization, will be essential to further advancing technological research and development. Given this, while following the previous plan in advancing technological development and planning and implementation in an integrated fashion with the entire scope of technology policy as its subject, the new plan also adds a focus on the realization of desirable cycles in which the comprehensive utilization of technology leads to the spontaneous creation of new technologies, and specifies the necessary perspectives and the target orientation for the advancement of technological research and development.

By providing Japan's research organizations, industries, universities, and learned societies with MLIT's guidelines for technological research and development and the cultivation of human resources, in addition to fostering a shared awareness between industry, academia and government, the plan seeks to advance technological research and development effectively and efficiently, promoting collaboration between the three groups, with each becoming a major actor and realizing their optimum efforts (Figure 2-2-2).

Π



2 Initiatives Related to Innovation

Promotion of i-Construction

At present, of the approximately 3.26 million skilled workers engaged on construction sites in Japan (as of 2016), approximately one-third are aged 55 or above. The construction workforce is aging, and there is a strong possibility that large numbers of workers will retire within the next 10 years due to age and other factors. In addition to this projected mass retirement of older workers in the construction industry, the high rate of younger skilled workers in the industry leaving their jobs represents a concern (Figure 2-2-3). A survey of companies and construction industry workers who had left their jobs showed that four reasons for employees leaving their positions were shared among the top eight reasons for both groups: "It is difficult to take



time off," "The work is dangerous," "Wages are low for the work," and "Wages fluctuate depending on the amount of work per month" (Figure 2-2-4).

Based on the awareness of the issues among companies and the actual situation of younger workers leaving their jobs, the MLIT is pushing ahead with initiatives that look at the coming decline in Japan's working population and seek to increase the productivity of the construction industry while maintaining on-site capability through the use of ICT, which is displaying dramatic development.



The construction industry is simultaneously an agent in the provision of social capital and an agent in the protection of the areas in which it operates, one that assists in guaranteeing the safety and security of Japanese society and plays an indispensable role in the preservation of the national territory. In order to allow the industry to fulfill these roles even as Japan's population declines and ages, it will be essential to increase productivity in the industry, while at the same time increasing wage levels and reforming working styles (for example by increasing time off). The MLIT is therefore advancing the concept of "i-Construction" (Figure 2-2-5), which will apply the latest technologies, including ICT, to all construction industry processes, from survey and measurement, through design, implementation and inspection, to maintenance management and renovation, with the aim of realizing a 20% increase in the productivity at construction worksites by fiscal 2025. In fiscal 2016, the three leading measures pushed ahead were the application of ICT in all areas of construction (ICT civil engineering), the comprehensive utilization of ICT in construction processes including cutting and embankment work, following the setting of 15 new standards and surveying standards to enable the use of three-dimensional data; the adoption of overall optimization, for example the regularization of standards for concrete work; and the standardization of construction periods, etc., through measures including the use of two-year government bonds and providing obligatory assurances of national subsidization of multi-year construction projects.



As of March 2017, ICT civil engineering has been implemented in 584 construction projects. In the Chubu-Jukan Nyukawa West Section Road Construction Project, conducted in Nyukawa Town, Takayama City, Gifu Prefecture, the contractor made active efforts to utilize ICT civil engineering, including measurement verification by drone (UAV) and cutting slope molding using machine-controlled (MC) backhoes (Figure 2-2-6). The use of UAV and ICT construction machinery in this project considerably reduced the construction period (by around 30 days, from 36 days to 7 days), principally by reducing the number of days necessary for measurement, and enabled even inexperienced operators to bring procedures to completion with a high level of accuracy. In addition to this, the automation of measurement and slope shaping eliminated the danger of accidents such as workers falling from slopes.



Cutting Slope Molding Performed by an MC Backhoe During the Chubu-Jukan Nyukawa West Section Road Construction Project, Takayama City, Gifu Prefecture



Source) MLIT

The Oita River Dam Construction Project being conducted in Oita City, Oita Prefecture, is also making active use of ICT, which has improved efficiency. For example, as a result of the use of UAV measurements, measurements that previously required six-man teams are now performed by teams with a minimum of two members. In addition, the development of a unique construction production system has enabled linked operations by automatic dump trucks and automatic bull-dozers, and surface compaction by automatic vibrating rollers, advancing the automation of dam construction. Because it is possible for multiple pieces of construction machinery to operate and conduct procedures based on instructions input into a tablet in advance, it is possible for operatives to oversee procedures even if they are not highly skilled.

The use of ICT is also expanding among local governments. In the first ICT civil engineering project ordered by Niigata Prefecture, the Itakura Ward Kokugawa Area Landslide Prevention Project, the company implementing the project used the ICT construction equipment in its possession and also made efforts to develop operators able to deploy the equipment. In addition to reducing the construction period, it was reported from the worksite that by reducing the amount of operations conducted around heavy machinery, the application of ICT construction equipment helped prevent accidents caused by contact with the machinery, thus increasing safety. In order to further spread the use of ICT, the MLIT has held workshops for the regional construction industry and local government personnel at 468 locations throughout the country, attended by more than 36,000 people.

In addition, the Ministry established the i-Construction Promotion Consortium in January 2017, seeking to promote the realization of attractive high-productivity new construction sites by promoting cooperation between industry, academia and government in a variety of fields in order to advance measures including the introduction of innovative technologies (the IoT, AI, etc.) to construction sites and the use of 3D data. This consortium has three Working Groups: The Technological Development and Introduction WG, which studies new technologies and measures to promote cooperation between companies in order to introduce cutting-edge technologies to construction sites, the Three-dimensional Data Distribution and Use WG, which con-



Use of models

created automatically by 3D printer

Use in explanations to residents

Allocation of funds, dimensions, etc.

ducts studies toward the creation of rules for the use of open data and the creation of data systems, seeking to promote the collection of 3D data and its more widespread use by government and industry, and the International Standards WG, which studies international standardization and other topics looking toward the overseas expansion of i-Construction (Figure 2-2-7).

In the future, the Consortium intends to expand the range of construction work in which ICT is used (expansion of application to road paving and dredging, trials of use on bridges, etc.), to introduce CIM, and, via the activities of the i-Construction Promotion Consortium Working Groups and other parties, to introduce new technologies to construction sites and boost measures for their promotion and the realization of more widespread use, thereby realizing attractive new construction sites that offer good wages, the ability to take adequate time off, and hope for the future (Figures 2-2-8 and 2-2-9).



Source) MLIT

The automotive ICT revolution

It is claimed that today, 96% of traffic accidents originate with the driver. Autonomous driving can be expected to have a significant effect in alleviating the various issues associated with automotive transport, for example by reducing accidents, easing traffic congestion, assisting in responding to the decline in public transport as a result of Japan's declining birthrate and aging population, and boosting international competitiveness. In addition, among other effects, the practical realization of autonomous driving technologies will increase safety, increase transportation efficiency, and allow the creation of new transport services, and can thus be expected to make a major contribution to increased productivity (Figure 2-2-10).



A survey of trends in the passenger vehicle market conducted by the Japan Automobile Manufacturers Association (JAMA) in fiscal 2015^{Note 44} showed "Safety will increase" as the most frequent answer among respondents to the question "What do you expect from autonomous driving?". However, "I have concerns about safety" was the most frequent answer to the question "Why are you not interested in autonomous driving?" Both responses reveal a high level of concern regarding safety. As can be seen from these results, in order to ensure that innovations are accepted by society, it will be essential to eliminate anxieties concerning new technologies and services. In order to do so, it will be vital to ensure safety via more advanced technological research, and to formulate rules and verify systems for the social implementation of technologies and services.

Looking toward the practical realization of autonomous driving, a diverse range of businesses and governments in countries around the world are working together on R&D and tests toward the improvement of technologies such as radar, cameras, laser scanners, and vehicle technologies, and the formulation of rules and the verification of systems are proceeding. Competition is fierce to take the lead in the field of autonomous driving.

To allow Japan to lead the world in this area, the MLIT has proceeded with studies of advanced digital maps, technologies utilizing ICT, and methods allowing safe and smooth communication between drivers and systems, the formulation of rules in areas such as international standards for road-vehicle cooperation systems and other autonomous driving technologies, and social trials and social implementation. In November 2016, the Ministry established the MLIT Autonomous Driving Strategy Headquarters, which is organizing issues to be studied toward the practical realization of autonomous driving, and holding discussions regarding matters including proving trial plans and the provision of the necessary environment. The Ministry has also established a study group considering the liability for damages in the case of autonomous driving, which is studying issues of liability in relation to the Automobile Liability Security Act, and formulating rules while taking into consideration factors such as ensuring rapid aid to victims of accidents, realizing an acceptable financial burden, and the status of discussions in the area internationally.

In the future, the Ministry intends to select areas for proving trials of an autonomous driving service in mountainous areas that uses roadside stations as bases, and to commence these trials from summer 2017. In addition, looking toward the commercialization of a convoy driving technology for trucks on expressways between Tokyo and Osaka (in which the vehicles following the first in the convoy will be unmanned) from fiscal 2022, and an unmanned automated transport service from fiscal 2020, from January 2018 the Ministry intends to hold proving trials with human subjects in the following vehicles ^{Note 45}, and, in collaboration with the Ministry of Economy, Trade and Industry, to conduct initiatives in the area of last-

Note 44 Based on a survey of households that own cars throughout the country and other respondents conducted from August 19 to September 17, 2015. Autonomous driving was not divided into phases in this question.

Note 45 Proving trials with human subjects in the following vehicles are trials in which the lead vehicle is operated by a driver, and the operation of the following vehicles is automated, but human subjects are present in the vehicles. From January 2019 the viability of the automated convoy system, in which the following vehicles will be unmanned, will be verified on the basis of the status of the subjects in the following vehicles.

mile autonomous driving (Figure 2-2-11). These measures can be expected to assist in the practical realization of autonomous driving, help secure a means of transport for the elderly and others who have difficulty with regard to mobility, supplement public transport systems, resolve shortages of drivers, and promote international expansion based on the technologies and expertise acquired.



A Revolution in logistics productivity

In addition to being marked by a shortage of truck drivers and other workers, contemporary logistics in Japan is also facing various inefficiencies – for example, truck loading rates have declined to around 40%. Seeking to respond to Japan's future shortage of labor power and contribute to economic growth, the MLIT is advancing a revolution in logistics productivity that will significantly increase the "smartness" of logistics by means of the realization of increased efficiency in procedures and increased added value. Specific initiatives include the promotion of measures including modal shift and joint transportation and delivery using the framework of the revised Act on Advancement of Integration and Streamlining of Distribution Business, the promotion of the introduction of open delivery boxes to reduce re-delivery by home delivery services, the provision of support for drone port systems for logistics to realize parcel delivery by small, unmanned vehicles, and informing relevant parties of the design and management of buildings with consideration of logistics.



With regard to the realization of increased added value in particular, at present the Ministry is working to support the overseas expansion of Japanese logistics businesses by promoting the international standardization of Japan's logistics systems, and by this means to increase the quality of logistics services in other countries. As the globalization of supply chains proceeds and logistics demand increases in countries in Asia and elsewhere, the international standardization of Japan's logistics systems and their positioning as the market standard will be essential in order to effectively support the overseas expansion of Japanese logistics businesses^{Note 46}. The establishment of cold chains, including cold home delivery in particular, is expected to progress, with increases in standards of living due to factors including increasing wages in ASEAN and other nations furthering the provision of high added value in logistics. Japanese logistics businesses are currently actively advancing into the field of cold chain logistics in these nations. In order to support the overseas expansion of Japanese logistics businesses, in March 2016, the MLIT established a review committee that includes representatives of logistics businesses, industry groups and administrative bodies, and is working toward the international standardization of Japan's logistics systems. As a result, in February 2017, the British Standards Institution (BSI) issued the world's first standard, PAS 1018, based on the cold home delivery services offered by Japan's logistics businesses. In the future, the Ministry is aiming toward the formulation of an ISO standard; ISO standards function as international standards. In addition, in fiscal 2018, within the framework of Japan-ASEAN transport cooperation, the Ministry intends to formulate guidelines toward the improvement of the quality of cold chain logistics in the ASEAN region in collaboration with ASEAN governments. The Ministry will work to further expand this international standardization by lobbying in forums including policy dialogues with foreign governments. In addition to establishing an environment in which cold chain logistics can be used safely and securely in nations in Asia and throughout the world, these efforts toward international standardization can be expected to contribute to the realization of greater convenience in daily life, the provision of support for SMEs, the development of electronic trading, and the expansion of markets including markets for agricultural products and pharmaceuticals (Figure 2-2-12).

The Maritime Productivity Revolution (i-Shipping and j-Ocean)

In the area of maritime affairs, the Ministry has positioned a maritime productivity revolution, aiming toward the realization of strong industry, high growth and prosperous regions, as part of the Productivity Revolution Project, and is advancing its efforts via the twin prongs of "i-Shipping," an initiative that seeks to increase the productivity of the shipbuilding industry and reduce fuel waste and eliminate accidents in shipping operations, and "j-Ocean," an initiative that seeks to enable Japanese maritime industry to build a larger share in the ocean development market (Figure 2-2-13).

Between 1956 and 2001, Japan's shipbuilding industry was the world's best in terms of constructed tonnage, and at its maximum, its market share was more than 50%. However, with the rise of China and South Korea in this area, Japan's industry has dropped to number three in the world, and its market share has declined to approximately 20%. Against this background, the i-Shipping initiative seeks to enhance the competitiveness of the Japanese shipbuilding industry by increasing productivity in every phase of the process, from the development and design of ships through construction to operation, via the application of technologies including ICT.

In the category of development and design, the i-Shipping initiative seeks to halve the development time for new ship configurations. By focusing on conventional development that relies on a repeated process in which optimal ship configurations are studied and their performance verified in a test tank, allowing improvements to be made, the initiative is working to reduce development time for new ships by realizing advanced CFD in order to replace some of the water tank tests.

In the areas of construction and operation, looking toward the realization of increased efficiency and sophistication in design and production in the fields of shipbuilding and the manufacture of onboard equipment, and in ship operation via the application of technologies including the IoT and big data (which are displaying marked development at present), in fiscal 2016 the Ministry provided support for the development of four innovative shipbuilding technologies and seven advanced ship technologies. In addition, the Act concerning the Partial Revision of the Maritime Transportation Act and the Mariners Act, which specifies the establishment of a system of authorization for plans, for example for the introduction of advanced ships, was enacted on April 12, 2017, in order to promote the R&D, construction, introduction and diffusion of ships using these advanced technologies (Figure 2-2-14).

Note 46 "Concerning the Basic Orientation, etc., for Physical Distribution Policy" (a report published in December 2015 by the Council for Social Infrastructure and the Traffic Policy Council) states that: "Given the fact that Japan's physical distribution businesses display the world's highest standards of service and expertise in precision services tailored to customer needs (such as high-frequency, low-volume delivery and fixed-time delivery), cold chains, home delivery systems, etc., it will be important for Japan to proactively work with other Asian nations to establish Asian standards. In order to do so, it will be necessary to consider initiatives that allow Japan to regularize the nation's physical distribution systems and take the lead in international standardization."

In addition, the field of ocean development (ocean-floor oil and gas fields, etc.) is expected to expand over the medium to long term with increasing global demand for energy, and this represents an important new market for Japan's maritime production (shipbuilding industry, onboard equipment manufacturing industry, maritime transportation industry, etc.). The j-Ocean initiative seeks to increase technological capacity, productivity and other parameters across a wide range, from the design and construction of ships and other equipment to their operation, in order to tap into these growth markets.



Figure 2-2-14

System for Authorization of Introduction, etc. of Advanced Ships



Column Enhancing and Promoting Training in Shipbuilding at Technical High Schools

There were about twenty high schools that had shipbuilding courses centered on naval architecture during the industry's peak period in the 1970s, but that number had fallen to three^{Note 1} as of 2011. However, even as Japan's global share of the shipbuilding industry has grown in recent years, the need for enhanced training in shipbuilding at technical high schools has once again grown in regions where the industry is concentrated. A course in shipbuilding was instituted in FY2016 at Ehime Prefectural Imabari Technical High School, and specific plans for enhancing training in shipbuilding have emerged, including the establishment of such a course at Kagawa Prefectural Tadotsu High School in April 2017.

In the pioneering example of Imabari Technical High School, systems were constructed to support shipbuilding education at the school. In addition to the traditional classroom instruction and school-based technical training, the school joined forces with local shipbuilders and companies that manufacture ship equipment and machinery, the Imabari Regional Shipbuilding Technology Center (a shared site for technological training), the National Maritime Research Institute, and Ehime University, which dispatched lecturers, provided practical training at worksites, and offered training in three-dimensional CAD^{Note 2}. The program received high marks for its innovative nature, including the participation of local companies, local governments, research institutes, and national government bodies in a framework involving links among industry, academia, and government. In FY2016, Imabari Technical High School was designated as a "super professional high school"^{Note 3} by the Ministry of Education, Culture, Sports, Science, and Technology.

Furthermore, in order to promote training in shipbuilding and to promote the enhancement of training programs, the Ministry of Land, Infrastructure, Transport, and Tourism undertook a joint project with technical high schools, shipbuilding companies, and industry organizations in FY2016, with the aim of producing attractive teaching materials in shipbuilding for high school students. In addition, these organizations will cooperate with MLIT in FY2017, creating training programs for shipbuilding instructors in order to promote continuing education for these instructors and to strengthen shipbuilding instruction at the high school level.





Source) MLIT

Figure 2-2-16 Touring a Shipbuilding Plant



Source) MLIT

- Note 1 Shimonoseki Technical High School (Yamaguchi), Susaki Technical High School (Kōchi), Nagasaki Technical High School (Nagasaki)
- Note 2 Computer-assisted design and drawing
- **Note 3** With the objective of training persons skilled in specialized trades and able to be active on the front lines of society, the Ministry of Education, Culture, Sports, Science and Technology designated ten specialized high schools that are making cutting-edge and superior efforts. In FY2016, fifty-five schools applied for this distinction.



Japan Infrastructure Management Council

Having positioned 2013 as the first year of its maintenance regimen, in May 2014 the MLIT formulated the Plan for Extending the Life of Infrastructure (Action Plan), and is working to respond to deteriorating infrastructure. In order to allow the steady implementation of the plan, it will be essential to make efforts to realize strategic maintenance, for example by reducing and standardizing the total cost of infrastructure maintenance. To speed up these efforts, the National Council for Infrastructure Maintenance^{Note 47} was established in November 2016 as a platform to bring together industry, academia, government and the people to enable a full mobilization of technology and knowledge, and to allow efforts toward the maintenance management and upgrading of infrastructure by society as a whole. Diverse actors participate in the National Council. In addition to representatives of construction companies, the council features the participation of representatives of companies in a wide range of industry fields, including information and communications technologies, big data analysis, materials, and machining technologies, regional administrations, NPOs, and others. The National Council provides an official forum in which, using the methods of open innovation, members extend their discussions while exchanging information on concrete issues and matters of concern, and determine directions for technological development and measures for the resolution of problems. Since the establishment of the National Council, five forums, dealing with innovative technologies, support for municipal administrations, the fostering of engineers, citizen participation, and the Kinki region headquarters, have been organized, and are implementing concrete initiatives including the Innovative River Management Project, which is attempting to introduce the latest technologies, including IT and aerial measurement technologies, to river management, and the Regional Forum (including trials), which is promoting exchanges between different industries, looking toward the resolution of problems chiefly among municipal administrations in the Kinki and Chubu regions. The Local Government Support Forum, held in February 2017, is working to promote effective information exchanges and discussions between government and private enterprise (through initiatives including question-and-answer sessions with municipal administrations and other entities in remote regions using ICT) and the horizontal rollout of advanced initiatives throughout the country (Figure 2-2-18).

Note 47 As of March 21, 2017, the National Council for Infrastructure Maintenance had 492 members.


Using the methods of open innovation, the Innovative River Management Project is urgently seeking to implement the latest technologies, including IT and aerial measurement technologies, in river management and to increase the sophistication of both river management and disaster response. As the project's first stage, in November 2016, a public call was issued for participation in open innovation toward the practical realization of 1) land-based and underwater laser drones, 2) cloud-type maintenance-free water level indicators, and 3) all-weather drones. Looking toward rapid onsite implementation, pitch events^{Note 48} were held in December 2016 and January 2017, and development teams were formed (three teams for Theme 1, 12 teams for Theme 2 and two teams for Theme 3); the earliest experimental onsite measurements will be conducted from April 2017^{Note 49}.

As a result of efforts of this type to promote open discussion between industry, academia, government and public, onsite trials are advancing steadily via cooperation between companies and matching between the public and private sectors (Figures 2-2-19 and 2-2-20).

Note 48 Pitch events are events at which the respective participants bring details of the technologies that they can offer, and offer presentations and hold Q&A sessions and information exchanges in relation to the required technological specifications. These events allow interaction between companies, supporting business matching and the rapid creation of development teams toward implementation.

Note 49 Amuse Oneself, Inc., and Pasco Corporation are scheduled to conduct the first onsite proving trial for Theme 1 (Land-based and underwater laser drones) in the Yura River system (managed by the Kinki Regional Development Bureau) in late April 2017.

By means of these initiatives, we will make use of diverse technologies and the know-how of the private sector at every stage of infrastructure maintenance, working to promote innovation that will realize the infrastructure maintenance productivity revolution, in addition to developing and invigorating the maintenance industry.



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Chapter 2 Present Efforts Toward and Issues Regarding Pilot Projects and Creation of Innovation
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Creation of a meteorological business market

With the development of technologies such as the IoT and AI, a dramatic increase in productivity in a wide range of industries can be anticipated through the use of meteorological data. This will support services in a wide range of fields; for example, it will be possible to use photographs supplied by ordinary people in making forecasts, and to provide services, even routing services, to shipping, aviation and rail businesses, while considering not only meteorological data but factors such as speed and low fuel consumption, and taking into account the characteristics of the freight being carried and the status of the industry. In March 2017, the Ministry established the Meteorological Business Promotion Consortium^{Note 50}, the purpose of which is to match industries and meteorological services. The Consortium is moving ahead strongly to create and invigorate new meteorological businesses using cutting-edge technologies such as the IoT and AI. In the future, the Consortium will share information and knowledge regarding meteorological data, conduct proving trials toward the formulation of advanced case studies of the



use of meteorological data, hold discussions concerning responses to problems looking at the use of the data, and organize regional Meteorological Business Forums.

In addition, the Japan Meteorological Agency is working to make the data it holds open data. In May 2013, the Agency established a dedicated website enabling users to gain a quantitative understanding of the climate risk occasioned by changes in the weather and the atmospheric temperature, to allow the reduction of risk or the seizing of business opportunities. To make it easier for companies and farmers to use the data in their responses to climate risk, the site's content includes an introduction to methods of analyzing how the climate is related to elements such as product sales and the raising of agricultural products and actual case studies of responses. The site also makes available past measurement data for regions throughout the country. In addition to being able to specify a period and download the past data, users can also obtain temperature predictions for two weeks or one month ahead.

In the future, geographic information system (GIS) data will be formulated and published for the forecast divisions^{Note 51} used for different types of data, and meteorological data and actions to be taken will be translated into multiple languages to allow the creation of an environment enabling meteorological data to be provided to overseas visitors to Japan and others.

Open innovation and open data initiatives will be pushed ahead in meteorology-related fields aiming toward the realization of a 200-billion yen^{Note 52} boost in GDP by 2020 (Figure 2-2-21).



Note 51 The regional divisions used in weather forecasts are specified by the Japan Meteorological Agency Forecast and Warning Regulations. Each prefecture is divided into a number of primary subdivision units; warnings and alerts are issued for secondary subdivision units.

Note 52 Estimated as an effect of the avoidance of cold weather damage in the agricultural industry, optimal inventory management in the retail industry, increased sales by meteorological businesses, etc.

A new form of town planning using traffic-related big data (Promotion of smart planning)

Town planning up to the present has considered the siting of public facilities and other buildings based on static analysis, using data such as that concerning population distribution and the status of siting of other facilities. However, today an environment is being formed that allows dynamic analysis using big data, made up of data concerning movement at the level of the individual, obtained from GPS data, Wi-Fi data and other data types via smartphones. The MLIT is engaged in the development of "smart planning," which will simultaneously optimize user convenience and corporate business activities, based on "behavior data" for each personal attribute, obtained using this traffic-related big data.

In fiscal 2016, using Okayama City as a case study, in response to the problem of increasing the ease of getting around in the central city area, a system for the predic-



tion of changes in pedestrian patterns when an open café was hypothetically established was developed, and the effect of implementation of the measure was studied. In future, based on the findings obtained, the system will be upgraded in order to make predictions regarding the siting of major public facilities such as welfare centers and childcare facilities in addition to open cafés, etc., and to predict changes in factors such as the number of visitors to the city center in relation to public transport. The goal in doing so will be to make possible town planning that optimizes the entire city via public-private collaboration (Figure 2-2-22).

Toll structure making intelligent use of expressways

With regard to the toll structure in use on Tokyo expressways, the interim report of the National Arterial Road Task Force of the Panel on Infrastructure Development's Road Subcommittee (published on July 30, 2015) indicates the necessity for the introduction of a policy-based toll structure that would organize and unify the toll structure and realize seamless tolls based on points of origin and destination, following the "Three Principle of Intelligent Metropolitan Tolls."

Based on these guidelines, and taking into consideration the status of development of Tokyo's three expressway ring roads, the toll structure on the inner route of the Metropolitan Ken-O Expressway, which struggled with differences in the particulars of establishment, factors including toll standards and vehicle classifications depending on route and section, was transformed from a road development-oriented toll structure into a use-oriented toll structure based on distance traveled in April 2016 (Figure 2-2-23).

The main points of the new expressway tolls are unification of toll standards in suburban areas on an existing national expressway and unification of vehicle classifications into five classifications.

In addition, taking into consideration policy issues in inner urban areas in relation to matters such as road traffic and the environment, seamless tolls based on the shortest distance between the points of origin and destination are being introduced to ensure that the use of the Metropolitan Ken-O Expressway does not become disadvantageous as a result of tolls.

Following the introduction of the new expressway tolls, traffic shifted from passing through the city center to the outer ring road. Through traffic in the center of the city was reduced by approximately 10% (in the case of the section between the Tomei Expressway and the Tohoku Expressway, through traffic in the city center has been reduced by approximately 50%). As a result, traffic volume on the Metropolitan Expressway has been reduced by approximately 1%, and time lost to traffic congestion has been reduced by approximately 10%. In addition, the extension of the network and the reduction of

toll standards has promoted the use of the Metropolitan Ken-O Expressway, increasing its traffic volume by approximately 30%, and the situating of new physical distribution facilities along the expressway has increased approximately 4.6-fold.



In addition, to ensure more effective and intelligent use of expressways in the Kinki region, in June 2017, distance-based tolls using the existing national expressway suburban sections will be introduced, vehicle classifications will be unified into five classifications, and a new toll structure will be introduced based on considerations including the securing of resources for future extension of the network.

The Linear Chuo Shinkansen

Superconductive linear technology is a world-class advanced technology developed in Japan. Unlike conventional rail, it does not make use of friction between the wheels and the tracks; magnetic force between superconductive magnets installed in the train and coils in the guideways enables operation with no contact, making it possible to realize stable ultra-high-speed operation of 500 km/h.

In 1962, two years before the opening of the Tokaido Shinkansen route, the Institute for Rail Technology of the Japanese National Railways began research on next-generation high-speed rail. Later, at a public test held as an event commemorating the centenary of rail in Japan, levitation at 60 km/h was realized on the 480m track at the institute^{Note 53}.

The fourth Comprehensive National Development Plan (National Land Agency, 1987) states that "With regard to the Chuo Shinkansen^{Note 54}, from a long-term perspective, in addition to proceeding with surveys, research on new technologies including magnetic levitation and efforts to increase the sophistication of existing technologies in order to reduce construction costs will be promoted toward the realization of a high-quality rail system." Following the reform of Japanese

Note 53 During a manned test in April 2015, a maximum speed of 603 km/h was recorded.

Note 54 The Chuo Shinkansen is a new shinkansen originating in Tokyo and terminating in Osaka, planned based on the Nationwide Shinkansen Railways Construction and Improvement Act. The shinkansen plan was incorporated in the Basic Plan in 1973, and the surveys required by the Act were conducted. In February 2010, the Minister of Land, Infrastructure, Transport and Tourism consulted with the Transport Policy Council, and the Chuo Shinkansen Working Group of the Railway Task Force of the Council's Land Transport Subcommittee conducted a review. The construction plan settled on in May 2011 specified the use of superconductive magnetic levitation (superconductive linear) as the drive method, with a maximum speed of 505 km/h.

National Railways, the Railway Technical Research Institute (previously an incorporated foundation, and now a public interest incorporated foundation) took over research duties and advanced research and development. In April 2007, the Central Japan Railway Company announced its goal of beginning operation of the Chuo Linear Shinkansen between the Tokyo metropolitan area and the Chukyo metropolitan area as an alternative transportation route to the Tokaido Shinkansen. In July 2009, the Technological Evaluation Committee for Superconductive Magnetic Levitation Rail found that prospects were excellent for the development of technologies to realize an ultra-high-speed mass transportation system, including on the operational front. In May 2011, the Central Japan Railway Company was designated as having responsibility for both the business and construction aspects of the project, and a construction plan was formulated and instructions regarding construction were issued to the company. In October 2014, the Minister of Land, Infrastructure, Transport and Tourism approved a construction implementation plan.

The development of superconductive linear technologies has been advanced jointly by the Central Japan Railway Company and the Railway Technical Research Institute, following the Basic Plan for the Development of Superconductive Magnetic Levitation Rail Technologies, based on a 1990 directive from the Minister of Transport. Given that the period for technological development specified in the Basic Plan concluded in fiscal 2016, the Central Japan Railway Company and the Railway Technical Research Institute reported to the 20th Technological Evaluation Committee for Superconductive Magnetic Levitation Rail regarding the future direction for technological development in February 2017. This report was reviewed and accepted. As a result, the MLIT approved changes to the Basic Plan for the Development of Superconductive Magnetic Levitation Development of Superconductive Magnetic Levita-

tion Rail Technologies in March 2017.

Superconductive linear technology can be considered an innovation that has been through multiple verifications of safety, created through long years of technological development and proving trials conducted jointly by government and private enterprise. In the future, the MLIT will make the most of the socially-implemented superconductive linear technologies to link major cities and create "super-mega-regions," will support initiatives for regional revitalization (access roads, development of areas around stations, development of tourist areas, provision of public transport, etc.), and will work toward the international deployment of superconductive linear technologies by urging their introduction in the US. These efforts can be expected to boost linkage between cities via higher-speed

Figure 2-2-24		Examples of Town Planning Initiatives along the Linear Chuo Shinkansen Route		
Prefecture	Designation		Responsible entity	Date
Tokyo Metropolitan	Toward the realization of "true region-building in which Tokyo and regional areas flourish together" – Comprehensive Strategy for Tokyo –		Tokyo Metropolitan	November 2015
Kanagawa Prefecture	Plan for the Establishment of a Center for Wide-area Exchange in Sagamihara City		Sagamihara City	August 2016
Nagano Prefecture	Basic Vision for Development of Areas Around Linear Chuo Shinkansen Stations		lida City	June 2015
Gifu Prefecture	Basic Plan for Development of Areas Around Linear Chuo Shinkansen in Gifu Prefecture		Gifu Prefecture Study Group for Strategy Regard- ing Utilization of the Linear Chuo Shinkansen	March 2015
Aichi Prefecture	Vision for N	Town Planning Around lagoya Station	Nagoya City	September 2014
Source) MLIT				



travel, increase the international competitiveness of major cities, realize redundancy as a preparation for disasters such as a Nankai Trough earthquake, and contribute to regional revitalization and international initiatives using superconductive linear technologies (Figures 2-2-24 and 2-2-25).

Responses to the sharing economy

The sharing economy is described as "activities contributing to economic revitalization, which make usable assets, etc. (including intangible assets such as skills and time) possessed by individuals, etc., available for use by other individuals, etc., via Internet-based matching platforms" ("Interim Report of the Sharing Economy Review Meeting"^{Note 55}). By enabling existing resources to be used efficiently and allowing individuals to provide and receive a wide range of services, the sharing economy can contribute to the resolution of problems facing Japan via the creation of new solutions and innovation. At the same time, however, the sharing economy presents a number of issues, including protecting the privacy of users, ensuring safety, creating rules and harmonizing the new economy with existing lifestyles.



The scale of the global sharing economy market is ex-

pected to reach approximately 335 billion US dollars in 2025^{Note 56} (Figure 2-2-26). In Japan itself, some sharing services have begun to be provided by businesses originating overseas, among others, making responses essential.

(Responses to home sharing)

Internet-based services matching individuals for home-sharing have recently taken off throughout the world, and in Japan also, home-sharing services utilizing these matching services are rapidly becoming more widespread.

The MLIT believes that the use of home-sharing services will be important in responding to issues such as satisfying the needs of the rapidly increasing number of foreign visitors to Japan and the lack of sufficient accommodation to meet demand in large cities, and that in realizing the use of these services, it will be an urgent task to create rules with a focus on ensuring public hygiene and avoiding problems, for example with local residents, and to respond to illegal home-sharing (operating a hotel business without permission). Given this, the Ministry presented a draft bill concerning the residential accommodation business to the Diet in March 2017. The bill was passed on June 9.

(Responses to car sharing)

In 2014, the MLIT published "Concerning the Treatment of One-way Car Sharing in Rent-A-Car-Type Car Sharing." This statement indicated that when rent-a-car-type car sharing was conducted via a one-way arrangement, when it is recognized that vehicle management can be implemented through the use of IT, etc., irrespective of whether the handover or the return of the vehicle is conducted in an off-street parking facility, this parking facility can be authorized as a vehicle allocation office, and this office can be recognized as the base for the use of the vehicle, as stipulated in Article 7, Item 1(5) of the Road Transport Vehicle Act.

As a result, the number of vehicles used in one-way rent-a-car-type car sharing increased from 160 at the end of fiscal 2014 to 460 at the end of fiscal 2015, an almost three-fold increase.

In order to promote further social implementation, in fiscal 2016, the Ministry conducted social trials of car sharing involving small vehicles using the road space and social trials of high-speed buses and car sharing (Figure 2-2-27).

Note 55 Comprehensive Information Technology (IT) Strategy Office, Cabinet Secretariat (November 2016)Note 56 As of 2013, the scale of the industry is reported to have been approximately 15 billion US dollars.



Trial venue: Hamamatsu Interchange parking area (Higashi Ward, Hamamatsu City, Shizuoka Prefecture) Participants: Enshu Railway Co., Ltd. / Times24 Co., Ltd. Trial period: November 15, 2016 (Tues) – October 31, 2017 (Tues) (scheduled)

Map of trial position

Method of use of car sharing



(Responses to ride sharing)

"Ride sharing^{Note 57}" using private cars is predicated on the driver of the private car having sole responsibility for the carriage of passengers, without any entity being responsible for operational management, vehicle maintenance, etc. The acceptance of compensation for the carriage of passengers under these conditions presents problems from perspectives including the guarantee of safety and the protection of users, and necessitates extremely careful consideration.

It should be noted that ride sharing using private cars is prohibited in countries including Germany, France, Britain (London), and South Korea.

At the same time, the Ministry believes that in Japan, it will be important to increase convenience and productivity in legal passenger carriage services that are acceptable to society using ICT, and has set aside the necessary expenses for proving trials toward the realization of new services including, for taxis, an advance fare confirmation service and a ride-sharing service using smartphone taxi booking apps in its draft budget for fiscal 2017.

Note 57 A service in which the driver of a private car uses that car to convey another person to a destination for money. Smartphone apps, etc., act as the intermediary between the driver and the passenger.

Column A Medium- and Long-Distance Ride Matching Service

According to the Road Transportation Act, individually owned automobiles are not, as a rule, permitted to provide transport for pay. On the other hand, when a driver receives compensation from a passenger for expenses that he or she would not have incurred without taking such a trip, such as gasoline costs, highway tolls, and parking fees, this does not count as transport for pay, so it is outside the purview of the Road Transportation Act.

The medium- and long-distance ride matching service "notteco" began offering its services in 2007. It matches drivers with riders who pay for their share of gasoline costs and highway tolls.

This service recruits riders over the Internet, and the gasoline and highway toll expenses involved in the trip are shared among the riders. Since ride sharing increases the number of persons per vehicle and reduces the number of vehicles on the road, it contributes to lessening the burden on the environment, alleviating traffic congestion, and solving the problem of finding a parking space.

The company announced in the spring of 2017 that it has begun an experimental project in Teshio Town, Hokkaido, where obtaining transportation for everyday needs has become a problem. It is experimenting with a new means of transport that will link Teshio with the city of Wakkanai City, conducting a pilot project in cooperation with Teshio Town.



Fire-resistant timber materials, etc.

Timber materials are a recyclable and renewable resource, and the use of timber materials in housing and construction, etc., helps to revitalize forests, and is important from the perspectives of regional revitalization and responses to global warming.

Public buildings are highly visible and have a high symbolic value, and the construction of public buildings from wood could therefore be expected to increase awareness of the importance of using timber materials and of the virtues of wood. However, after the war, as Japan sought to create cities that would not be prone to the threat of fire, demand for highly fire-resistant buildings increased, and at the same time, there were concerns that large-scale felling during the postwar reconstruction period would deplete Japan's forestry resources and devastate the national land. Because of this, there was a period in which the use of timber materials in public buildings was controlled, and even today, the level of use of timber materials is low. Against this background, the Act on the Promotion of the Use of Timber Materials in Public Buildings, etc. (Act No. 36 of 2010) entered into force in October 2010. With the goal of increasing demand for the entire range of timber materials, including the realization of a ripple effect to the construction of normal buildings such as residences, this Act seeks to promote the use of timber materials with an emphasis on public buildings, in which the rate of timber construction is low and latent demand can be projected. The inclusion of stipulations regarding performance in building standards in the 2000 revision of the Building Standards Law represents another starting point. Demand for and expectations of timber construction are increasing, and a variety of businesses are currently engaged in the development of timber materials.

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Seeking to promote the use of timber materials, since 2011 the MLIT has conducted fire tests and other tests on actual large-scale timber buildings, and is studying safety in relation to fire, for example performance in the rapid prevention of the spread of fire. In addition, following the enactment of the Act on the Promotion of the Use of Timber Materials in Public Buildings, etc., in March 2013, the Ministry formulated Guidelines for the Construction of Fire-resistant Timber Buildings (Government Facilities), which compiles technical items relevant to the construction of fire-resistant timber buildings, a subject involving a high degree of technical difficulty. In June 2013, the Ministry formulated Guidelines for Introducing the Use of Timber Materials to Government Buildings, which compiles technical items relevant to the rapid prevention other than as office buildings. These were followed in May 2015 by Points to Consider in relation to the Rational Design of Timber Government Building projects in implementing rational design, covering details that affect the construction cost and period, such as procurement of timber materials, selection of timber materials for major structural sections, and examination of joint sections, and in May 2016 by Points to Consider in relation to Maintenance that will contribute to Adequate Preservation of Government Facilities using Timber Materials (Draft).

In addition, in April 2016, the Ministry of Agriculture, Forestry and Fisheries and others revised the Plan to Promote the Use of Timber Materials in Government Buildings. In addition to formulating a new Technology Basic Plan, the MLIT is continuing to work toward the creation of new construction materials and new construction methods for the timber building market and to realize their implementation, for example by conducting projects that take the lead in timber building technologies in order to increase demand for timber materials, while maintaining a focus on building safety.

Other than this, in addition to the use of timber construction and the use of wood in interior fittings for the venues to be used for the 2020 Tokyo Olympics and Paralympics, further progress in the use of a diverse range of timber materials, including cross-laminated timber (CLT^{Note 58}) and new timber members, can be expected.

Construction of LNG bunkering bases

Compared to fuel oil, natural gas displays excellent environmental performance, emitting minimal carbon dioxide, nitrogen oxide and sulfur oxide, and there is already a global transition underway from the use of oil to the use of natural gas for land-based applications.

At sea also, a transition from the use of conventional petroleum-based fuels to the use of clean LNG fuels^{Note 59}, which present a lower environmental burden, has begun; for example, special marine zones have been established in North America and Europe in which regulations on exhaust gas emissions from ships are more stringent, and the International Maritime Organization (IMO) decided in October 2016 to begin strengthening regulations on the sulfur concentration in ship fuels in ordinary waters, including around Japan from 2020. In North America and Europe, which have pioneered vessel exhaust gas regulations, container, cruise and other ships able to use LNG as fuel are appearing. Looking to the future, it will be essential to promote the use of LNG fuel in ships in the Asian region also as regulations become more stringent.

In Japan, two companies, Tokyo Gas (which has been conducting studies in the area since the latter half of the 1950s) and the Tokyo Electric Power Company, its partner in the joint project, have built the world's first joint LNG supply system for power generation and gas supply. In August 2015, the LNG-fueled ship Sakigake was introduced. A tugboat able to use LNG as fuel, the Sakigake is a ship that provides assistance when large ships that are unable to turn in a small radius enter or leave port and dock or leave shore. Because it is necessary for the ship to move ships and structures much larger than itself, it is provided with powerful engines, enabling the realization of operation as a tugboat, which are subjected to the most severe fluctuations in load of any ships. At present, the Sakigake operates in the ports of Yokohama and Kawasaki, and is supplied with LNG fuel using a truck-to-ship method.

Singapore is a central location for fuel oil bunkering (the supply of fuel to ships), but while the nation is making active efforts in the area of LNG bunkering, it is lacking in LNG base facilities, and it lacks expertise in the operation of, and the supply of fuel to, LNG-fueled ships. As a result, at present, there are almost no LNG bunkering bases in the Asian

Note 58 Cross-laminated timber is a laminated and bonded timber construction material formed such that the direction of the fibers in each laminated board is at right angles to the fibers in the surrounding boards.

Note 59 LNG is an abbreviation of liquefied natural gas. It is natural gas that has been chilled to -162 degrees or below, turning it into a liquid. Because it is necessary to store LNG under high pressure, it is essential to establish infrastructure for pressure management, etc.

region. Japan is the world's largest importer of LNG, possesses a large number of existing LNG bases contiguous to the port of Yokohama, operates the Sakigake and has begun LNG bunkering for the vessel. The potential for taking the lead in the area of LNG bunkering in cooperation with Singapore by exploiting these advantages is now under study. In October 2016, in an effort to promote the introduction of LNG-fueled ships, a memorandum of understanding (MOU) concerning cooperation in the development of LNG as a maritime fuel was signed by eight representatives of seven countries, including Japan and Singapore, looking toward the creation of an international network of LNG bunkering bases.

In an effort to advance the creation of bunkering bases in Japanese ports and to promote the introduction of, and stimulate demand for, LNG-fueled ships that will reduce the burden on the maritime environment, the Review Committee for Measures toward the Establishment of an LNG Bunkering Base in the Port of Yokohama^{Note 60} was established in June 2016. The importance of Japan taking the initiative and assuming a leadership role in this area has been reported to the Committee. With the participation of experts, private sector businesses and relevant government agencies, the MLIT launched the Review Committee for Technologies for the Realization of LNG-fueled Work Vessels in December 2016 as a technological review committee looking toward the use of LNG as a fuel for work vessels employed by regional development bureaus and the like. Adhering to the guideline of studying LNG fueling with marine environment improvement vessels as model vessels, the committee examined matters including problems and design conditions related to the installation of LNG-fueled equipment.



The MLIT will continue to advance the creation of LNG bunkering systems for large vessels in Japan's ports, in advance of the rest of the Asian region, and to ensure that Japan takes the lead in international cooperation. By increasing the number of visits to Japanese ports by LNG-fueled vessels, these initiatives can be expected to contribute to enhancing the international competitiveness of Japan's ports and to stimulating economic growth in Japan.

Section 3

Issues in Innovation in the National Land and Transport Sectors, and Requirements for Future Efforts toward Innovation

In this section, we use investigations regarding innovation and other materials to analyze the condition and issues of

Note 60 Looking toward the creation of LNG bunkering bases in the Asian region in cooperation with the Port of Singapore and other ports, the committee is studying the establishment of Japan's first bunkering base in the Port of Yokohama, a strategic international container port.

innovation activities in industries related to national land and transport. In addition, we use the results of an attitude survey (national attitude survey) we administered to the general public to clarify the conditions under which society will accept new technologies and services, and discuss the creation of further innovation in the national land and transport sectors and what will be required of pilot projects in the future.

Present State and Issues in Innovation in the National Land and Transport Sectors

(1) Corporate Efforts and Issues

The following is an analysis of the innovation realization and the state and issues of innovation activities in industries related to national land and transport (the construction industry, the real estate and rental and leasing industry, the transport and postal services industry, and the lodging, food and beverage services industry), based largely on the results of the Fourth Round of the Japanese National Innovation Survey^{Note 61} conducted by the National Institute of Science and Technology Policy of the Ministry of Education, Culture, Sports, Science and Technology (MEXT).

(Innovation realization and the implementation status of innovation activities)

Of the companies involved in land, infrastructure, transport and tourism that realize innovation (companies that realize product innovation, process innovation, marketing innovation or organizational innovation)^{Note 62}, 46% in the lodging, food and beverage services industry realize innovation, which is greater than the 40% average for all industries. In contrast, the figures for the real estate and rental and leasing industry (38%), the construction industry (31%), and the transport and postal services industry (24%) are below average (Figure 2-3-1).



- Note 61 A general statistical survey implemented in October 2015 by the National Institute of Science and Technology Policy under MEXT. The Fourth Round of the Japanese National Innovation Survey investigated corporate activities executed during the three-year survey reference period from FY2012 to FY2014. The survey population comprised 380,224 private companies with at least 10 full-time employees. A questionnaire was administered to a sample of 24,825 companies selected from the population, and 12,526 companies returned valid responses (a valid response rate of 50%).
- Note 62 In the Fourth Round of the Japanese National Innovation Survey, innovation was classified into the following four categories: (i) Product Innovation: The introduction of new or vastly improved products or services into the market; (ii) Process Innovation: The introduction of new or vastly improved manufacturing processes or distribution methods within the company; (iii) Marketing Innovation: Sweeping changes to product or service design or packaging, and the introduction of new marketing methods regarding sales channels, merchandising methods or pricing methods within the company; (iv) Organizational Innovation: The introduction of new methods within the company regarding business practices, workplace organization or external relations.

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The survey also investigated the implementation status of innovation activities regarding product innovation and process innovation^{Note 63}. Overall, 23% of companies implement innovation activities regarding product or process innovation, and 20% are actually realizing product or process innovation; most companies implementing innovation activities are actually realizing product or process innovation. This demonstrates that the low percentage of companies that implement innovation activities in industries related to national land and transport is connected to the low percentage of companies actually realizing innovation (Figure 2-3-2).



(Obstacles to innovation)

In line with overall trends, many companies indicated the lack of skilled employees, the lack of quality ideas, and the pursuit of immediate sales and profits as obstacles to innovation (Figure 2-3-3).

As for individual industries, a high percentage of companies in the lodging, food and beverage services industry indicated the lack of internal funding and other financial problems as obstacles. One major reason for this is the burden of investing in facilities and the like faced by hotels and Japanese inns, which are included in the lodging, food and beverage services industry, and which use buildings and facilities to provide services to customers. According to the FY2015 Basic Survey on Small and Medium Enterprises conducted by the Small and Medium Enterprise Agency (Figure 2-3-4), the fixed asset ratio (the ratio of fixed assets (buildings, land, etc.) to net assets) of the lodging industry and food and beverage services industry was 697%, and the debt ratio (the ratio of debt (loans, etc.) to net assets) was 827%, both of which are substantially higher than those of other industries (Figure 2-3-4). The fact that loans from financial institutions and the like are invested in fixed assets is one reason investment in innovation is so limited.

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Note 63 Companies that implement innovation activities are defined as companies that actually realized product or process innovation, and companies that implemented activities toward realizing product or process innovation, but ceased those activities before they actually realized innovation.
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(Efforts toward open innovation, etc.)

As for the percentage of companies that cooperate with other companies and organizations to implement innovation activities, the transport and postal services industry and the lodging, food and beverage services industry trail overall industries by more than 10 points (Figure 2-3-5).

As for the nature of the cooperation partners, overall, the highest percentage of companies cooperate with suppliers, but the highest percentage of companies in the transport and postal services industry cooperate with clients and customers. In addition, the percentage of companies in the construction industry that cooperates with the government, public research institutes, and universities and other higher education institutions is lower than that in other industries.

The state of research and development, which is one source of innovation, reveals

that a low percentage of companies in the construction industry, the transport industry, and the postal services industry conduct research and development, and that companies in those industries spend less than 1% of their gross sales on research expenditures, which is low compared to the manufacturing industry average and the overall industry average (Figure 2-3-6). In addition, the percentage of externally funded research expenditures in the construction industry is extremely low.



Now we will focus on the achievement of outcomes of innovation realization.

We will compare the achievement of two outcomes of product innovation: Developing new markets (market development), and maintaining and improving customer and product unit prices through the creation of high value-added (creation of high value-added). As for market development, 58% of companies in the transport and postal services industry achieved outcomes that exceeded their targets, a level of achievement that is greater than the overall figure of 43%. In contrast, companies in some industries are not well suited to proactive efforts toward market development; the level of target achievement among companies in the lodging, food and beverage services industry and real estate and rental and leasing industry are 33% and 32%, respectively, and a high percentage of companies in those industries make no efforts toward market development (Figure 2-3-7). As for the creation of high value addition, 20% of companies in the construction industry produced outcomes that exceeded their targets, which is extremely low compared to the 45% of overall companies that achieved their targets (Figure 2-3-8). This is likely because companies in the construction industry win



Source) Prepared by the MLIT based on "the Fourth Round of the Japanese National Innovation Survey Statistical Report" by the National Institute of Science and Technology Policy under MEXT



business by executing various kinds of construction to meet buyers' demands, and could be related to the lack of research and development investment demonstrated in Figure 2-3-6.

In addition, a substantially high percentage of companies in the construction industry indicated that they did not verify outcomes in terms of market development (30%) or the creation of high value addition (27%).



Next, we will look at two outcomes of process innovation: cost reduction, and improving capacity and flexibility to deal with demand fluctuations (readiness for demand fluctuations). As for cost reduction, 64% of companies in the lodging, food and beverage services industry produced outcomes that exceeded targets, which is greater than the overall figure of 50% (Figure 2-3-9). As for readiness for demand fluctuations, 62% of companies in the transport and postal services industry produced outcomes that exceeded targets (Figure 2-3-10).

A substantially high percentage (34%) of companies in the construction industry indicated that they did not verify outcomes in terms of cost reduction or readiness for demand fluctuations.



Companies in the transport and postal services industry are steadily achieving targets in both product and process innovation. Companies in this industry emphasize cooperation with customers and clients with needs in the course of implementing innovation activities, and this could be linked to the realization of product and process innovation. In contrast, the level of target achievement through innovation in the construction industry is low for all outcome items. In addition, a high percentage of companies in the construction industry do not verify outcomes, and there is a need to implement effective innovation activities, and for governments and the industry as a whole to continue to build systems to proactively and effectively use and evaluate new technologies and the like.

(Response to societal challenges)

As a country that leads the way in tackling societal challenges, Japan must take action in response to a variety of societal challenges. Although these societal challenges can be interpreted as business opportunities, few companies have taken the initiative to create research and development themes that address them. While 38.3% of companies believe that Japan's declining birthrate offers opportunities for business development (Figure 2-3-11), only 15.0% of companies have created research and development themes that address Japan's declining birthrate (Figure 2-3-12). Companies recognize that this development can be positive for business in the future, but their prioritization of immediate sales and profits and the difficulty companies face in attempting to formulate resolutions or markets on their own could explain why none are able to conduct targeted research and development.



Figure 2-3-13

(2) Public Awareness of Innovation

The MLIT conducted a national attitude survey to explore the extent to which society has incorporated new technologies and services in the national land and transport sectors, and to gauge the need for

New Technologies/Service Categories in the National Attitude Survey

National Land/Infrastructure Improvement Sector	Transport Sector	Lifestyle Sector
Citizen reporting of infrastructure deficien- cies, participation in maintenance SNS disaster information systems Navigation systems to assist in evacuation Compact cities Intelligent robots for work in the field Robots for disasters Buried sensor-linked warning/evacuation assistance systems Technology that integrates accident history and geographic information Train car preventive maintenance/malfunc- tion prediction systems Satellite-linked disaster prevention systems	Fully autonomous vehicles Driver-assistance systems Ride sharing Linear Shinkansen Traffic accident prevention sensors Real-time traffic information services Connected cars Automated delivery services Home delivery using drones Seamless positional informa- tion, inside or outside Navigation systems for elderly people or disabled people	Private residence accommo- dation services Telecommuting Distribution of existing housing Smart housing Living assistance robots for home use Virtual reality tourism Home use of augmented re- ality/virtual reality technology Home delivery boxes Shared housing

implementing pilot projects^{Note 64}. The following are observations based on the results of that survey. Note that results of the survey, which investigated the degree of recognition of specific new technologies and services, as well as the public's interest in using them and requirements for bringing them into widespread use, were consolidated and aggregated into three categories: the national land and infrastructure improvement sector, the transport sector, and the sector involving living (the lifestyle sector) (Figure 2-3-13).

(Recognition, interest, and requirements for widespread use)

As for sector-specific recognition of and interest in using new technologies and services, only 13.5% of respondents indicated that they recognized or understood technologies and services in the national land and infrastructure improvement sector, the lowest degree of recognition among the three sectors; however, 70.1% of respondents said that they wanted to use those technologies and see those technologies realized, which was the highest percentage among the three sectors. The national land and infrastructure improvement sector involves many new technologies and services related to disaster prevention and reduction; the strong interest observed in the survey and factors such as the increasing intensity of disasters in recent years suggest that the general public's interest in disaster prevention, response and the like is increasing. However, the public's recognition and understanding of these new technologies and services is low, and pilot projects should include elements for improving recognition (Figure 2-3-14, Figure 2-3-15).

In contrast, recognition in the lifestyle sector was the highest among the three sectors, but interest was the lowest; pilot projects should include elements for the formation of an environment that makes the technologies and services easy for the general public to accept.



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Note 64 The survey was administered online to individuals throughout Japan in March 2017 (1,500 people responded). The survey was administered to 50 people in each of 30 categories: Two categories of gender (male, female), five categories of age range (20s, 30s, 40s, 50s, 60s), and three categories for place of residence (the three major metropolitan areas (which include Saitama Prefecture, Chiba Prefecture, Tokyo Prefecture, Kanagawa Prefecture, Gifu Prefecture, Aichi Prefecture, Mie Prefecture, Kyoto Prefecture, Osaka Prefecture, Hyogo Prefecture and Nara Prefecture), regional cities (addresses in prefectures and government-designated cities other than those in the three major metropolitan areas), and other regions.

As for requirements bringing new technologies and services into widespread use, compared to the other two sectors, for the national land and infrastructure improvement sector, a relatively high number of respondents indicated the need to improve convenience through an improvement in functions and services and to establish environments and improve infrastructure for use and operation (structural), as well as many responses that indicated the need to improve recognition and promote the benefits of the new technologies and services over existing technologies and services. For the traffic sector, the highest number of respondents indicated the need to ensure safety, establish safety and quality standards, and ensure alternative means of transport during emergencies; there is likely a need to improve technical safety as well as provide a psychological sense of



security. For the lifestyle sector, compared to the other two sectors, a higher number of respondents indicated the need to protect privacy and attain harmony with modern lifestyles and society; there is a need to mitigate the disharmony and new risks caused by the introduction of new technologies and services (Figure 2-3-16).

Next, we will analyze trends for each topic.

(Disaster prevention and reduction)

We will examine six new technologies and services related to disaster prevention and reduction in the national land and infrastructure improvement sector: Satellite-linked disaster prevention systems, technology that integrates accident history and geographic information, buried sensor-linked warning and evacuation assistance systems, robots for disasters, navigation systems to assist in evacuation, and SNS disaster information systems.

Except for robots for disasters, fewer than 20% of respondents indicated that they recognized and understood these new technologies and services. Images of robots for disasters being used in major earthquakes and disasters in recent years have been broadcast in the media, which is likely why recognition of robots for disasters is higher than for the other five technologies and services (Figure 2-3-17).



A large number of respondents indicated that improving convenience through improvement of functions and services is required to bring these new technologies and services into widespread use, but a substantially higher number of respondents indicated the need to ensure safety, establish safety and quality standards, ensure alternative means of transport during emergencies, and reduce usage fees, prices and costs for robots for disasters than for the other five new technologies and services. In addition, more respondents indicated the need to create rules for use and operation (non-structural), improve recognition, promote benefits, and protect privacy for navigation systems to assist in evacuation and SNS disaster information systems than for the other four new technologies and services. Each and every member of the general public will come into direct contact with these new technologies and services during disasters; there is a need to create rules for non-structural aspects as well as to undertake efforts to improve recognition and protect personal information (Figure 2-3-18).



(Sharing Economy)

What does the general public think about the new worldview known as the sharing economy (Chapter 2, Section 2) and of the new services it creates? We will examine ride sharing, private residence accommodation and shared housing. The youngest age range expressed the strongest interest in using private residence accommodation and shared housing, but interest in using ride sharing was strongest among people in their 50s; trends vary across age ranges (Figure 2-3-19) (Figure 2-3-20) (Figure 2-3-21).







As for requirements for the widespread use of these new technologies and services, for shared housing and private residence accommodation, the highest number of respondents indicated the need to protect privacy; for ride sharing, the highest number of respondents indicated the need to ensure safety, establish safety and quality standards, and ensure alternative means of transport during emergencies, followed by the need to create rules for use and operation (non-structural) (Figure 2-3-22).



(Logistics)

We will examine three new technologies and services related to logistics: Home delivery boxes, home delivery using drones, and automated delivery services using autonomous driving, etc. As for interest by gender, both male and female respondents indicated the strongest interest (over 60% for both genders) in using home delivery boxes over the other new technologies and services. Home delivery boxes continue to be introduced, mainly in the Greater Tokyo area, and it appears that people recognize the benefits, convenience and other positive aspects of this service. As



for home delivery using drones and automated delivery services, female respondents indicated lower interest than male respondents (Figure 2-3-23) (Figure 2-3-24) (Figure 2-3-25).





As for requirements for the widespread use of these new technologies and services, for home delivery using drones and automated delivery services, the highest number of respondents indicated the need to ensure safety, establish safety and quality standards and ensure alternative means of transport during emergencies. For home delivery boxes, the highest number of respondents indicated the need to protect privacy, followed by the need to improve convenience through improvement of functions and services (Figure 2-3-26).

As indicated previously, there are various requirements for pilot projects for new technologies and services in the national land and transport sectors, and efforts must be undertaken in response to the status of the development of innovation sectors, technologies and the like.



2 Requirements for Promoting Innovation in the National Land and Transport Sectors

In light of public awareness of innovation and the condition and issues of innovation activities in the national land and transport sectors, we will focus on innovation creation and pilot projects in the following examination of requirements for promoting innovation in the national land and transport sectors.

(1) Strengthening Innovation Creation Capacity

(Creating environments for a diverse range of people to flourish and introducing new technologies, etc., to improve productivity)

As in other industries, the lack of skilled human resources in industries related to national land and transport present a major obstacle against innovation; innovation requires the efforts of a diverse range of people, and the creation of an environment in which those people can flourish.

There is a strong perception of male-dominated workplaces in the construction and transport industries, and efforts are being made throughout those industries to create environments where women can flourish and to reform those perceptions. However, the efforts of a diverse range of people, including but not limited to women, are what brings the winds of change into a company. It is crucial to avoid inflexible, conventional ways of thinking and make proactive efforts toward human resources by developing work environments and education systems that cater to a wide range of people and styles of working. Moreover, human resources assessment, smooth communication and other efforts are likely required to link the flourishing of a diverse range of people to innovation.

In addition, new technologies, systems and the like are being introduced in various industries in pursuit of addressing the lack of labor and improving production efficiency. These efforts lead to more opportunities to devote more time and human resources to innovation activities; it is important to effectively and proactively use this extra time and these extra human resources.

In addition to the efforts to improve productivity through the i-Construction initiative described in Chapter 2, Section 2, the MLIT and the construction industry are working to establish a Construction Career Boosting System for properly evaluating the skills and experience of engineers, leading to improved treatment, and other aims (Figure 2-3-27). In addition, the Consortium for Securing and Developing Construction Industry Labor, which was established in October 2014, encourages relevant organizations to secure and develop human resources and works to horizontally develop examples of efforts; efforts such as these where entire industries act as one are important.



(Stimulation of innovation activities through various fundraising methods)

It is important to use various fundraising methods to provide financial support to reduce cash deficits in the lodging, food and beverage services industry, as well as to stimulate entrepreneurial activities and other actions in industries related to national land and transport.

At present, the main methods of fundraising are direct financing, namely through stocks and corporate bonds, and indirect financing from financial institutions; however, the use of crowdfunding to raise funds online has increased in recent years as a method of direct financing (Figure 2-3-28). Crowdfunding enables businesses that may not have



a track record but that exhibit novelty and promise to raise funds from supporters who find that the descriptions of those businesses resonate with them; newly established companies, SMEs and other entities that have difficulty obtaining support from financial institutions are turning to crowdfunding. In addition, fundraising can generate interest in the market for a company and serve as a marketing tool to help companies learn the market's evaluation of them.

Crowdfunding has come into use in facility repairs in the tourism industry, and in the reconstruction of vacant houses and old houses in the countryside and in other ways in real estate investment. In light of these developments, the Act to Partially Amend the Act on Specified Joint Real Estate Ventures, which was established on May 26, 2017, sets out environment improvement, including computerization, to account for crowdfunding in addition to transactions conducted on paper by specified joint real estate ventures^{Note 65}, and relaxed the capital requirements for venture participation, and otherwise promoted the entry of regional real estate companies, ventures with new ideas and other new entities into this business (Figure 2-3-29).

Government aid must also be used effectively. For example, for support related to industrial promotion, it is important to clarify the objectives of the support, and to flexibly determine support periods and methods that correspond to types of business and projects in order to promote the ability of ventures to help themselves continue doing business. In the future, we must promote innovation in the national land and transport sectors by stimulating entrepreneurial activity through efforts to discover and cultivate venture companies, and not only through financial support. In addition, it is important to work toward the widespread adoption of innovation by providing aid and other support to purchasers of new products and services (and not only to the businesses that produce them), as is done with the eco-car tax reduction, the clean energy vehicle introduction promotion subsidy, and the special tax measure for certified Long-Lasting Quality Housing.



(2) Promotion and Enhancement of Pilot Projects for Innovation

(Open innovation, open data)

The promotion of efforts toward open innovation in the national land and transport sectors is a critical part of the drive to improve productivity and take action to tackle societal challenges.

To improve productivity, it is important to use ICT and know-how from other industries, and to make efforts to promote the development of new services and products and to improve production efficiency. For example, Pokémon Go, an augmented reality game developed by the American company Niantic, Inc., was a social phenomenon, and cases in which

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Note 65 Ventures that receive contributions in the association style and pay dividends to investors from profits from the sale or leasing of real estate.

the game was used to attract tourists and create business demonstrate how technological development and new services from other industries can produce innovation in the national land and transport sectors. In addition, the cooperation with customers and clients in the implementation of innovation activities in the transport and postal services industry is connected to business development from the source of needs, and such cooperation in which venture companies and outside companies complement lacking know-how can be a catalyst that creates new innovations.

Regarding global technical innovations that use AI, ICT and the like, Japan must band together to drive forward with technological development and pilot projects. For example, autonomous driving technology requires technological development that combines AI, sensor technology and a variety of other technologies. To move toward putting this technology to practical use, the establishment of vehicle safety standards and rules for liability for damages and accidents and the like, action to accommodate the technology on roads and other infrastructure, verification testing and other efforts to improve public acceptance must be taken, and cooperation between industry, academia and government are critical toward this endeavor.

As for the declining birthrate, aging population, environmental problems and other societal challenges, it is difficult for private companies to project the future, formulate markets, and move forward with research and development and project development on their own. Tackling societal challenges leads to new business opportunities for companies, and the government must involve experts, private companies and others in the determination of approaches and formulation of markets.

Finally, as computerization continues to progress, efforts toward open data will become more important. The Regional Economy and Society Analyzing System (RESAS), provided by the Cabinet Office, aggregates data from the public and private sectors and expresses how money circulates throughout regions, the nature of transactions between regions, tourism trends and demand, and other information in chart, graph and other visual formats in an effort to visualize information (Figure 2-3-30). Local governments use RESAS to fully understand the nationalities, travel ranges and other information about foreign tourists who visit their regions, which enables them to extract priority areas and



countries in which to focus tourism promotion, and is useful in their development of tourism policy. Effectively opening data from the private and public sectors in this way encourages the use of information and promotes voluntary innovation activities by companies and local governments based on objective data.

(Creating a foundation for social acceptance of innovation)

As demonstrated by the national attitude survey and the efforts for the pilot project for autonomous driving described previously, for society to accept new technologies and new services, it is necessary to ensure technological safety and elicit a sense of safety in users and throughout society by establishing rules and conducting field testing. For example, for the use of drones and other small unmanned aircraft in the logistics business, efforts are being made to establish an environment that is conducive to commercialization of the technology, while the performance is improved, systems are established, and other efforts are made to alleviate the general public's uncertainty regarding the safety of the technology.

In addition, it is necessary to resolve the disharmony between the way the general public lives and regional societies, and to establish environments in which innovations can be used effectively. For example, private residence lodging is rapidly becoming common in Japan, but trouble with neighbors and other problems have become societal challenges. In March 2017, the MLIT submitted a bill for private residence lodging business to the Diet, and the bill was passed into law

on June 9, 2017, and is indicative of our efforts to promote the spread of sound private residence lodging services that take regional circumstances into account.

(Establishing a PDCA cycle for innovation)

Among companies that realize innovation are many companies that have not achieved their targets or verified outcomes. It is important to create a PDCA cycle in which current innovation activities are connected to subsequent innovation activities through the establishment of targets and the verification of outcomes. It is also effective to standardize evaluation criteria for quality, technology and other factors throughout industries and establish common best practices in order to create targets for individual companies to aim for.

Chapter 3

Prospects for the Future Generated by Innovation

Chapter 3 will first present a projection up to the year 2050, with an overview of a future social environment in which advances have been made in the implementation in society of new technology and new services in the land, infrastructure, transport and tourism sectors. Then, in light of the future social environment, the chapter will present lifestyles and issues together with an examination of the future society in terms of community development undertaken by corporations and local communities as well as of future-oriented innovation activities. This chapter will further refer to the results of national attitude survey^{Note 66} of the Japanese public conducted by the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) to determine the Japanese people's ideal image of a future society.

Section 1 Predictions of the Future Social Environment

(1) National Land and Regional Development with a View to 2050

In order for the MLIT to respond to the kinds of drastic changes in the circumstances surrounding the national land, including rapidly declining population, low birth rates, and a possibly imminent large-scale disaster, which were summarized in Chapter 1, the ministry published the "Grand Design of National Spatial Development Toward 2050" in July 2014. This document shares the public sense of crisis and sets forth principles of national land and regional development from a medium- to long-term perspective (generally with a view to the year 2050). Taking this into consideration, changes to the National Spatial Strategies (National Plan) for a plan period of roughly 10 years starting in 2015 were adopted by a Cohingt decision in August 2015.

Cabinet decision in August 2015.

The second phase of the National Spatial Strategies (National Plan) presents a basic framework for building a "convection-promoting national land" that creates vigorous interactive movements of people, goods, money, and information back and forth between regions (convection) by refining the varied and distinctive individual characteristics of those regions. The plan describes the kind of national structure and regional structure that will create this convective movement in terms of compactness and networks. That is, medical, commercial, and other such life service functions, as well as other types of functions, are consolidated within certain defined regions in a compact manner and the regions are tied into a connecting network (Figure 3-1-1).



(2) Advancing the Development of Transportation Infrastructure

Support for the foundation of national land development by compactness and networks includes transportation infrastructure. Major advances in the development of key transportation infrastructure are anticipated by the year 2050. These include three

Note 66 Survey coverage and so on are the same as those of the public opinion poll cited in Section 3 of Chapter 2.

ring roads in the Tokyo Metropolitan Area, the Linear Chuo Shinkansen^{Note 67}, and the new Shinkansen lines to be developed.

(Arterial high-standard highways)

When adjacent metropolitan areas collaborate through the use of expressway networks, they will be able to secure a certain scale of population even under the circumstances of a declining population. Furthermore, the development of trunk road networks of arterial high-standard highways and other such roads (Figure 3-1-2) contributes significantly to vitalization of local economies by encouraging the siting of factories and large distribution facilities near expressway interchanges, for example, and by increasing employment and tax revenues. At the same time, this also contributes greatly to improving the quality and safety of the lives of the Japanese people by making it possible, for example, to receive wide-area medical services in rural areas and to ensure detour routes over wide areas in the event that trunk roads are made impassable by disaster or other such reason.

(Forming a super mega-region)

Opening the Linear Chuo Shinkansen for service^{Note 68} to connect Tokyo, Nagoya, and Osaka is very likely to dramatically heighten the convenience of access between major metropolitan areas and rural areas and to have as great an impact on the national land as the Tokaido Shinkansen did. Opening the Linear Chuo Shinkansen for service will link the three major metropolitan areas within one hour. This will make that travel much the same, in a sense, as travel within a city, so that the three major metropolitan areas will become integrated even as they function in their individually distinctive ways. This can be expected to form a super mega-region that takes the lead globally by providing access





Note 67 Shinkansen train that runs at a top speed of 505 km/h using a conducting magnetic levitation (superconducting maglev) system. It will travel between Tokyo and Nagoya in 40 minutes, and between Tokyo and Osaka in 67 minutes.

Note 68 The Minister of Land, Infrastructure, Transport and Tourism has designated the Central Japan Railway Company as the entity of operation and construction. Service between Shinagawa in Tokyo and Nagoya is scheduled to begin in 2027. Construction is presently underway at Shinagawa Station and the Southern Alps tunnels. The Fiscal Investment and Loan Program is to be used for construction of the section between Shinagawa and Nagoya, thus bringing forward the opening of the entire length to Osaka by a maximum of eight years from 2045.

to four major international airports and two strategic international container ports while attracting people, goods, money, and information from around the world (Figure 3-1-3). This will form an enormous metropolitan area that is the largest in the world, with a population of 70 million. Tokyo and Osaka will serve as giant hubs for the mega-region, which will make it possible to develop a "regional economic development corridor" that integrates the whole country in a single economic sphere. This will facilitate steps to improve Japan's international competitiveness, while also spreading that capacity for growth throughout the country and causing the Japanese economy as a whole to expand.

Intermediate stations along the Linear Chuo Shinkansen will also be used. This will stimulate the "convective" flow between major cities and local communities that have found it difficult so far to obtain rapid access to those cities, and will raise the possibility of new lifestyles (including people having residences in two regions) when urban living and environments surrounded by nature are brought closer together in terms of travel time as well as possibilities for promoting corporate siting outside the major urban areas (Figure 3-1-4).



(3) Technological Innovation Advanced by Dramatic Progress in ICT

Technological innovations have already brought major changes and progress to people's lives and to society. The evolution in recent years has been particularly conspicuous in AI, robots, IoT, and other such sectors that are predicted to bring significant impact to the economy and society. According to research conducted by Nomura Research Institute, Ltd., into the effects of computerization on employment, 49% of the working population in Japan could be replaced by technological means (Figure 3-1-5). The robot market in Japan is also predicted to grow to 5.3 trillion yen in 2025 and to 9.7 trillion yen in 2035. Outside the manufacturing sector, particularly conspicuous growth in the service sector is predicted (Figure 3-1-6).



(Advances of technological innovation in the construction sector)

The situation of the construction industry with regard to skilled workers is that as those workers age, the industry faces the possibility that they will leave their employment in large numbers due to retirement. It is projected that maintenance and management of deteriorating infrastructure and responses to disaster will increasingly be carried out by remotely operated monitoring and surveys conducted by robots. The conspicuous improvement in monitoring technology makes it a simple matter to identify locations that need repair, making it possible for small numbers of workers to carry out highly efficient work, and also significantly shortening construction time (Figure 3-1-7).



(Advances of technological innovation in the transportation and logistics sectors)

Automated driving technology, if it is applied to practical use, will assure a level of safe driving that equals or exceeds that of accomplished safe drivers. This will realize a society in which traffic accidents almost never happen. In regions that have feared that public transportation will decline as birthrates drop and the population ages, this technology will ensure that elderly people and other who need it will have a means of transportation. Public transporta-



tion networks that make use of automatic driving will also be developed as necessary at junction points and regional cities in the essential transportation infrastructure. This can be expected to realize an environment in which even people who are unable to drive an automobile can receive the life services they need. The use of automated driving technology can also realize truck platooning, thereby increasing the amount of cargo that can be transported by a single truck driver. This will contribute to a resolution of the driver shortage (Figure 3-1-8).

Section 2 Japan in 2050 as Envisioned with Innovation

The Future Envisioned Based on the Present and the Ideal Future

(1) Envisioned Future

(The future envisioned based on the present)

According to the "Survey on The Long-term Outlook of The Country" given by the Ministry of Land, Infrastructure, Transport and Tourism to specialists and knowledgeable people in a wide range of fields, including population, socioeconomics, national infrastructure, and industry^{Note 69}, Japan in the year 2050 is envisioned as described below.

With respect to demographic shifts, many replies imagine the population will concentrate in urban areas. As for housing style, 75% or more of respondents predicted an increase in a "housing style in which people live in single-person households, such as elderly people living alone," and 72.1% predicted an increase in a housing style in which the elderly live together with other elderly people who are not relatives. Thus, they forecast changes in housing style (Figures 3-2-1 and 3-2-2).



Note 69 Given to the members of around 30 associations related to national planning, such as the Science Council of Japan and the Architectural Institute of Japan. The survey was conducted from July 7 to 28, 2010, and a total of approximately 620 responses were received.

Figure 3-2-2

Housing Styles in 2050

Question) Even though the population is forecast to decline, the number of households is expected to change little by 2030. Housing not confined to the conventional "family" unit, such as group homes for the elderly and room sharing, especially among young adults, is attracting interest, mainly in the cities. It is thought that the form that "families" take will change with the times. How do you predict that housing styles will change in Japan by 2050? (Three major metropolitan areas)



Regarding transportation and the movement of people and goods, although it is thought that activities that do not require the movement of people and goods will increase with progress in the application of information and communications networks in various fields, such as work and medical care, the movement of people and goods is predicted to increase even if information and communications networks develop and spread (Figure 3-2-3). Looking at the predicted use of automobiles in 2050, 46.7% of respondents in farming, mountain and fishing villages replied that the use of pri-



vate cars would increase (Figure 3-2-4). In such rural villages, dependence on cars will increase further on the back of reductions in public transportation networks, and there is concern that the shortage of means of transport for elderly people who cannot drive will become more serious.

Π



Regarding infrastructure development, a variety of problems are anticipated to emerge if investment remains at the current level. Particularly with respect to existing infrastructure, around 70% of respondents forecast that maintenance and updating will become difficult, that safety will decline, and that population decline and changes in the socioeconomic situation will lead to the serious problems of increase in and neglect of unused infrastructure (Figure 3-2-5).





In terms of responses to social issues toward the realization of a low-carbon society, there were more replies predicting changes in the field of transportation, such as the rapid spread of eco-cars, great improvement in the convenience and economy of public transportation, and a shift in use away from private cars, than there were other replies (Figure 3-2-6). Moreover, it is thought that the formation of compact cities will progress as an urban structure that encourages low-carbon lifestyles.

As described above, when imagining the year 2050 based on the current situation, it becomes clear that there is a need to address global-scale social issues such as environmental problems, as social issues in Japan related to such topics as population and infrastructure become more serious and apparent. There is also a need for environmental development suited to lifestyle changes such as housing styles.

(The future envisioned by companies and communities)

Next, we look at future-oriented town development and innovation initiatives by companies and communities.

Town development creating the future

"Smart city" initiatives, which utilize ICT throughout society to maximize the use of renewable energy, are attracting attention inside and outside Japan, driven by environmental problems and energy problems that are anticipated for the future. New town development efforts that attempt to add a little something extra to such smart city initiatives are taking place in different locations.

The Fujisawa Sustainable Smart Town (Fujisawa SST), which is being developed on an old Panasonic Corporation factory site in Fujisawa City, is a joint public-private project between private sector companies including Panasonic and Fujisawa City. Residential areas (with low- and mid-to-high-rise housing), lifestyle support areas, and welfare, health, and educational areas are located in a town covering an area of about 19 ha. There will be around 1,000 households. People started moving into some units in March 2014 and the town should be completed after 2020 (Figure 3-2-7).



All detached houses in the community are equipped with solar power generation systems and storage batteries. Environmentally friendly initiatives are implemented community-wide, including visualization of electricity use for each household and facility and the establishment of energy goals such as a reduction of CO_2 by 70% for the town as a whole.

A feature of the town development at Fujisawa SST is that it is making efforts to establish a green and smart lifestyle by adopting cutting-edge technologies and services in a variety of fields such as mobility, not just energy, taking daily living as the starting point.

In terms of mobility, for instance, the town has developed a mobile-friendly environment for residents by providing a variety of means of transportation within the community, such as a sharing service for electric cars and power-assisted bicycles, a rental car service, and the provision of a mobility concierge service to suggest the best means of transportation according to the destination and situation (Figure 3-2-8).

Also, through the Town Portal, which uses smart TVs installed in every house, in addition to getting energy information on each household and the town as a whole, notices and event information can be sent out from the town management company and each facility, so that users can check the town's latest information. Residents can also post messages, provide information on club activities, and share objects and skills that they have. The system thereby acts



like a town bulletin board for sharing various kinds of daily life information in real time.

In this way, Fujisawa SST has created a system for individuals and groups that are active in the community to proactively participate in community activities, and makes use of community feedback in town development. Also, aiming to create a new, future-oriented town and society, Fujisawa SST has become a place that adopts and conducts proof-of-concept tests on cutting-edge technology and services. In October 2016, a system was started to improve the efficiency of deliveries by collecting packages from different delivery companies at the community's distribution center, from which Yamato Transport Co., Ltd., then makes batch deliveries to each household. This is the first approved proposal of a general efficiency improvement plan based on the amended Act on General Improvement of Efficiency of Distribution.

As described above, town development through public-private collaboration and a focus on daily life is a new initiative to create a future society. It is hoped that from here on, such initiatives will turn town development into opportunities for creating innovation. Also, in the lifestyles of the future, efforts will be made to enhance and improve the convenience of functions related to community living, and it is hoped that a community-focused society with connections and relationships will be built.

Weather information business of the future

With progress in technologies such as AI, weather data is being used in a wide range of industries. Weathernews Inc., a major weather information company in Japan, works at providing new services by using new technologies and understanding customer needs. Looking ahead to new issues that climate change, anticipated for the future, and technological innovation will produce, the company is also working to create a new weather information business.

In response to climate change, the company measures and makes forecasts about sea ice and provides a support service for ship operation, since sea ice in the Arctic Ocean has been decreasing in the summer due to global warming in recent years, resulting in the Northeast Passage attracting the attention of the marine transportation industry as a third sea route connecting Asia and Europe^{Note 70}. As heavy use of this sea route is anticipated in the future, the company is even planning to launch a satellite to perform its own observations.

In terms of new issues created by technological innovation, in making automatic driving practical, for example, onboard sensors must recognize the lane by detecting boundaries of the road surface and the white lines, but that becomes difficult when it is snowing. Accordingly, the company supports the practical application of new technologies by providing high-quality information about snow, for instance.

In order to reduce damage caused by sudden localized torrential rain ("guerrilla rainstorms"^{Note 71}), which is difficult to predict and has been increasing in recent years, the company has adopted new technologies such as AI in its services in an effort to more quickly notify users of weather forecasts of guerrilla rainstorms. The service uses AI technology and algorithms to analyze observed weather data as well as reports of sky changes and sensations from users who have registered for the service, and then notifies users as quickly as possible of the possibility of a guerrilla rainstorm (Figure 3-2-9).

As described above, initiatives to over-

Figure 3-2-9 "Guerrilla Rainstorm" Notification System Step1 Step2 Step3 Step4 Report + observation **Request cloud Cloud observation Guerrilla rainstorm** observations and report alarm distribution data analvsis When there is a possibility of a guerrilla rainstorm, Team members observe the clouds and send a A notification is sen those registered for the cloud reports in Weathernews requests report combination with other querrilla rainstorm al guerrilla rainstorm ense team to make observed data such as that from its own radar before the guerrilla rainstorm occurs. cloud observatio Source) Weathernews

come social issues and technological innovation, with a view toward the future, have begun at the level of individual companies. Moreover, as initiatives move forward to protect daily life from weather disasters using new technology and information shared by people, disaster forecasting will become increasingly accurate, and disaster information and damage situations will be shared in a timely manner. It is hoped that this information will be useful for rapid evacuation activities and disaster responses.

Note 71 Weathernews Inc. uses the expression "guerrilla rainstorm."

Note 70 The sea routes that connect Asia and Europe are, in addition to the Northeast Passage, the route through the Suez Canal and the route around the Cape of Good Hope.
Ultra small mobility vehicles created in response to social issues

Given mounting worldwide environmental awareness, the problem of means of transportation for the elderly, increasing urban populations, traffic congestion, and other problems, the spread of environmentally friendly, compact ultra small mobility vehicles^{Note 72} is expected.

According to the Road Traffic Census, many people who use cars use them mainly for transportation over short distances and most often drive alone (Figure 3-2-10). Given this kind of usage, efforts are being made to use small mobility vehicles as: (i) a means of daily transportation; (ii) a means of commercial transportation, such as small deliveries in the city; and (iii) a means of transportation for sightseeing (Figure 3-2-11).





Note 72 An ultra small mobility vehicle is defined as "a vehicle that is more compact than a car, can make tight turns, has excellent environmental performance, and can provide simple transportation within the community for one or two people." Small mobility vehicles are useful as a future means of transportation suited to social issues. We are studying how to develop the environment to meet this technological innovation, including various kinds of infrastructure development (driving lanes, parking spaces, charging, etc.), ways to ensure safety, and other measures toward their full-scale application. These kinds of initiatives will enhance the means of community transportation within future lifestyles and enable stress-free transportation for all people, including the elderly and travelers, hopefully further boosting the movement of people and goods.

(2) The Future Hoped for by the Public

A "National Attitude Survey" conducted by the MLIT asked people what kind of lifestyle they hoped to have in a future society that will be changed greatly by innovation. As in Section 3 of Chapter 2, we consider the future society hoped for by the public, divided into three areas: land and infrastructure development, transportation, and lifestyle.

(Land and infrastructure development: Demographic shifts)

Society in 2050 is envisioned as having developed transportation infrastructure, providing fast and convenient transportation between cities with the development of high-speed networks. Within communities, compact city initiatives will have put all functions needed for daily life within reach by walking or public transport. It is also envisioned that the spread of working styles such as telework will reduce restrictions on location and time of working. When asked where they would choose to live in such a society, around half of people responded that they would hope to live in a different place than now^{Note 73} (Figure 3-2-12).



As for the reasons for choice of place of residence, people who hope to live in the "center of a metropolitan area" place a premium on conveniences such as the concentration of people and goods and the large number of facilities: "Because there are lots of people and goods," and "Because there are plenty of recreational facilities." People who hope to live in the "center of a city other than a metropolitan area," in addition to the concentration of people and goods, also stressed nature and a good climate as well as conditions related to family, such as "Because my parents or children live there" (Figure 3-2-13). Among those who hope to live in a place other than the above, on the other hand, in addition to nature, a good climate, and conditions related to family, comparatively more people indicated "low disaster risk" as a reason for their choice of place of residence.

Note 73 This is the trend when the three major metropolitan areas are taken to be the "center of a metropolitan area" and "suburb slightly outside the center of metropolitan area," government-ordinance-designated cities and prefectural capitals are taken to be the "center of a city other than a metropolitan area" and "suburb slightly outside the center of a city other than a metropolitan area," and other areas are taken to be the "center of a town or village" and a "suburb slightly outside the center of a town or village; rural area." "Other areas," for example, include regional cities that are not a metropolitan area, government-ordinance-designated city, or prefectural capital, and so could be different in a narrow sense.



(Land and infrastructure development: Action during disasters)

It is envisioned that the accuracy of forecasts related to disasters will increase as we head toward the society of 2050. The National Attitude Survey asked: Supposing that the accuracy of disaster forecasting improved to the same level as the accuracy of weather forecasting, what would you do if you knew accurately the type, size, and timing of a disaster that would occur at your current place of residence within five years?

Looking at the actions of the public by place of residence, the highest response among those in the metropolitan areas was that they would "consider changing my place of residence" at 34.4%, followed by "evacuate temporarily to another region" (Figure 3-2-14). In government-ordinance-designated cities and prefectural



capitals and in other areas, the most common response was "prepare disaster prevention goods," at 34.8% and 38.0%, respectively. Based on these responses, we see that people who live in cities intend to change their place of residence or evacuate and that they would be inclined to use disaster forecasting to ensure safety by leaving their place of residence.

(Transportation: Cars)

At present, a variety of initiatives are being carried out through collaboration among government, industry and academia toward the practical implementation of automatic driving technology, and it is even envisioned that automatic driving will become the rule rather than the exception in society by 2050. As with the case above, we conducted a survey on the car use environment that the public hopes for, assuming progress in transportation infrastructure development. Looking at inclinations by place of residence, the percentage of people who wish to own a car accounts for more than half in all regions (Figure 3-2-15). Also, the percentage of people who wish to own was the highest, at 73.2%, in



the other areas, where the percentage who wish "to own a private automated driving car" was also the highest, at 41.2%.

(Transportation: Movement of people and goods)

It is envisioned that in society by 2050, such things as transportation infrastructure development will result in faster and more advanced transportation technology for people and goods. In such a society, how will views of the transportation of people and goods change? Taking perishable foods, in which value is placed on freshness, as an example, we surveyed people's willingness to buy and found that 41.7% of people thought that opportunities to buy perishable foods from inside and outside Japan using distribution would increase, and 18.1% of people thought that opportunities to buy them by going directly to the source would increase. It is therefore clear that faster and more advanced transportation technology would result in the increased movement of people and goods (Figure 3-2-16).

(Lifestyle: Way of working)

It is envisioned that the spread of new working styles, such as telework, will reduce restrictions on location and time of working. When asked where they would like to work in such a society, 51.5% of people said that they would like to work at home (Figure 3-2-17). Changing the place where work is performed from places of employment to people's homes or other locations could result in changes in the locations of daily consumption and could also change the features sought in housing as places of work.

Also, looking at inclinations by occupation, 73.7% of "full-time housewives and stay-at-home dads" chose their homes and, where assuming that they would newly perform office work, there was an inclination to prefer one's home (Figure 3-2-18). On the other hand, 59.2% of "regular salaried and other full-time employees" chose a worksite, and most people who are already working in a company imagine that they would prefer to keep working at their worksite.







Based on the above, we see that innovation in the land, infrastructure, transport, and tourism sectors would spark changes in the public's behavior and consciousness, and that changes in the national consciousness and lifestyles could come with new needs in these sectors.

2 Forecasts of the Future in the Land, Infrastructure, Transport, and Tourism Sectors in 2050

Below, we paint a picture of forecasts of Japan's future, focusing on the land, infrastructure, transport, and tourism sectors, based on the kind of future society hoped for by the public, as obtained in the discussion in 1 above and in the National Attitude Survey.

(1) Land and Infrastructure Development

In society by 2050, core transportation infrastructure such as expressway networks and a Linear Chuo Shinkansen bullet train will have shortened the temporal distance between cities. Also, with the development of such express transportation infrastructure as well as public transportation and infrastructure connecting areas within communities, transportation will have become dramatically fast and convenient. Within communities, initiatives such as compact cities will put all functions needed in daily life within reach via walking or public transportation. Additionally, with ICT development, working styles with fewer restrictions on place and time, such as teleworking, will have spread and made it possible to receive medical exams by a doctor in one's own home, greatly changing the conditions sought in places of residence. Although many people will still like the capital region with its concentration of people and goods, we will be able to choose places of residence that suit our lifestyles and preferences, such that places of residence will have become more diverse than in the past.

There will be more diverse kinds of disasters happening at a greater frequency due to such factors as climate change. However, with observation using satellites and sensors that detect such things as landslides and with analyses by AI and other developments, forecasting of disasters such as torrential rain and sediment disasters will become more accurate and infrastructure for communicating information to people will also be developed. This will make it possible to get a grasp on situations much faster, enabling disaster prevention and disaster reduction responses. Under basic disaster prevention and disaster reduction policies for each region, people will each choose concrete actions such as evacuation in advance and preparation of disaster prevention goods. Everyone will have greater disaster awareness and implementation of measures such as evacuation drills using VR (virtual reality) and AR (augmented reality) will be strengthened. As a result, people will have a concrete grasp of what to do during each stage of a disaster and disaster prevention will become more familiar.

The development of compact cities will make efficient maintenance and management possible with the development of infrastructure that gives priority to maintenance and management and with the use of AI-equipped drones and robots for daily infrastructure inspections and data collection. With decisions such as the timing of performing repairs being made quantitatively and appropriately, infrastructure in all regions will be maintained in good condition.

(2) Transportation

The development of express transportation networks as described above will reduce restrictions related to transportation, making travel faster and more convenient, enabling people to easily visit family and friends far away without hesitation. Also, with the development of VR technology, it will be possible to enjoy the scenery and atmosphere of different places without actually visiting them, but the desire for travel will be aroused through VR's simulated experiences, increasing opportunities to actually travel. Highly accurate translation and interpretation services will be provided through the use of AI technology, breaking down the language barrier between Japan and the world, increasing opportunities for Japanese to travel abroad and for foreign travelers to come to Japan.

Automated driving technology will contribute greatly to the maintenance of regional transportation networks. Such data as the number of users and transportation needs will be gathered and analyzed by AI, and using automated driving cars will make it possible to create the most suitable transportation networks according to the number of users and transportation needs. Many different kinds of mobility (means of transportation and vehicles) suited to individuals' lifestyles will exist, not bound by the conventional concept of a car, and the ways of use will also vary, including ownership and sharing. With automated driving technology, traffic accidents will decrease substantially, making vehicles highly safe and convenient.

With the realization of complete automated driving, people will seek enrichment time and other functions in mobility vehicles during transportation, which will lead to the provision of new value such as "private comfortable spaces" and "customization." Moreover, with mobility available continuously, the optimum number of mobility vehicles will be running according to demand such that, especially in the cities, there will be no need for parking spaces at such places as private houses and facilities that attract customers, resulting in efficient utilization of land.

(3) Lifestyle (Living Environment and Working Style)

With respect to working style, telework will have spread and it will be possible, for example, to attend meetings even while far away, using VR technology. It will therefore become possible to work without worrying about location or time. Since the place to perform work will change from conventional worksites to places such as one's own home or a satellite office near one's home, places for consuming activities will also change, such as an increase in doing daily shopping close to home. Also, with many people working from home, more and more people will create the spaces they prefer, such as setting up an environment in which they can switch clearly between work and private life. People will be relatively free to choose when to work, and less time will be needed for commuting, increasing the time that can be spent with family and on hobbies, enabling balance between work and family life and fulfilling leisure time.

Also, driven by environmental problems and energy problems that are anticipated in the future, houses and communities will be fully equipped with power generation and storage facilities that use renewable energies such as solar light. The amount of energy generated and used will be managed on a community-wide basis, and energy will also be shared. Mobility vehicles owned by each household will also function as storage batteries and will be used as emergency power sources during disasters.

Housing styles will change and more young adults and elderly people will be living alone or in shared housing. However, communities will be formed around things such as locality and personal interests, forming a society with connections not limited to family, such as sharing of community information in real time, as well as individuals' skills and goods, using ICT.

The above is one vision of the future. As our consciousness and lifestyles change, new demands will arise, and many different futures are possible.

As we know from examples of corporate and community initiatives, as well as from the National Attitude Survey, innovation in the land, infrastructure, transport, and tourism sectors has a major connection to the day-to-day life of the people, and the growth of innovation will change our consciousness. Land, infrastructure, transport, and tourism administration must constantly re-examine past initiatives aimed at the creation and social implementation of innovation. In addition, it must steadily implement initiatives according to the demands of the times. It is therefore important for administration to boldly attempt to develop its own innovation in order to create forward-looking initiatives.

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Part II

Trend in MLIT Policies

Chapter 1

Initiatives towards Restoration and Reconstruction from the Great East Japan Earthquake

Section 1 Current Status and Measures Towards Restoration and Reconstruction

Accelerating restoration from the Great East Japan Earthquake is one of the top priorities of the MLIT. Although the number of refugees has decreased from the initial 470 thousand individuals at the time of the earthquake, around 119 thousand people^{Note 1} currently lead lives in evacuation in approximately 1,090 municipalities^{Note 2} throughout 47 prefectures. Six years after the earthquake, we are in the second year of the Reconstruction and Revitalization Period that started in April 2016. The MLIT is working to further expedite the restoration and reconstruction processes, making an all-out effort so that people from the affected areas can actually experience the progress in restoration.

Attentive to voices from areas affected by disaster, the MLIT will work as a united body to swiftly respond to on-site needs of the Regional Development Bureau, the District Transport Bureau, the Japan Meteorological Agency, and the Japan Coast Guard. In order to achieve this goal, in January 2013, we split the parliamentary secretaries into groups of three, and assigned a prefecture to each group as an Affected Area Assistance Team within the MLIT to respond sensitively to requests from each area affected by disaster.

The scale reconstruction work of basic infrastructures such as roads and ports is advancing steadily as well. We will continue to faithfully execute the work according to the infrastructure progress schedule. Also, the rebuilding of homes and urban development towards restoration are steadily making progress in line with the Residence Recovery Construction Timetable, and we will continue to provide support to the affected areas with care. We will also work to secure local public transportation and promote tourism in the affected areas.



Note 1119,163 people as of March 13, 2017, based on study by Reconstruction AgencyNote 2As of March 13, 2017, based on study by Reconstruction Agency

Section 2 Steady Recovery and Reconstruction of Infrastructure and Transportation

(1) Outline

For the public infrastructure under the jurisdiction of the MLIT, we are steadily working toward transitioning to fullscale restoration and reconstruction based on the project plan and progress schedule. We will continue our endeavors now and in the future to achieve a full recovery of northeastern Japan as soon as possible, while staying mindful of requests from other disaster-stricken areas.

(2) Coastal Countermeasures

In terms of the full-scale restoration and reconstruction of the coastal levees and so on, of the shores of the 677 districts where restoration and reconstruction is to be done, construction has begun in 595 districts and had been completed in 236 districts as of the end of March 2017. Of these, a section of the approximately 40 km of national construction area (including the section for which the national government will cover disaster recovery) was completed at the end of March 2017. Also, reconstruction of the bay mouth breakwaters will be continued systematically so that there will be as little hindrance as possible to city building and industry activity, which is targeted to be completed around the end of March 2018.

In proceeding with construction, whenever possible we are incorporating structures where the effects of the levees will persistently demonstrate their capabilities, even when they are struck by tsunamis. In Iwanuma City and Yamamoto Town, Miyagi, we have established a model in which the coastal levees are integrated with green coastal levees comprised of coastal levees with vegetation planted throughout. We also actively use disaster waste for coastal levee material, while paying careful attention to the surrounding landscape and natural environment during reconstruction.

(3) River Countermeasures

Full-scale restoration work to secure pre-earthquake safety levels has been completed for the affected river management facilities in zones managed by the national government. Building on this, we will implement the necessary earthquake and tsunami countermeasures. In addition, full-scale restoration work has been completed in approximately 90 percent of locations in zones under control of prefectures/municipalities.

(4) Sewage System

A total of 126 wastewater treatment plants (excluding three facilities located in evacuation order areas in Fukushima) were affected. Sendai Minami Gamo Purification Center was severely damaged, and was restored at the end of FY2015. In total, 124 treatment plants were restored to normal-level operations by the end of FY2015. Two plants without wastewater were not completed. Of the treatment plants located within Fukushima's evacuation order cancellation ready area, two plants have already completed full-scale recovery. In regards to the 960 km of sewer pipes affected by the disaster, 814 km was fully recovered as of the end of March 2017. We will continue to work in accordance with the reconstruction plan and aim for the earliest possible restoration and reconstruction, combined with the incorporation of earthquake- and tsunami-resistant structures.

(5) Countermeasures against Sediment-related Disasters

We will push ahead with countermeasures against sediment-related disasters in Iwate, Miyagi and Fukushima Prefectures, where sediment-related disasters occurred at the time of the Great East Japan Earthquake.

(6) Roads

(1) In regard to expressways, the Joban Expressway, which was fully opened to traffic on March 1, 2015, is frequently used. The Joban Expressway also encourages companies to move in the area along this expressway in Hamadori, Fukushima, which generates employment in this area. The conversion of some sections into four-lane expressway and the installation of additional lane at Joban Expressway are planned to be completed within the Reconstruction and Revitalization Period. Additional interchanges, Okuma IC and Futaba IC, were newly planned to develop on June 12, 2015.(2) In regard to the national highways that are under direct control of MLIT, full-scale reconstructions were basically completed by the end of 2012. Furthermore, the major disaster areas were reconstructed based on the restoration plan, including the bridges on national road route 45 and other structures. (3) In regard to the Reconstruction Roads and Reconstruction Support Roads, to contribute to the post-disaster reconstruction of afflicted areas, reconstruction has been undertaken at the fastest pace possible through public-private partnership (PPP) for quick delivery, which makes use of the private sector's technological skills. Of a total of 550 km, including the section opened after the Great East Japan Earthquake, over 90% (or 503 km) of the roads have been re-opened or have moved a step forward toward reopening.

(7) Railroads

Of the railways that were damaged by the Great East Japan Earthquake, the Sanriku Railway resumed full operations in April 2014, the Ishinomaki Line in March 2015, and the Senseki Line in May 2015. Regarding the Ofunato Line and the Kesennuma Line, the BRT^{Note} has been operated as a temporary restoration measure to secure public transportation, and acceptance of full-scale restoration by BRT was agreed for the Ofunato Line in December 2015 and for Kesennuma Line in March 2016. As a result, the only railway lines with zones where service is still suspended are two of Japan Railways East Japan lines (Yamada Line and Joban Line).

As for the Yamada Line, JR East and relevant parties, including local government bodies, agreed to transfer the management of the line from JR East to Sanriku Railway in February 2015. The restoration work, which started on March 2015, is now underway, targeting completion by the end of FY 2018.

In regards to the Joban Line, the policy to resume operations for the entire line in the future was decided in March 2015. In March 2016, the goal became to open the entire line by the end of FY2019. The route between Haranomachi and Odaka Stations opened in July 2016, and the route between Soma and Hamayoshida Stations opened in December of that year. Of the remaining routes where service is still suspended, the zone between Odaka and Namie Stations will open on April 1, 2017, in accordance with the lifting of the evacuation directive in Namie Town on March 31, 2017, and operations will resume on the route between Tomioka and Tatsuta Stations in October 2017. In addition, the goal is to open the route between Namie and Tomioka Stations by the end of FY2019.

(8) Ports/Harbors

With regard to ports and harbors, disaster restoration of the bay mouth breakwaters at the Port of Ofunato was completed in FY2016. The restoration of the bay mouth breakwater will be continued according to plan, while the port/harbor facilities that are foundational to the economic recovery, such as quay walls and breakwaters, have been repaired. The Japan Coast Guard plans to complete the restoration of incomplete 9 (as of March 2017) of the 158 aids to navigation that were damaged by the Great East Japan Earthquake in concert with the restoration of ports and harbors and breakwaters.

Meanwhile, the sea area landfill sites of the Sendai Shiogama and Ishinomaki ports zone and the Ibaraki and Hitachi-Naka ports zone are undergoing maintenance in order to advance the disposal of disaster waste produced by the Great East Japan Earthquake. Landfill disposal has started in the Sendai Shiogama and Ishinomaki ports zone in February 2013 and in the Ibaraki and Hitachi-Naka ports zone in July 2012.

Section 3 Promoting Post-Disaster Town Reconstruction and Securing Stability of Residency

To give the disaster victims a prospect as to when they will be able to secure a residence, we are working on the promotion of post-disaster town reconstruction and securing the stability of residency, taking into account the "Residence Recovery Construction Timetable" that organizes the prospects for the provision of building lots for private residences and the completion of disaster public housing based on reports from local governments. As the reconstruction projects progress full-scale in the disaster affected areas, we need to compensate for the lack of personnel and know-how in the disaster affected municipalities to help the projects progress smoothly.

For these reasons, in addition to supporting the progress of projects by providing personnel support to disaster affected local governments, implementing procurement methods for relieving the burden of procurement operations in disaster affected local governments, and utilizing the Urban Renaissance Agency, we also disseminate information by providing

Note Abbreviation for Bus Rapid Transit, meaning a bus transportation system that is faster and more punctual than regular route buses by operating trains on bus-only roads.

technical support through notifications regarding procedures for the efficient execution of reconstruction projects and by posting the "Reconstructive City Development Index", an online website for compiling support initiatives.

(1) Promoting Post-disaster Town Reconstruction

For post-disaster town reconstruction, various projects are being carried out, such as the Disaster Prevention Group Relocation Project, which helps people whose homes are in zones considered unsuitable for residence, and the Disaster Urban Area Land Recovery and Readjustment Project, which supports comprehensive town building by combining work on public facilities, such as building sites and roads, with site reconstruction work on tsunami disaster-affected urban areas, as well as the preparation of building sites for relocation to higher ground.

As of the end of March 2017, the Disaster Prevention Group Relocation Project had secured the consent of the Minister, which is a statutory procedure required for starting the project, for all 331 districts in which implementation of the project was planned under the Residence Recovery Construction Timetable; almost all districts have started site preparation work and 307 districts have completed such work. As for the land readjustment project, project approval was obtained and construction work started in all 50 districts under the Residence Recovery Construction Timetable, and 13 of those districts have completed site preparation work.

(2) Securing Stability of Residency

For victims who are able to build or obtain housing on their own, interest rates are lowered for disaster recovery housing loans provided by the Japan Housing Finance Agency. Disaster recovery housing loans are also provided to victims who only suffered damage to real estate. Pre-existing loans were given up to five-year extensions on payments and payment deadlines, and interest rates were lowered for such loans.

Victims who face difficulties in building or obtaining housing on their own are being provided public housing (disaster public housing) by local governments. In addition to distributing grants to offset the cost of maintenance in these facilities and expenses resulting from lowering rent for victims, we are devising special arrangements concerning the requirements for occupant qualification and assignment of housing facilities.

Moreover, in response to the Fukushima No. 1 Nuclear Power Plant accident, we plan to secure stability of residency for refugees residing in evacuation order areas (evacuees or returnees) by providing them the same accommodations as disaster victims, such as moving into disaster public housing.

Figure II-1-3-1 Development Status of Disaster Public Housing (March 31, 2017)							
Prefecture	Procuring of land	Design started	Construction started	Construction completed	Overall plan		
Iwate	5,666 houses	5,401 houses	5,008 houses	4,594 houses	5,964 houses		
Prefecture	207 districts	200 districts	169 districts	152 districts			
Miyagi	15,722 houses	15,541 houses	15,176 houses	13,784 houses	16,149 houses		
Prefecture	432 districts	429 districts	416 districts	376 districts			
Fukushima	7,973 houses	7,850 houses	7,224 houses	6,227 houses	8,016 houses ^(Note)		
Prefecture	183 districts	179 districts	169 districts	152 districts			

(Note) - The plan number is from the Residence Recovery Construction Timetable (as of the end of March 2017). - Regarding Fukushima's disaster public housing, the overall plan is not finalized for disaster public housing for returnees from evacuation due to the nuclear disaster. Source) MLIT

Section 4 Securing Local Public Transportation and Promoting Tourism

(1) Securing Local Public Transportation

In regards to local public transportation, which suffered damage from the Great East Japan Earthquake, we are implementing exceptional measures, such as mitigating the auxiliary requirements for the Regional Public Transportation Securement, Sustentation, and Improvement Projects to support the securing and maintaining of local public transportation systems, such as buses, and to share taxis in disaster affected areas.

Specifically, these measures support the securing and maintaining of inter-regional mainline bus transportation networks, as well as community bus transportation for daily commutes between evacuation shelters, temporary housing, remaining settlements, and hospitals, shops, and public agencies.

(2) Reviving of Tourism

According to the Overnight Travel Statistics Survey by the Japan Tourism Agency, the number of guest nights of foreign visitors throughout Japan in 2016^{Note 1} was 246.2% of the benchmark of 100% in 2010, before the earthquake. Although tourism in the six prefectures of Tohoku^{Note 2}, which recorded a figure of 126.8% over the same period, has recovered to the level of tourism prior to the earthquake, it still lags far behind the rapid increase in the rest of Japan. Fukushima Prefecture is particularly far behind at 82.4% of pre-disaster tourism.

In response, 2016 was dubbed the "First Year of Tohoku Tourism Recovery," and the goal was set to reach 1.5 million foreign visitors guest nights (triple the amount in 2015) in the six prefectures of Tohoku by 2020. The Japan Tourism Agency and the Japan National Tourist Organization (JNTO) have established the nation's first intensive tourist destination campaign in Japan, in which they are collaborating with the Tohoku Tourism Promotion Organization, local governments and people in the tourism industry to promote the appeal of Tohoku around the world.

In addition, in FY2016, we established the Reconstruction Grant for Tohoku Tourism Recovery Measures, which has supported a variety of efforts to attract inbound tourists. These efforts include the improvement and enhancement of tourist activities, such as hands-on experiences in programs drawn up and implemented by local communities; intensification of promotions; and development of an environment for receiving foreign travelers. These are worthy efforts because capitalizing on the effects of the rapid increase in inbound tourism to Japan will accelerate the recovery of afflicted areas. In addition, to facilitate the earliest possible recovery of tourism in Fukushima Prefecture, we have supported tourism-related businesses that contributed to the efforts for disaster recovery and reputation damage control, such as domestic promotions implemented by the prefectural government, and a project to revive educational travel. Additionally, we have supported community efforts to create far-ranging sightseeing routes throughout Tohoku.

Section 5 Ensuring the Smooth Execution of Reconstruction Projects

The restoration/reconstruction projects for the disaster areas are moving forward steadily and the home rebuilding/town reconstruction is basically progressing according to the "Residence Recovery Construction Time Table".

MLIT has been taking necessary measures to assist the smooth execution of reconstruction projects by cooperating with the institutions concerned and related industries in "Restoration Acceleration Meetings" (held 7 times since March 2013) and the "Council to Secure Execution of Reconstruction Projects" (held 8 times since December 2011). In order to set predetermined prices that reflect current market prices, the unit price of design work for public works in the three affected prefectures has been raised five times since April 2013, and reconstruction production rates, which are based on construction works conducted, and the reconstruction coefficient were introduced. Also, the national and prefectural governments established public ready-mixed concrete plants.

Furthermore, the MLIT is also working on measures to ensure smooth execution of projects for public building construction, such as disaster public housing, schools, government offices, and hospitals. These measures include the reflection of current market prices and the actual status of construction sites at predetermined prices, such as by continuing the

Note 1 Preliminary figures.

Note 2 The six prefectures in Tohoku Region: Aomori, Iwate, Miyagi, Akita, Yamagata, and Fukushima.

special measure on standard construction expenses for disaster public housing and promoting the use of the construction and repair cost estimation method developed by the MLIT for the reconstruction of public buildings, as well as by providing individual consultation with care at the public buildings construction inquiry desk.



Section 6 Reconstruction and Revitalization of Fukushima

After the Tokyo Electric Power Fukushima No. 1 Nuclear Power Plant accident, the number of refugees from the evacuation zones was approximately 34,000 individuals^{Note 1}, while the total number of refugees in Fukushima Prefecture, including self-imposed evacuees, climbed to approximately 77,000 individuals^{Note 2} (according to studies by the Reconstruction Agency). Evacuation directives have been lifted in most restricted residential zones and zones that are ready for the lifting of the directives. In addition, a proposal to amend the Act on Special Measures for the Rebirth of Fukushima has been submitted to the Japanese Diet given the fact that the amount of radiation is decreasing in some zones where return has been deemed difficult; this amendment aims for the soonest possible launch of efforts to reconstruct and revitalize these zones. Now that the movement toward lifting evacuation directives is gaining steam, the government must further enhance support measures for the new lives and soonest possible return of residents to their communities, and must enhance initiatives toward the rebuilding and self-sustenance of businesses, livelihoods and lifestyles.

The MLIT strives to recover and reconstruct infrastructures in accordance with the Timetable, offer free charging at expressways for evacuees, and quash harmful rumors about tourism to Tohoku Region, and overcome harmful rumors. In addition, within the framework of the amended Act on Special Measures for the Rebirth of Fukushima, measures are taken so that we can carry out infrastructure improvement projects on behalf of municipalities and provide support for the establishment of new downtown areas in Special Reconstruction and Revitalization Zones in which the government aims to lift evacuation directives in five years' time based on the extent to which radiation has decreased, thereby allowing people to live in them.

Section 7 Building Tsunami-resistant Communities by Learning from the Great East Japan Earthquake

Based on the lessons learned from the Great East Japan Earthquake, in December 2011 the Law for Tsunami Disaster Prevention District Building was established and put into effect. This law is based on the thinking that even when a maximum level tsunami occurs, people's lives are the number one priority, and the promotes building districts that are well fortified against tsunami disasters with the concept of multiple defenses that combine structural and non-structural measures. The MLIT provided technical advice related to the enactment of the aforementioned law to support local governments in building communities resistant to tsunamis, published guidance documents regarding the settings for tsunami flood suppositions, and opened a consultation desk for inquiries related to tsunami flood suppositions. Also, in order to configure a maximum class tsunami fault model for the Sea of Japan where the accumulation of scientific knowledge is insufficient, the MLIT is providing technical support by publishing reports of the Study Commission of a Large Scale Earthquake in the Sea of Japan.

Tsunami flood suppositions for maximum level tsunami occurrences have been published for 30 prefectures (as of the end of March 2017). Also, since March 2014, Tsunami Disaster Caution Zones were designated in Tokushima, Yama-guchi, Shizuoka (Higashi Izu Town and Kawazu Town), Wakayama (19 municipalities), Kyoto and Nagasaki, and eight municipalities have developed plans for comprehensively promoting the building of tsunami resistant regions (promotion plan).

In the disaster affected areas, 24 districts are proceeding with recovery efforts using the Law concerning the Construction of Tsunami-resistant Communities, like making city planning decisions regarding the Tsunami-resistant Urban District Forming Facility by Building a Housing Complex (as of the end of March 2017).

Going forward, we must take into consideration the characteristics of the entire region and using the existing public facilities to combine 'structural' measures like sea embankments with 'non-structural' measures like evacuation drills to further proactively advance the construction of tsunami-resistant communities to protect the lives of citizens.

Chapter 2

Deploying Land, Infrastructure, Transport and Tourism Administration Tailored to Urges of the Times

Section 1 Driving the Implementation of a National Land Policy Package

In order to respond to drastic changes in the situations surrounding national land, including rapidly declining population, low birth rates, and a possibly imminent large-scale disaster, the MLIT published the "Grand Design of National Spatial Development Towards 2050" in July 2014 to share the sense of crisis with the public and show the principles of national land and regional development with a medium- to long-term view (generally 2050 in sight). Taking this into consideration, in August 2015, changes to the National Spatial Strategies (National Plan) and the National Land Use Plan (National Plan) for roughly the next 10 years were adopted through a Cabinet decision. In March 2016, the National Spatial Strategies (Regional Plans) were adopted through a decision of the Minister of Land, Infrastructure Transport and Tourism.

The National Spatial Strategies (National Plan) have the basic vision of building convection-promoting national land that creates active movements of people, goods, money, and information between regions (convection) by refining regional individualities that are varied. Also, as national and regional structures for creating convection, the idea of compactness and networks—consolidating various functions that include life services into certain regions in a compact manner and connect regions with networks—was laid out. The building of the convection-promoting national land and compactness and networks for that purpose should contribute to realization of the balanced development of national land that is suitable in the coming age and leveraging the unique individualities of nature, culture, and industries specific to each region. Furthermore, the National Spatial Strategies include the correction of overconcentration of people in Tokyo as Tokyo has congestion problems while net outflows of population, mainly young people, from rural regions to the Tokyo Area continue, also taking into consideration such issues as possibly imminent large-scale disasters that include a Tokyo inland earthquake.

The Fifth National Land Use Plan (National Plan) aims at land use to enhance resilience, sustainability and prosperity in our country.

In order to manage the progress of both National Plans, as well as to examine effective promotion measures, four technical committees were established within the National Land Development Council plan promotion task force in April 2016, and are currently engaged in discussions toward the formation of convection-promoting national land. In addition, discussions based on characteristics and resources of each Region are ongoing toward the specific contents of Regional Cooperation Projects defined in the National Spatial Strategies (Regional Plans). Furthermore, the formulation and modification of the National Land Use Plan (prefectural and municipal plans) continues to progress, and investigations and assistance are being implemented toward their promotion.

Section 2 Measures, etc. against Aging Social Infrastructures

(1) MLIT's Action Plans for Life Extension of Infrastructure

In Japan, those infrastructures that have been built after the rapid-growth period of the nation's economy, including Tokyo Metropolitan Expressway Route 1 laid after the 1964 Tokyo Olympic Games, are forecast to become aged simultaneously in the future with the proportion of facilities that will reach 50 years of age or older in 20 years to expanding at an accelerating pace. The ratio of the number of such highway bridges, for example, is predicted to surge from about 18% in March 2013 to about 43% 10 years later and to about 67% 20 years later (Figure II-2-2-1). Simultaneously aging infrastructures should dictate strategic maintenance/management and renewal.

In October 2013, the Liaison Conference among Ministries and Agencies Concerned with the Promotion of Measures

to Combat Aging Infrastructures was inaugurated. In November of the same year, it came up with the Basic Plan for Life Extension of Infrastructure to envision future approaches directed at infrastructures of all kinds to be taken by the state, local public entities and so on.

The MLIT responded by working out the MLIT Action Plans for Life Extension of Infrastructure in May 2014 ahead of all other ministries and agencies to finalize and visualize specific approaches based on the basic plan, declaring it a maintenance guide presenting a roadmap to the implementation of maintenance cycles (Figure II-2-2-2).

The plan calls for:

 Checking infrastructure periodically and repairing or renewing it as appropriate, and maintaining the information in chart form in a database to create maintenance cycles;

Of all the infrastructure that was built after the rapid-growth period of the nation's economy, including highway bridges, tunnels, rivers, sewage systems and ports and harbors, the proportion of those facilities that will reach 50 years of age or older in 20 years will expand at an accelerating pace. *The status of aging facilities is not uniformly determined by when they were initially built, but varies depending on where they are located, how they have been maintained and managed and so on. For convenience's sake, an actual age of 50 years after initial construction is used as a measure of aging.						
< <percentage 50="" infrastructure="" is="" of="" old="" older="" or="" social="" that="" years="">></percentage>						
	March 2013	March 2023	March 2033			
Highway bridges [about 400,000 bridges Note 1 (of about 700,000 bridges that are 2 m long or longer)]	Approx. 18%	Approx. 43%	Approx. 67%			
Tunnels [about 10,000 tunnels ^{Note 2}]	Approx. 20%	Approx. 34%	Approx. 50%			
River management facilities (such as water gates) [about 10,000 facilities Note 3]	Approx. 25%	Approx. 43%	Approx. 64%			
Sewerage pipes [Total distance: approx. 450,000 km Note 4]	Approx. 2%	Approx. 9%	Approx. 24%			
Port and harbor quays [Approx. 5,000 facilities Note 5 (4.5 m deep or deeper)]	Approx. 8%	Approx. 32%	Approx. 58%			
Note 1: Approximately 300,000 bridges whose year of initial construction is unknown have been excluded from percentage calculations. Note 2: Approximately 250 tunnels whose year of initial construction is unknown have been excluded from percentage calculations. Note 3: State-managed facilities only, including approximately 1,000 facilities whose year of initial construction is unknown. (Since records generally exist for facilities built within the last 50 years, facilities whose year of initial construction is unknown. (Since records generally exist for facilities built within the last 50 years of age or older.) Note 4: Including approximately 15,000 km of piping whose year of initial construction is unknown. (Since records generally exist for facilities built within the last 30 years, facilities whose year of initial construction is unknown. (Since records generally exist for facilities built within the last 30 years, facilities whose year of initial construction is unknown. (Since records generally exist for facilities built within the last 30 years, facilities whose year of initial construction is unknown are sorted out as being approximately 30 years of age or older and their length proportionally distributed in the ratio of construction by documented number of years elapsed.) Note 5: Approximately 100 quays whose year of initial construction is unknown have been excluded from percentage calculations. Source) MLIT						

Present Status of Aging Social Infrastructure

(2) Moving ahead with further cost reductions by leveraging maintenance technologies and with lifetime extension strategically based on the concept of preventive maintenance, thereby leveling the burdens of maintenance spending; and

Figure II-2-2-1

(3) Providing financial support by granting subsidies for disaster preparedness and safety, etc., as well as personnel support for providing training in order to drive forward the initiatives of local governments that manage most of the infrastructure.

In addition, in order to push ahead with these initiatives, the Fourth Priority Plan for Social Infrastructure Development adopted by a Cabinet decision in September 2015 set the strategic maintenance and renewal of social overhead capital as one of the priority goals, focusing on measures against aging infrastructure, such as by setting target indicators that include the ratio of life extension programs (individual facility plans) for individual facilities (100% within FY2020).

Follow-ups are conducted on the Action Plans every year in order to observe the progress of measures against aging infrastructure based on the Action Plans. The MLIT will continue to work on measures against aging infrastructure in a focused and systematic manner so that the required infrastructure will be sustainably maintained.



(2) Development and Expansion of the Maintenance Industry

Based on the report "Recommendations on Maintaining, Managing and Renewing Social Infrastructures" compiled in December 2013, in FY 2014, the Social Infrastructures Maintenance Strategy Subcommittee under the Infrastructure Development Council and the Traffic Policy Council investigated and deliberated matters that require continued discussions for the development of specific measures, and compiled recommendations on future directions concerning:

- 1. Establishment of a qualification system for inspections and diagnoses
- 2. Framework for conducting maintenance and management smoothly and measures for supporting local governments
- 3. Sharing and visualizing information pertaining to maintenance, management and renewal.

With regard to the establishment of a qualification system for inspections and diagnoses, required knowledge and skills were set forth according to job descriptions, a system for registering private qualifications was introduced, and the registered qualifications on inspections, diagnoses and the like have been used since the ordering activity of FY2015.

In regard to a frameworks for conducting maintenance and management smoothly and measures for supporting local governments, we are having specific discussions in cooperation with local governments on the methods of outsourcing maintenance and management works of multiple areas and facilities to the private sector comprehensively in order to leverage technologies and expertise as well as economics of scale of private sectors for efficient maintenance and management. In addition, we are conducting engineer dispatch on a trial basis, sending private-sector engineers to municipalities that are struggling to maintain and manage social infrastructure, and are identifying effective tasks, verifying the technological standards required of dispatched engineers, and discussing the standardization of procedures.

In regard to sharing and visualizing of information pertaining to maintenance, management and renewal, information on maintenance and renewal, especially important information such as the status of facility inspections, will be made visible.

Also, in an effort to take advantage of technology from various industries and know-how from the private sector in each

stage of the infrastructure maintenance cycle, and improve the productivity of the maintenance industry while striving to cultivate and revitalize it, we established the Japan Congress for Infrastructure Management in November 2016 as a platform for people in government, industry, academia and the private sector to mobilize their knowledge and technical skills into maintenance efforts, and created the Infrastructure Management Award to recognize outstanding efforts and excellent technical development regarding infrastructure maintenance.

We will continue to work toward the realization of steady, efficient infrastructure maintenance and regional revitalization by enhancing the efforts described previously, and by developing and revitalizing the maintenance industry.



Column Japan Congress for Infrastructure Management —Platform for Society-wide Infrastructure Management Efforts-

Based on the awareness that infrastructure maintenance, management and renewal must be addressed by society as a whole, the Japan Congress for Infrastructure Management was founded on November 28, 2016, as an industry-academia-government-civil society collaboration platform for infrastructure management using Japan's wealth of technologies and wisdom.

The Congress aims to achieve the following objectives, with a membership of companies, local public bodies and NPOs not only in the construction sector, but also in a wide range of industries such as the information technology, big data analysis, materials and processing technology industries.

- 1. Discovery and social implementation of innovative technologies
- 2. Greater cooperation with companies, etc.
- 3. Provision of support to local governments

4. Dissemination of the principles of infrastructure management

5. Promotion of public participation in infrastructure management

The Congress's broad membership, including people from industry, academia, government and civil society, provides a platform of cooperation in which facility administrators can address the issues they face with the help of relevant companies and organizations, using open innovation methods. To maximize this advantage, public forums are established on specific matters and issues of interest to members, to promote discussions through mutual interaction and exchange of information among freely participating members.

Since the Congress's founding, five forums have been established, related to innovative technologies, local government support, engineer development, public participation, and Kinki region headquarters. These forums have so far implemented an innovative river management project that aimed to apply information technologies, aerial survey technologies and other such latest technologies to river management, and organized regional forums (on a trial basis) for promoting inter-industry exchanges with the objective of addressing local government issues mainly in the Kinki and Chubu regions, among other initiatives.

By addressing important topics for achieving steady and efficient infrastructure management in the future, such as promoting the implementation of new technologies and addressing local government issues as mentioned above through the concerted initiatives of industry, academia, government and civil society, the Congress will make continued efforts to develop and revitalize the infrastructure industry.



(3) Development and Introduction of Monitoring Technologies

Bracing for the development and introduction of monitoring technologies that provide an efficient insight into the conditions of social infrastructures, the MLIT has directed studies on the field verification of monitoring technologies to match field needs and seeds and to assess and analyze their effectiveness at the Committee for Exploring and Promoting Usage of Social Infrastructure Monitoring Technologies in October 2013. Monitoring technology hopefuls have been sought from the general public since September 2014, and their field verifications, etc. are now underway.

(4) Development and Introduction of Robots

The MLIT promotes the development and introduction of robots of practical usefulness that are capable of checking up growing volumes of infrastructures effectively and efficiently while probing disaster sites that are hardly accessible by human beings and expediting recovery quickly and precisely.

Section 3 Driving the Social Infrastructure Development

Priority Plans for Social Infrastructure Development are formulated to drive the efficient and prioritized implementation of social infrastructure development projects in accordance with the Act on Priority Plan for Social Infrastructure Development. In September 2015, the Fourth Priority Plan for Social Infrastructure Development (FY2015–2020) was adopted through a Cabinet decision. The Fourth Plan has the basic principles of maximizing stock effects of social infrastructures in order to address the following four structural issues under severe fiscal constraint: (i) possibly imminent massive earthquakes and increasingly severe weather disasters, (ii) accelerating aging of infrastructures, (iii) battered countryside in association of declining population, and (iv) intensifying international competitions. Based on the basic principles, the Plan aims to ensure selection and concentration on projects whose stock effects are high while pushing forward the effective use (smart use) of existing facilities, as well as their consolidation and realignment. Also, the Plan for the first time includes the positioning of the stable securing and development of on-site and skilled human resources for supporting social infrastructure development, stating that it is important to ensure stable and sustainable prospects for public investment in light of systematic implementation of social infrastructure development and securing and developing personnel to conduct it. Furthermore, in order to develop social infrastructures with medium- to long-term prospects, the Plan set four priority goals (implementing strategic maintenance and renewal of social infrastructure; mitigating disaster risk in accordance with characteristics of disasters and vulnerabilities of regions; building sustainable local communities that respond to declining/aging population; inducing private investments and enhance infrastructures that support economic growth) and 13 policy packages, and positioned typical indicators as key performance indicators (KPIs).

In order to check the progress of the Priority Plan and propose improvements, the Planning Task Force under the Panel on Infrastructure Development and the Transport System Subcommittee of the Council of Transport Policy is supposed to appropriately conduct follow-ups. As part of this activity, the expert committee established under the Planning Task Force conducted investigations and reviews of viewpoints and types of efforts to "smartly" invest in and utilize the infrastructure, methods of identifying and "visualizing" the stock effects, and measures for driving forward these efforts. The committee compiled their findings in "A Proposal of Practical Strategy for Maximizing the Stock Effect" (November 2016). In the near future, we will make efforts to realize these measures and steadily promote the Priority Plan based on the committee's proposal.

Furthermore, the Priority Plans for Social Infrastructure Development of Regional Blocks was established in March 2016 based on the Fourth Priority Plan for Social Infrastructure Development as plans for developing social infrastructure in a focused, efficient and effective manner in accordance with the characteristics of each region. Additionally, in August 2016, the public and private sectors joined forces to begin basic research toward launching the Infrastructure Future Map Project (tentative name) to visualize in map form a timeline for future infrastructure development as set out in the Priority Plans of Regional Blocks.

Figure II-2-3-1 The Fourth Priority Plan for Social Infrastructure Development									
1. Four Structural Issues of Social Infrastructure Development									
(1) Increasingly aging infrastructures (2) Vulnerable land (possibly imminent massive earthquakes, severer w	eather disasters) (3) Exhaustion of the count	vside due to population declines	(4) Intensifying international competitiveness						
Based on the National Spatial Plan (adopted on August 14	, 2015, by a Cabinet decision), systematically	implement social infrastructure de	evelopment toward the realization of the Pla						
2. Basic policy toward the realization of sustainable social infrastructure development									
Toward strategic infrastructure management aimed at maximizing stock effects of social infras	tructure								
Thorough management to maximize stock effects of social infrastru	cture								
 (i) Strategic maintenance of existing facilities including consolidation and realignment Securing infrastructure safety by building maintenance cycles Cutting and leveling total costs in the medium to long term (including creation of proper sizes through consolidation or other means) Strengthening competitiveness of the maintenance industry 	 (ii) Effective use of existing facilities (efforts for smart use) Maximizing the functions of existing facilities (Example: expanding the processing capacity of Haneda Airport by reviewing its flight routes) Enhancing and advancing the functions of existing facilities (Example: establishing welfare facilities in association with public housing consolidation) Increasing the functions of existing facilities (Example: establishment of power generation facilities using the upper space of wastewater treatment facilities) 								
(iii) Ensuring selection and concentration according to the purposes	and roles of social infrastruc	ture (considering p	riorities and time horizon)						
Safe and secure infrastructure Life Focus on projects for protecting human lives and properties with all-out efforts from both structural and non-structural perspectives, such as countermeasures against the Nankai Trough, Tokyo Inland earthquake, and increasing concentration and severity of precipitation.	Life infrastructure Focus on projects to secure sustainable and effective local community services and enhance the quality of life.		Growth infrastructure Focus on projects that boost the production expansion effect by strengthening competitiveness with international strategies and enhanced coordination with private business operators.						
Clear time horizon - Set the to-be state in the medium to long term (rough	ly 10–20 years), priority measures and r	numerical targets to achieve	during the plan period (by FY 2020).						
Revitalization of economy and fiscal improvement - Support stable growth around the consumption tax in Active use of PPP/PFI -	crease in FY 2017, 2020, and onwards,	contributing to economic re	evitalization and fiscal improvement.						
Structural reforms concerning workers on the ground and skilled talents who support social infrastructure development	Necessity for stable and sustainable prospects of public investments								
 Secure and foster workers on the ground and skilled talents, who are the guardians of the region, in a stable manner. Conduct structural reforms by increasing on-site productivity. Promote initiatives by orderers to ensure the quality of public works and secure bearers of the works. Secure and develop various talents involved in social infrastructure development (personnel who engage in maintenance and PPP/PFI) 	 Sudden increases/decreases in public investments in the past gave rise to various problems [Example: many cases of unqualified entrants and dumping, leaving talent). It is necessary to ensure stable and sustainable public investments suitable to the size of the economy to underpin sustainable economic growth so that socia infrastructure development, including maintenance, will be conducted in a systematic and steady 								

Column Launch of Basic Research for the Infrastructure Future Map Project (tentative name)

In preparation for the launching of the Infrastructure Future Map Project (tentative name), which will aim to create a map and visualize the time series for future infrastructure management, the MLIT commenced basic studies with the cooperation of private companies in August 2016.

In light of Japan's aging population, low birthrate and population decline, social infrastructure improvement that would maximize the stock effect is sought to ensure economic growth, safety and security, and enhanced standards of living in a sustainable manner even under severe financial constraints.

In November 2016, an expert committee of the Planning Task Force in the Transport System Subcommittee under the Panel on Infrastructure Development and the Council of Transport Policy compiled a report titled "A Proposal of Practical Strategy for Maximizing the Stock Effect." In it, the committee states that disclosure of information such as of business plans and project completion outlook is an important requirement for maximizing the stock effect.

The Priority Plans for Social Infrastructure Development of Regional Blocks, which was established in March 2016, contains some 2,800 projects, and unlike previous plans, specifies the slated date of completion of major projects to the extent possible, to facilitate understanding of the outlook of infrastructure management plans along a time axis.

By creating a map of such information and visualizing the future management of infrastructure, the Infrastructure Future Map Project (tentative name) will provide a useful reference for creating life plans or making investment decisions, for example for deciding the location of residences and plants or planning a store opening, with hopes of contributing to attracting greater private investment and promoting regional

revitalization.



Section 4 Promoting the Implementation of Transport Policy

1 Developing Policies Based on the Basic Act on Transport Policy

In December 2013, the Basic Act on Transport Policy was promulgated and enacted. Based on the Act, the Basic Plan on Transport Policy was adopted through a Cabinet decision in February 2015 after deliberations at the Council of Transport Policy and the Panel on Infrastructure Development of the MLIT.

The Basic Plan on Transport Policy defines the period from FY2014 to FY2020 as a planning period and provides for basic policies, measure goals, and measures to be taken by the state on a comprehensive and planned basis. More specifically, three basic policies have been set forth as follows: (A) Realize easy-to-use transportation conducive to a wealthier national livelihood; (B) Create international and inter-regional passenger transportation and logistics networks to underlie growth and prosperity; and (C) Develop infrastructures for sustainable, safe and secure transportation. For each of these basic policies, four measure goals have been presented along with specific measures to approach them. Numeric indicators have also been defined to verify the progress of approaches in following up the said plan, and factors for consideration in implementing measures in accordance with the three basic policies above.

In May 2016, the second Transport Policy White Paper based on the Basic Act on Transport Policy was approved by a Cabinet decision and reported to the Diet. The Transport Policy White Paper is to report annually to the Diet on transport trends and measures taken, and to be taken, by the government concerning transport, and the Paper follows up on the progress of measures and numerical targets stated in the Basic Plan on Transport Policy.

Continuously, leveraging the Transport Policy White Paper that is prepared annually, we will appropriately follow up on the Plan to ensure the steady progress of the Plan.



2 Reconstructing Local Public Transportation Networks

While population progresses to decline in an aging society with falling birthrates, concerns grow over downsized public transport networking and a degraded quality of services particularly in rural areas. In the meantime, local public transportation is of vital importance particularly to those who are unable to drive car, such as students and elderly people. To contribute to the realization of regional communities that are full of vitality, it is important to collaborate with efforts to create compact towns, and strive to revitalize and revive local public transportation.

Based on these circumstances, the Act on Revitalization and Rehabilitation of Local Public Transportation was amended in 2014, thereby establishing a framework for achieving the formulation of optimum public transportation networks and services for each region in agreement with relevant personnel, led by local governments in charge of regional administration with appropriate division of roles among relevant parties, and in collaboration with town development, tourism revitalization and other regional strategies.

Under the amended Act, 273 local public transportation networking plans were submitted to the Minister of Land, Infrastructure, Transport and Tourism by the end of FY 2016, and 15 local public transportation restructuring plans received the Minister's approval. This indicates that efforts toward the formation of sustainable local public transportation networks are gathering momentum.

Furthermore, in 2015, the Japan Railway Construction, Transport and Technology Agency established a program for investing in new companies that engage in businesses of rebuilding local public transportation networks, in order to diversify and enhance support.

The MLIT will also continue to provide necessary support to the initiatives of local governments.



Present Status of Local Transportation

The progression of motorization has resulted in a decline in the role of local public transportation.

Local public transportation networks continue to shrink due to the withdrawal of transportation operators from unprofitable routes, the number of trains/buses per day and other indicators of the level of service continue to decline drastically, and private operators who provide local transportation services find it harder and harder to run profitable businesses.



The impending precipitous decline in population is expected to further restrict the regional public transportation situation.

Source) MLIT



3 Promotion of Comprehensive Logistics Policy

In order to speedily and appropriately respond to socioeconomic circumstances surrounding logistics of Japan, such as the deepening of global supply chains, global warming countermeasures, and heightening needs for ensuring safety and security, the Comprehensive Logistics Policy Guidelines (2013–2017) were adopted by a Cabinet decision in June 2013. In accordance with the Guidelines, relevant ministries are pushing forward logistics policies in coordination with each other in a comprehensive and unified manner, together with other plans and policies, such as the Priority Plan for Social Infrastructure Development and the Basic Plan on Transport Policy.

Japan has high-standard logistics services in terms of punctuality, safety, and conformity with shippers' orders and the like mainly through track transportation, which underpinned the just-in-time system of the manufacturing industry, and contributed to the development of the distribution industry and the improved convenience of daily lives of citizens through delivery and other services. On the other hand, in recent years, the socioeconomic circumstances surrounding logistics are changing dramatically, including declining/aging population, innovations in such areas as information communication technology (ICT), heightening disaster risk, increasingly frequent deliveries of smaller goods, and diversification of customer needs. Moreover, labor shortages are especially evident and posing challenges in the logistics sector, with aging truck drivers and possibilities of increased difficulties in securing personnel in the medium to long term; therefore, actions need to be taken as early as possible.

Based on these circumstances, and given the December 2015 report "On Basic Directions of the Future Logistics Policy" of the Council of Transport Policy and the Panel on Infrastructure Development, the "Logistics Productivity Revolution" recommended in the report was selected in April 2016 as one of the revolution in productivity projects of the MLIT Productivity Revolution Headquarters. In addition, the Amended Act on the Total Efficiency of Logistics, which sets out assistance for a wide range of efforts related to the integration and streamlining of logistics and collaboration with officials, was passed in May 2016, and we have driven forward with accreditation for total efficiency plans that comprise joint transportation, modal shifts, and aggregation of transportation network to warehouses that have introduced truck reservation systems.

The objective under the "Logistics Productivity Revolution" Project is to improve labor productivity in logistics operations by 20% by FY2020, and we are proceeding with the promotion of modal shifts and joint transportation that use the framework of the Amended Act on the Total Efficiency of Logistics, the reduction of redelivery in home delivery services, the promotion of the international standardization of logistics systems, and other efforts to contribute to the streamlining and creation of high value-added in logistics operations.

Section 5 Driving the Implementation of a Tourism Policy Package

Steady Promotion of the "New Tourism Strategy to Invigorate the Japanese Economy" and the New "Tourism Nation Promotion Basic Plan" Based on the New Tourism Strategy

The number of foreign visitors to Japan has increased rapidly in recent years. In 2011, the year the Great East Japan Earthquake struck, the number of foreign visitors was 6.22 million, which was nearly 30% less than the previous year. However, the figure has increased dramatically since then, first to 8.36 million visitors in 2012, then nearly tripling to 24.04 million visitors in 2016. Tourist spending has also increased, to 3.7476 trillion yen in 2016, which is roughly 3.5 times the 1.846 trillion yen spent in 2012; tourism is growing into an industry that helps support the Japanese economy.

Based on these changes to the circumstances surrounding tourism in recent years, on March 28, 2017, a new Tourism Nation Promotion Basic Plan for the period from FY2017 to FY2020 was adopted through a Cabinet decision based on the provisions of Article 10 of the Tourism-based Country Promotion Basic Act (Act No. 117, December 20, 2006). The plan aims to comprehensively and systematically promote measures related to the realization of a Tourism Nation, and to allow Japan to flourish as "a place that the world wants to visit."

The plan was drafted on March 30, 2016, with consideration given to the objectives and measures set out in the New Tourism Strategy to Invigorate the Japanese Economy, drafted at the Meeting of the Counsel for a Tourism Vision to

Support the Future of Japan chaired by Prime Minister Abe, and while receiving various viewpoints from private-sector experts, relevant organizations, local governments and others. The new Tourism Nation Promotion Basic Plan incorporates the five objectives set out in the New Tourism Strategy (which include objectives for numbers of foreign visitors as well as money spent), and also sets out a specific objective for the number of international conferences hosted in pursuit of proactively incorporating business travelers, who tend to spend a lot of money, and a specific objective for the number of Japanese people (including young people), who travel abroad in consideration of the significance of mutual exchange. In addition, the committee aggregated measures for the various efforts toward achieving these objectives. This includes measures for the creation of highly attractive tourism areas that are globally competitive, the development of human resources who can strengthen the global competitiveness of the tourism industry and contribute to the promotion of tourism, the promotion of international tourism, and the establishment of an environment for promoting sightseeing travel.

The number of foreign visitors to Japan eclipsed 20 million in 2016, but this figure is no more than a checkpoint. As people continue to move throughout the world more actively in the future, our government will align, and our public and private sectors will join together in their efforts to ensure that many people choose Japan as a tourism destination, and that Japan becomes a "world-class tourist destination" that people want to visit again and again.

Section 6 Driving the Implementation of Ocean Policy (Oceanic State)

Steadily Driving the Basic Plan on Ocean Policy

A nation surrounded by sea on its four sides, Japan recognizes the vast expanses of surrounding sea as a frontier, which urges the nation to grow into an "oceanic state" in its true sense. The Ministry of Land, Infrastructure, Transport and Tourism has been driving the implementation of ocean policies by working in conjunction with the governmental agencies concerned pursuant to the "Basic Plan on Ocean Policy," based on the "Basic Act on Ocean Policy," as many of the administrative fields relevant to oceans fall under its jurisdiction.

Specifically, we are working on, among other efforts, the use of marine renewable energy, development and use of marine resources, fostering of human resources in ocean development, efficient marine transportation of energy resources, and promotion of marine industries. Furthermore, in July 2016, "Efforts to Consolidate the Capability of Maritime Domain Awareness" were adopted by Headquarters for Ocean Policy, and were used to guide efforts toward the improvement and enhancement of marine surveys, and the establishment of the Maritime Situation Indication System, an information system for aggregating, sharing and providing marine-related information, including satellite information. Also, the "Basic Policy concerning Preservation and Management of Islands for Management of Sea" was partially revised, and taking this into consideration, we are promoting the development of strategic maritime safety and security systems, preservation of the low-tide lines^{Note} that serve as the basis of the exclusive economic zone and establishment of bases of activities on Minami-torishima Island and Okino-torishima Island.

In addition, in a message to herald Marine Day in 2016, Prime Minister Abe announced the launch of the "Nippon Platform for Marine Education," an organization promoting marine education through 'all-Japan' efforts by industry, academia, and government, to intensify efforts toward marine education. The prime minister also announced the goal to have marine education put into practice in every municipality by 2025. In light of these announcements, we are proceeding with discussions of marine education programs for primary and secondary school education, and implementing efforts to encourage outlooks of occupations (career education) to ensure that Japan has the human resources to run the marine industry in the future.

Note Refers to the boundary between the land and water surface when the water surface reaches its lowest point.



2 Protecting Our Country's Interests in Maritime Rights and Interests

(1) Promoting Ocean Surveys in Territorial Sea and the Exclusive Economic Zone and Integrating Marine-related Information

In our country's territorial sea and the exclusive economic zone, there are waters lacking adequate survey data and the Japan Coast Guard has been conducting intensive ocean surveys in these waters including sea bottom topography, crustal structure, and the low-water lines to strategically and continuously implement the development of basic information that will contribute to the safety of vessel traffic, protecting our country's maritime rights and interests, and development in the sea.

Also, under the comprehensive coordination of the Secretariat of the Headquarters for Ocean Policy, Cabinet Secretariat, the Marine Information Clearinghouse, which centralizedly provides the gathering, management, and provision of location of marine information, and the Marine Cadastre, which is a web service that allows general users to utilize various natural information (sea bottom topography, ocean currents, water temperature, etc.) and social information (port areas, fishing rights areas, etc.) by overlaying on maps are being operated. Furthermore, in July 2016, "Efforts to Consolidate the Capability of Maritime Domain Awareness" was adopted by the Headquarters for Ocean Policy, and based on this, initiatives are being taken for the improvement and enhancement of ocean observation, and the establishment of the Maritime Situation Indication System, an information system for aggregating, sharing and providing marine information, including satellite information.

(2) Initiatives to Delineate the Limits of the Continental Shelf

On April 20, 2012, the UN "Commission on the Limits of the Continental Shelf" adopted the recommendations on the limits of the continental shelf beyond 200 nautical miles in regard to the submission made by Japan in November 2008 in accordance with the United Nations Convention on the Law of the Sea. Since the recommendation granted an extension to Japan's continental shelf with an area equivalent to approximately 80% of her land area, the Shikoku basin sea area and the Okidaito ridge sea area were newly designated as Japan's continental shelf by a cabinet order in October 2014. In the meantime, since the review of some sea areas has been postponed, the Japan Coast Guard is working towards the establishment of the extended continental shelf in those areas by partnering with the ministries and agencies concerned under coordinated supervision of the Secretariat of the Cabinet Secretariat Headquarters for Ocean Policy.

(3) Conservation of Okinotorishima Island, Preservation of the Low-Tide Line and Developing the Base of Activities

(i) Conservation of Okinotorishima Island

Okinotorishima Island is Japan's southernmost territory and is a very important island that forms the foundation of the 400,000-km² area exclusive economic zone, which exceeds the area of national land, so the observation and gathering of basic data, checkups of damages, and repairs are carried out. The state is taking direct control to ensure adequate measures to preserve the entire island.

(ii) Preservation of low-tide lines

In accordance with the Law on the Development of Base Facilities and Preservation of the Low-Tide Line for the Promotion of Use and Conservation of the Exclusive Economic Zone and Continental Shelf (Low-Tide Preservation Act), 185 domestic locations are designated by government decree as low-tide lines preservation areas to implement restrictions on excavation in the area. Furthermore, surveys are conducted on low-tide lines and the surrounding conditions, using patrols by disaster prevention helicopters and ships, as well as satellite images, in order to check whether any restricted activities took place or any topographical changes were caused by natural erosion. Also, information related to the low tide lines is appropriately managed so that preservation activity will be carried out in a steady and efficient manner.

Figure II-2-6-2 Preservation of the Low-Tide Lines

Promoting Measures Regarding the Law on the Development of Base Facilities and Preservation of the Low-Tide Line for the Promotion of Use and Conservation of the Exclusive Economic Zone and Continental Shelf (Low-Tide Preservation Act) (effective in June 2010)

<<Preservation of Low-Tide Lines>>

In the waters surrounding the low-tide lines that form the basis for demarcating the limits of the exclusive economic zone and others, areas requiring conservation are specified as the low-water line preservation areas (185 areas) where activities are restricted.
 Satellite images, disaster prevention helicopters, and ships are used to monitor and research the conditions of the low-tide line and any artificial damages or natural erosion.

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 In order to ensure that the development and usage of maritime resources and maritime research activities are implemented safely and steadily in waters located far away from the mainland, the MLIT Minister implements the development and management of port facilities (the development details are stated in the basic plan based on the Low-Tide Preservation Act).

(Minamitorishima Island) Project started FY2010

(Okinotorishima Island) Project started in FY2011



<Exclusive Economic Zone and position of Minamitorishima Island and Okinotorishima Island> (Quoted from the website of the marine information division of the Japan Coast Guard, with additions made)



(iii) Developing and managing bases of activities on specified remote islands (Minamitorishima Island and Okinotorishima Island)

In accordance with the Low-Tide Preservation Act, port facilities are being developed on Minamitorishima Island and Okinotorishima Island, which are located in areas remote from the mainland, to enable the mooring and berthing of vessels and cargo handling as operational bases for the conservation and usage of the exclusive economic zone and continental shelf, with management of the ports by the government.

Section 7 Protecting Territorial Land and Territorial Waters Firmly

(1) Situation in Recent Years

Since September 2012, Chinese government-owned vessels have navigated into the contiguous zone around the Senkaku Islands almost every day, except in bad weather, and have repeatedly intruded into Japanese territorial waters at a frequency of about three times per month. The situation remains unpredictable; increases in the size, number and fortification of Chinese government-owned vessels has been confirmed recently, and in August 2016, Chinese government-owned vessels repeatedly intruded into Japanese territorial waters following Chinese fishing vessels.

Under the policy of protecting Japan's territories and waters at all cost, the Japan Coast Guard is responding to these circumstances in a calm but firm manner by taking such measures as deploying patrol vessels in the waters so that the situation will not escalate.

In addition, in Japan's exclusive economic zone around the East China Sea, surveys and other activities of foreign ocean survey vessels without Japan's consent were found. The Japan Coast Guard is taking appropriate measures on a caseby-case basis according to the situation, such as by requesting suspension of such activities and ongoing monitoring by patrol vessels in coordination with relevant organizations. Furthermore, in addition to the illegal operation of foreign fishing vessels, North Korea's repeated nuclear tests and ballistic missile launches and other developments have increased the seriousness of the situation surrounding not only the Senkaku Islands, but all Japanese territorial waters.





(2) Decision on the Policy on Strengthening the Maritime Security System

The situation in the sea areas around Japan has grown more serious, with the intrusion of foreign Government vessels and foreign fishing vessels into the territorial waters surrounding the Senkaku Islands, the increased activity of foreign oceanographic research vessels, the illegal operation of foreign fishing vessels in the water surrounding the Ogasawara Islands and elsewhere, and North Korea's repeated nuclear tests and ballistic missile launches. To respond to these problems, we must enhance the capacity of maritime law enforcement, maritime surveillance and ocean survey of the Japan Coast Guard. Therefore, the Ministerial Council on the Strengthening of the Maritime Security System was held on December 21, 2016, at which the Policy on Strengthening the Maritime Security System was adopted.

From now on, in accordance with above-mentioned policy, the Japan Coast Guard will promote the strengthening of the Maritime Security System according to the following five pillars.

- Strengthening the guarding system in territorial waters surrounding the Senkaku Islands, and implementing a system for responding to the simultaneous occurrence of major incidents
- •Strengthening the maritime surveillance system capable of monitoring the far-ranging sea areas around Japan
- •Strengthening the responding system for countering terrorism, ensuring security on remote islands and in remote waters, and otherwise responding to serious incidents



- Strengthening the ocean survey system for defending Japan's maritime rights and interests
- ·Developing human resources and other infrastructure to support these systems

(3) Expanding of a Maritime Safety and Security Policy Program

To encourage the collaboration and cooperation to ensure maritime safety and security by fostering mutual understanding and the promotion of exchange among Asian coast guard agencies, and to strive for a common understanding of the importance of reinforcing maritime order governed by law and rules and not by coercion, a Maritime Safety and Security Policy program offering masters-level education and aimed at young executive officers of the Japan Coast Guard and Asian coast guard agencies was opened in October 2015. In September 2016, the first class of graduates (from Japan, Indonesia, Malaysia, the Philippines and Vietnam) was granted a Master of Policy Studies. Presently, the second class of students (from Japan, Indonesia, Malaysia and the Philippines) is participating in the program.

In the future, we will continue to improve the educational content, encourage people from many countries to participate, and promote the strengthening of the establishment of a global network in the area of maritime safety and security.



Section 8 Driving the Implementation of Water Cycle

Developing Policies Based on the Basic Act on Water Cycles

The Basic Act on Water Cycle, which was promulgated in April 2014 and enacted in July of the same year, stipulates the establishment of the Basic Plan on Water Cycle in order to promote water cycle measures in a comprehensive and systematic manner. The Water Cycle Basic Plan was adopted through a Cabinet decision on July 10, 2015.

The Basic Plan on Water Cycle sets out nine measures, including "promotion of river basin coordination," to serve as a framework for the comprehensive and integrated management of river basins, and as "measures for the government to undertake comprehensively and systematically regarding measures regarding the water cycle," and relevant ministries and agencies are engaged in efforts based on this plan.

Furthermore, in July 2016, the first White Paper on Water Cycles based on the Basic Act on Water Cycles was adopted through a Cabinet decision and reported to the Diet. The White Paper on Water Cycles stipulates measures to be undertaken by the government regarding the water cycle, and to report to the Diet each year. In the most recent session, we clarified the present state and issues of the water cycle in response to the five basic policies set out in the Basic Plan on Water Cycle as trends surrounding water cycle measures, and reported on the enactment of the Basic Act on Water Cycle and the development of the Basic Plan on Water Cycle.

2 River Basin Management Promotion

River basin management is defined as the coordinated activity of relevant government and other public agencies, businesses, groups, residents and others through water cycle-related measures aimed at maintaining and improving natural environments that concern human activities, water volume and quality and water in forests, rivers, agricultural land, cities, lakes, coastal area and the like in river basins. In order to drive forward with this activity, we will set River Basin Water Cycle Councils in accordance with regional circumstances to create a River Basin Water Cycle Plan to set out basic policy, and implement appropriate conservation and management for river basins.

In FY2016, we implemented the "Model Study Regarding Visionary River Basin Management," which comprised activity support and fact-finding surveys in collaboration with three groups, and put together Japan's first plan for various regions to work toward maintaining and recovering sound water cycles, and released 17 plans on January 16, 2017, as the first round of action for the River Basin Water Cycle Plan.


Section 9 Efficient, Prioritized Deployment of Measures

Promoting i-Construction: Improving Construction Site Productivity

The construction industry is not only responsible for the development of social infrastructure, but as the protector of communities, which is a vital role in the conservation of Japanese national land, it is also tasked with ensuring the safety and security of our society. In order for the construction industry to continue to fulfill these roles even as the population continues to decline and age, they must reform the way they work by raising the level of wages or increasing holidays, and in addition, it is crucial to improve productivity. The MLIT is continuing its work on i-Construction, an initiative that incorporates the use of ICT and other technologies to drastically improve productivity in all construction and manufacturing processes, from studies and surveying to designing, execution of construction work, inspections, maintenance and renovations.

In i-Construction, the three measures of full-scale use of ICT (ICT earthwork), introduction of total optimization (standardization of concrete work standards, etc.), and the construction schedule leveling are promoted as a Top-Runner measure. Productivity improvement in earthwork (embankments, cut earth) has been lagging, and since FY2016, we have established new standards for using ICT and three-dimensional data and made all-out efforts to use ICT in earthwork performed by the government.

To introduce total optimization (standardized concrete work standards, etc.), we are establishing guidelines that set out ranges of application and optimal construction conditions with the aim of diffusing the latest technology and construction methods for improving productivity. To level construction schedules, we are striving to steadily implement various efforts, including the further use of two-year government bonds or obligatory assurance of national subsidization to encourage suitable construction work schedules.

Additionally, the i-Construction Promotion Consortium (chaired by Hiroshi Komiyama, Chairman of Mitsubishi Re-

search Institute) was established on January 30, 2017, to accelerate the efforts of collaboration between industry, academia and government. The consortium has established three working groups: the Technological Development and Introduction Working Group, the Three-Dimensional Data Distribution and Application Working Group, and the Global Standards Working Group. The consortium has resolved to discuss various matters, including the search for new, advanced technology for use in the field and the transition to open data for distributing three-dimensional data.

In addition to these efforts, we will expand the use of ICT in construction work on bridges, tunnels, dams and maintenance, and establish a platform to use three-dimensional data obtainable from public works, aiming for a 20% improvement in productivity on construction sites by FY2025. The MLIT will make all-out efforts for i-Construction, and will strive to increase each worker's productivity on construction sites, improve the operating environment of companies, and raise wage levels of people engaged in construction, while promoting safety.



2 Assuring Public Works Quality and Securing and Developing Leaders

With the aim of ensuring the present and future quality of public works and securing and developing leaders of public works over the medium to long term, the Act for Promoting the Assurance of Quality of Public Works (Quality Assurance Act), the Act for Promoting Proper Tendering and Contracting for Public Works (Tendering and Contracting Act), and the Construction Business Act were amended in June 2014 (the so-called Three Public Work Bearers Acts), and the amendment of the Basic Policy under Article 9 of the Quality Assurance Act and the Rationalization Guidelines under Article 17 of Tendering and Contracting Act was adopted by a Cabinet decision in September 2014. Furthermore, Guidelines on Implementation of Order Administration (Operation Guidelines) (an agreement of an advisory committee of relevant ministries and agencies for promoting quality assurance of public works) pursuant to Article 22 of the Quality Assurance Act were developed in January 2015 to enable commissioning entities to appropriately and efficiently implement order administration in order to fulfill the Responsibilities of Orderer set out in Article 7 of the Act.

Given the full-scale implementation of the Three Public Works Bearers Acts, the MLIT requires municipalities and all other commissioning entities of public works to move forward with specific efforts based on the Guiding Principles.



(1) Approaches to Fulfilling Duty of Orders

The MLIT is taking various initiatives for the appropriate implementation of order administration based on the Rationalization Guidelines and Operation Guidelines. In addition, to verify whether orderers are properly implementing order administration based on these Guidelines, we are conducting fact-finding investigations of tendering and contracting procedures pursuant to the Tendering and Contracting Act, and organizing and publicizing the results.

(i) Appropriate setting of predetermined prices

As an effort to eliminate so-called *bugiri*, which is the practice of deducting part of construction specification amounts that are based on fair estimation, the MLIT (with collaboration from the Ministry of Internal Affairs and Communications) has requested that local governments rectify the practice as soon as possible through every opportunity. As a result, all local governments (459 organizations) that engaged in *bugiri* as of January 2015 due to precedents, fiscal reforms of municipalities, and other reasons, decided to abolish the practice as of April 2016. In addition to the popular version of the Implementation Manual for the Repair Cost Estimation Method, which is a compilation of public construction works estimation standards and efforts regarding their implementation that was created in January 2015, we created a version for affected regions in Kumamoto in January 2017, and have continued efforts to develop and spread the word about the latest standards and manuals regarding estimation.

(ii) Measures against dumping

Dumping inhibits the healthy development of the construction industry; thus, the MLIT has requested that groups that have not yet introduced this anti-dumping system take every opportunity to engage in discussions toward introducing it as soon as possible.

(iii) Appropriate design changes

The MLIT aims for the appropriate stipulation of construction conditions in design documents, as well as appropriate

changes of design documents if deemed necessary, and has revised the Guidelines on Design Changes to facilitate design change work.

(iv) Leveling of construction work schedules, etc.

The MLIT has steadily driven forward with the promotion of systematic order administration, the setting of appropriate construction work schedules, the use of systems that allow leeway, and other efforts. In addition, we published "The ABCs of Leading Cases of Leveling," a collection of forward-thinking examples of efforts by local governments, in April 2016, and continue to encourage local governments to further level construction work schedules and the like.

(v) Review of varied tendering and contracting options, etc.

New additions to the Quality Assurance Act include the selection and utilization of varied tendering and contracting options, phased screening systems, technical proposal integrated negotiation systems and systems that contribute to the maintenance and management of regional social capital (multi-year contracts, bulk orders, joint order acceptance). In May 2015, the MLIT drafted Guidelines Regarding the Implementation of Tendering and Contracting Options for Public Works to enable various orderers to select the tendering and contracting options that correspond to the peculiarities of each project.

(2) Coordination and Support among Orderers

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The MLIT works to enhance coordination among orderers through the regional council of orderers and the coordination meeting on public works contracts, and pushes forward handling of shared issues of orderers and various measures. Specifically, we have reviewed the structure of the regional council of orderers by establishing prefectural working groups, setting up various consultation desks at Regional Development Bureaus, and creating the headquarters for supporting orderers of public works headed by Development Bureaus and the like. In addition, in the public construction works sector, we are working toward the diffusion of the "Ideal State of Orderers in Public Agency Facility Improvement," which was released by the Panel on Infrastructure Development in January 2017, in local government offices and the like based on the Responsibilities of Orderers set out in the Quality Assurance Act.

Section 10 Forming a New Phase of Relationships between the Central and Local Governments and Private Sectors

New Phase of Relationships between the Central and Local Governments

Based on appropriate division of roles between the central and regional governments, the MLIT promotes decentralization by transferring administration and authority in responding to important issues that include the formation of a vibrant economic society and regions.

In FY 2014, a proposal solicitation program was started to invite local governments to submit their own proposals and explore ways to implement them with the aim of promoting new initiatives based on proposals of local governments. As a result, response polices were adopted by a Cabinet decision, and matters that require amendments to the laws were incorporated in the Act Concerning Establishment of Relevant Laws to Promote Reforms to Enhance Regional Autonomy and Independence (the Fifth Omnibus Decentralization Act), thereby implementing revisions such as enabling municipalities to develop their own plans for securing stable residency for the elderly.

The examination results of FY2016 were adopted as response policies through a Cabinet decision, and the seventh omnibus decentralization bill, which includes a provision that changes discussion with the national government concerning the Land Use Basic Plan to gathering opinions and that enables regional governments to implement public housing reconstruction projects that allow reconstruction in areas adjacent to aggregations of public housing, was submitted to the Diet.

2 Driving Public-Private Partnerships, etc.

In order to promote the forming of specific projects for PPP/PFI endeavors, the MLIT subsidizes local governments and facilitates the formation of forums for industry-academia-finance-government discussions (regional platform) aimed at sharing and acquiring expertise and enhancing coordination between relevant parties.

In FY2016, the MLIT adopted 24 pioneering public-private partnerships projects and five public-private partnerships projects for earthquake reconstruction. The MLIT provided support, for example, surveys regarding area management conducted by the Japan version of LABV in Chikujo Town, Fukuoka Prefecture. In addition, within regional platforms established in each of the nine blocks throughout Japan, we held events for exchanging information with leaders, core member meetings and seminars, and supported 20 local governments launch regional councils.

Section 11 Policy Evaluations, Project Evaluations, and Interactive Administration

Driving Policy Evaluations

Based on the MLIT Basic Plan for Policy Evaluations under the Government Policy Evaluations Act, the MLIT uses three basic policy evaluation methods—(i) checking policies by periodically measuring and evaluating the achievement of each measure, (ii) reviewing policies by conducting in-depth analysis on specific focused themes and (iii) conducting policy assessment by analyzing the necessity of new measures—and runs management cycles for policies by linking those methods. In FY2016, (i) monitoring of 142 performance indicators was conducted, (ii) 4 themes and (iii) 15 new measures were evaluated by the respective systems^{Note 1}. In addition, policy evaluation of individual public-works projects, individual research and development issues, regulations, and special taxation measures are conducted as a method of policy evaluation according to the characteristics of policies, and the results of the evaluations are reflected in budget requests and the development of new measures.

Also, in accordance with the Act on General Rules for Incorporated Administrative Agencies, performance evaluations of 19 incorporated administrative agencies as the competent minister were performed.

2 Implementation of Project Evaluations

A fully integrated scheme of evaluating individual public-works projects is built in place to enhance the efficiency and transparency of their implementation. Under this scheme, new public-works projects are evaluated upon initial adoption and then reevaluated and post-evaluated upon completion. Project appraisal charts are organized to present a background of the evaluations of public-works projects, including supporting data relevant to their cost effective analyses upon initial adoption, reevaluation, and post-evaluation upon completion, and are posted on the Internet and elsewhere. Furthermore, starting from FY2015, maintenance costs have been specified in evaluation reports for projects under direct control for further transparency^{Note 2}.

In addition, the MLIT conducts planning-phase evaluations on public-works projects implemented under its direct control as its own approach in the preliminary phase of new project evaluation upon initial adoption.

Note 2 Project Appraisal Website: http://www.mlit.go.jp/tec/hyouka/public/index.html Project Appraisal Chart: http://www.mlit.go.jp/tec/hyouka/public/jghks/chart.htm

Note 1 Ministry of Land, Infrastructure and Transport and Tourism Policy Evaluations Website: http://www.mlit.go.jp/seisakutokatsu/hyouka/index.html

3 Driving Administrative Management Open to the Public, and Interactive Administration

(1) MLIT Hotline Station

In driving the land, infrastructure, transport, and tourism administration that has a very close bearing on people's living, it would be essential to gain a broad insight into people's views, requests and so on and deploy administrative actions directly related to the people. To this end, the MLIT has opened the MLIT Hotline Station to receive about 1,100 views on a monthly average.

(2) Keeping Consumers Informed

The MLIT has opened the Negative Information, Etc. Search Site at its website to provide a summary listing of the records of contractors, etc. relating to buildings, such as housing, and public transportation facilities, including administrative dispositions imposed on them, to ensure safety and security through proper selection by consumers, etc. and supervision by markets, as well as by administration as in the past.

(3) Making the Planning Process in the Development of Social Infrastructures More Transparent

In driving the development of social infrastructures, it is important to ensure the transparency and fairness of the planning process and win understanding and cooperation from the local residents. The MLIT is working to make the planning process more transparent by using guidelines that stipulate present key conceptual approaches to formulating plans efficiently with socioeconomic, environmental, and all other relevant perspectives taken into consideration while encouraging the participation of various entities, including local residents, in the process.

Section 12 Approaches to Hosting Tokyo 2020 Olympic and Paralympic Games

Act on Special Measures for the 2020 Tokyo Olympics and Paralympics was enacted on June 25, 2015, and the government has established promotion headquarters to contribute to smooth preparation toward Tokyo Olympics and Paralympics to be held in 2020. Also, in accordance with the Act, the Basic Policy was adopted on November 27, 2015, by a Cabinet decision.

The MLIT launched the MLIT Preparatory Headquarters for the 2020 Olympic and Paralympic Games headed by the MLIT Minister on April 18, 2014 to render all-out assistance. It will take whatsoever responses necessary to get the Games running smoothly, including assuring safety and keeping lodgings and transportation comfortable. It will also move ahead with necessary approaches to realize the future visions of a Tokyo and Japan defined for the Grand Design of National Spatial Development Towards 2050, instead of viewing the year 2020 as a goal. Further, the MLIT is keen to lure foreign visitors into every little locality of the land of Japan to help make for its buoyancy as we conduct the Games not only in Tokyo but nationwide.

Specifically, the MLIT will, in coordination with the game committee and Tokyo, work on such measures as the development of road transportation infrastructures (the section between Sakai-Koga IC and Tsukuba-Chuo IC on the Metropolitan Intercity Expressway (Ken-O Expressway) was opened on February 26, 2017), enhancement of the functionalities of metropolitan airports that are Japan's gateway, strengthening of barrier-free measures (the MLIT put together comprehensive measures of the ministry in August 2015), development of the environment for receiving foreign travelers that include multi-language information signs/maps and free public wireless LAN, improvement of the waterfront environment, disaster-prevention measures against typhoons and other disasters, security measures, such as maritime security, and issuance of special license plates.

Chapter 3

Realizing a World-Class Tourist Destination and Building a Beautiful Nation

Section 1 Trends in Tourism

Significance of a Tourism Nation

Tourism is an industrial segment of vital importance to Japan, for it helps the nation maintain regional vitalities to keep up with its social development by capturing global demands, as from rapidly advancing Asian nations, to expand nonresident population vising from both at home and abroad in a depopulating and aging society with falling birthrates, and also consolidate its position in an international community by promoting deeper global mutual understanding through two-way exchanges with the nations abroad.

2 Tourism Situation

(1) Japanese Domestic Tourism Consumption

Japanese domestic tourism consumption in 2016, including overnight travels and same-day trips, was 20.95 trillion yen (up 2.7% from the previous year).

Breaking down Japanese domestic tourism consumption, spending on overnight travel was 16.03 trillion yen (up 1.4% from the previous year) and spending on same-day trips was 4.92 trillion yen (up 7.1% from the previous year).

(2) Number of Foreign Visitors to Japan

The number of foreign visitors in 2016 increased to 24.04 million (up 21.8% from the previous year). It was the first time in Japanese history that the number of foreign visitors has exceeded 20 million.

By nationality and region, China accounted for about 6.37 million (up 27.6% from the previous year), followed by South Korea with about 5.09 million (up 27.2% from the previous year) and Taiwan with about 4.17 million (up 13.3% from the previous year). By market, the following 19 markets registered their annual record highs: South Korea, China, Taiwan, Hong Kong, Thailand, Singapore, Malaysia, Indonesia, the Philippines, Vietnam, India, Australia, the United States, Canada, the United Kingdom, France, Germany, Italy, and Spain.



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(3) Tourism Consumption by Foreign Visitors to Japan

With the increase in the number of foreign visitors, tourism consumption by foreign visitors in 2016 reached a record high of 3,747.6 billion yen (up 7.8% from the previous year).

By nationality and region, China accounted for 1,475.4 billion yen (up 4.1% from the previous year), followed by Taiwan with 524.5 billion yen (up 0.7% from the previous year), South Korea with 357.7 billion yen (up 18.9% from the previous year), Hong Kong with 294.7 billion yen (up 12.2% from the previous year), and the United States with 213.0 billion yen (up 17.4% from the previous year). These top five countries accounted for 76.5% of total travel spending by foreign visitors in 2016.

(4) Number of Repeaters among Foreign Visitors to Japan

The number of repeaters among foreign visitors in 2016 was 14.26 million (up 23.0% from the previous year).

By nationality and region, South Korea accounted for 3.41 million (up 26.2% from the previous year), followed by Taiwan with 3.38 million (up 16.1% from the previous year), China with 2.61 million (up 41.5% from the previous year), Hong Kong with 1.49 million (up 19.5% from the previous year), and the United States with 630,000 (up 7.4% from the previous year). Taiwan and Hong Kong especially produced high rates of repeaters, with the percentage of travelers in 2016 visiting for their second time or more being 81.2% for Taiwan and 81.1% for Hong Kong.

(5) Number of Guest Nights of Foreign Visitors in the Outlying Areas

The preliminary number of guest nights of foreign visitors in the outlying areas in 2016 was 28.45 million (up 13.2% from the previous year). Year on year, this exceeds that for the three major metropolitan areas (which were up 4.8%), with large increases by prefecture in Kagawa (up 69.5% from the previous year), Okayama (up 63.2% from the previous year), and Fukushima (up 41.3% from the previous year).

(6) Percentage of International Conferences of Those Held in Major Asian Countries

The number of international conferences held in Japan in 2016 was 410 (up 15.5% from the previous year), ranking 7th in the world together with China. Japan's share of international conferences out of those held in major Asian countries was 28%, remaining in the top position in Asia.

(7) Number of Japanese Overseas Travelers

The number of Japanese overseas travelers in 2016 was 17.12 million (up 5.6% from the previous year), the first increase in four years since 2012.

Section 2 Initiatives to Realize a World-Class Tourist Destination

On May 13, 2016, the Ministerial Council on the Promotion of Japan as a Tourism-Oriented Country decided on a "Tourism Vision Implementation Program 2016" as a short-term action plan for the "Tourism Vision to Support the Future of Japan." Based on this program, the government made united efforts to promote various measures to realize a worldclass tourist destination.

1 Enhancing the Appeal of Tourism Resources as a Cornerstone of Regional Revitalization

(1) Opening Appealing Public Facilities and Infrastructure to the Public

The MLIT promoted infrastructure tourism to encourage regional promotion by utilizing and opening infrastructure as tourism resources, such as expanding the number of tours held at the Metropolitan Area Outer Underground Discharge Channel.

Column **Promotion of Infrastructure Tourism**

Bridges, dams, ports, and other such infrastructure are assets specific to each region, and display various regional characteristics. These facilities exist in our immediate surroundings and support our lifestyles, but did you know you can observe, experience and enjoy them up close? In recent years, there has been a surge of interest in infrastructure tourism, or schemes that utilize infrastructure as regional assets and tourism resources to promote regional revitalization. In addition to its role in revitalizing regions, infrastructure tourism is also expected to contribute to promoting greater understanding of infrastructure development, maintenance and management.

Regional development bureaus and other public agencies are actively organizing facility tours and tie-up schemes with private sector travel agencies, and the MLIT opened an infrastructure tourism portal site in January 2016 to provide information on nationwide infrastructure tours. The infrastructure tourism boom has spread throughout Japan, and the number of tours offered by private sector companies has increased from five tours at the time the portal site was opened, to 23 tours by September of the same year. The media has spotlighted many of the tours, and a new aspect of infrastructure facilities is being presented to the public.

In this way, infrastructure not only supports our lifestyles, but plays an important role in revitalizing the regions as precious regional resources. We invite you to also participate in an infrastructure tour and see, learn, enjoy and experience infrastructure in Japan.



erground Discharge Channel (Saitama Pref.)



Amagikita Road (Shizuc



Source) MLIT



(2) Increasing the Attraction of Tourist Sites through the Preservation and Utilization of Tourism Assets with Excellent Scenery

From such viewpoints as creating pleasing landscapes, promoting tourism, keeping the driving environment safe and comfortable, and making roads disaster-ready, we promoted the removal of utility poles during construction of new roads or widening of existing roads and implemented model construction works to introduce low-cost methods.

Additionally, through workshops for all prefectures and municipalities, we encouraged municipalities that are major tourist sites to develop landscape plans. We also made information boards in national government parks multilingual.

(3) Improving Extensive Sightseeing Routes to a World-class Level

In order to encourage the formation of extensive sightseeing routes with themes and stories that help draw foreign

visitors to the countryside, four new routes across Japan were newly certified in FY2016 (making 11 routes in all). Also, focusing on specific model courses, we supported enhancement of stay-contents using regional tourism resources, initiatives to encourage foreign visitors to tour an area, and promotion of target cities. We also dispatched experts to each region to help identify an area's attractions and challenges, suggest measures, and help improve the skills of relevant persons in the community.

We also used a "Theme-based Tourism Program for Drawing Visitors to the Countryside" to support attractive tourist destinations around the country with shared themes such as sake breweries or movie/ TV shooting locations.

Furthermore, in January 2017, we released Flow of Foreigners-Data (FF-Data), which enables users to grasp not only the flows of foreign visitors in Japan, but also



factors such as their nationalities and modes of transportation used within the country. It is expected that this information will be used as basic data that contributes to the planning and revision of extensive sightseeing routes and strategic promotion measures.

We also used big data in an effort to strengthen quick-impact congestion measures by making smart use of the capacity and space of existing roads and parking lots. Specifically, we implemented a congestion measure that used wide shoulders in the Furano/Biei region of Hokkaido to separate vehicles waiting to park from through traffic. At the Hitachi Seaside Park in Ibaraki, we conducted a pilot program of a reservation system to encourage the use of surrounding parking lots through smooth, reliable parking during the season when the Bassia scoparia (summer cypress) are displaying their autumn colors.

(4) Revival of Tourism in Tohoku Region and Responses to Natural Disasters such as the Kumamoto Earthquake

We designated 2016 as the "First Year of Tohoku Tourism Recovery" and took various measures to further promote tourism revival initiatives in Tohoku^{Note}.

When the Kumamoto Earthquake struck in April 2016, we strove for early recovery of travel demand by establishing a general support program for the revival of tourism in Kyushu and instituting a subsidy for travel costs through a "Kyushu Revival Discount" and visit Japan promotions focused on Kyushu. Also, to eliminate damage caused by rumors about seismic activity of the Kumamoto Earthquake and volcanic activity of Mt. Aso, in January 2017, we established the Kumamoto Support Program jointly with Kumamoto Prefecture and subsidized travel costs through the "Aso (Central and Southern Areas) Support Tour."

In response to typhoon damage in Hokkaido caused in August 2016, we promoted Hokkaido through the Japan National Tourism Organization (JNTO) by disseminating tourism information about Hokkaido, including eastern Hokkaido, using Facebook between October and November 2016 and, in 2017, implementing a campaign to promote the sale of travel products to Hokkaido.

When the Tottori Central Earthquake struck in October 2016, we established a "Tottori Support Program" and subsidized travel costs through the "Tottori is Waiting for You Campaign."

2 Innovating the Tourism Industry to Boost its International Competitiveness and Develop It into a Core Industry

(1) Comprehensive Review of Tourism-related Regulations and Systems and Response to minpaku (Private Residence Accommodation) Services

In March 2017, we submitted to the Diet a bill to amend the Licensed Guide Interpreters Act and the Travel Agency Act, in order to respond to the overwhelming shortage of interpreter guides and cases such as malicious land operators bringing tourists to souvenir shops on condition of receiving large kickbacks. The bill's contents included the abolition of regulations on monopolization of the interpreter guide business while keeping in place a monopoly on the name, ensuring the quality of interpreter guides, introduction of a registration system for land operators, and deregulation of travel services limited to a specific area.

Also, in light of the content of a plan to implement regulatory reform (approved by the Cabinet on June 2, 2016) and of the final report of the review meeting on *minpaku* services (complied in June 2016), we drew up the Residential Accommodation Business Bill, to promote *minpaku* services that meet needs under appropriate regulations, and submitted it to the Diet in March 2017.

(2) Developing and Enhancing Tourism Management Personnel Based on Industry Needs

We took initiatives at each level—the top, core, and working levels—to develop and secure personnel in the tourism field.

With respect to the top level, with the objective of developing human resources who can drive Japan's tourism industry overall, we began considering curricula through industry-university-government cooperation. Our aim was to establish bases to continually develop management personnel for tourism at the graduate school level (including MBAs) at Hitot-subashi University and Kyoto University in 2018.

Regarding personnel at the core level, we horizontally extended an educational program conducted at Otaru University of Commerce in FY2015 and offered courses at Wakayama University and Oita University to increase managerial capabilities in the regional lodging industry. We also conducted a survey related to the industry's human resources needs.

As for working level personnel, as a response to the labor shortage in the tourism industry, we conducted a survey of the curricula of specialized training colleges as well as a survey of the employment needs of students hoping to enter the tourism industry and of seniors and women wanting to work.

As for tour operators that make travel arrangements for foreign visitors, the MLIT promoted the certification system operated by Japan Association of Travel Agents (JATA) as secretariat for indicating the levels of service quality and reliability of companies, as well as certified business operators by the system.

(3) Quick Resolution of the Shortage of Accommodation Facilities and Provision of Accommodation Facilities that Meet Diverse Needs

We established guidelines that clarify the operation of a system for relaxing floor area ratios, which is focused on development of accommodation facilities, and sent out notifications thereof to local governments. Also, to improve the satisfaction of travelers by matching services provided by accommodation facilities and travelers' needs, we are examining the kinds of services that are possible in accommodation facilities by first of all analyzing the diverse needs of travelers.

(4) Formation and Development of World-class DMOs

In order to encourage the formation and development in each part of the country of DMOs^{Note}, which are specialized organizations that strategically promote the revival of tourism, under consensus building with diverse stakeholders in the community, we provided assistance to DMO candidates in three ways: information, personnel, and financial/monetary support. As of the end of FY2016, 134 DMO candidates have been registered.

(5) Continual Operation of the Tourist Area Regeneration/Revitalization Fund and Deployment of Fiscal Resources to Become a Next-generation Tourism-oriented Country

The Regional Economy Vitalization Corporation of Japan (REVIC), which has entered into a comprehensive collaboration with the Japan Tourism Agency, had set up 12 tourism revitalization funds by the end of FY2016 in different regions, including Saga, together with local financial institutions. These funds have provided investment and loans to 26 projects. The Japan Tourism Agency supported REVIC's initiatives, including the provision of information on businesses with high relevance to REVIC's initiatives and efforts to get the word out about the funds, including through its website.

Also, from the perspective of combining economic revitalization and the achievement of fiscal soundness by becoming a tourism-oriented country, we are striving to continue to secure an appropriate tourism-related budget and will consider measures to secure additional fiscal resources for the nation, in order to implement high-level tourism policies in response to growing tourism demand, including inbound expansion in the future.

(6) Strategic Enhancement of Promotion on Visit to Japan With the Post Olympic and Paralympic Period in Mind and Better Dissemination of Wide Veriety of Tourism Attraction of Japan

In an effort to increase repeat foreign visitors to Japan and appeal to wealthy travelers, we enhanced the Japan National Tourism Organization's (JNTO) website from the perspective of foreigners to disseminate needed information in a form that is easy to obtain anytime and anywhere, and also made vigorous efforts to publicize Japanese history and traditional culture, such as by inviting media, including influential magazines, and travel companies to different parts of Japan.

Also, in an effort to further diversify the areas visited by travelers from Europe, the United States, and Australia, as well as their seasons of travel and the contents targeted at them, we exhibited at snow-related travel fairs, such as the UK's Ski & Snowboard Show, and extended invitations to travel companies that handle ski trips. In our general invitation programs as well, we conducted PR by incorporating activities such as cycling into the itineraries. Furthermore, in FY2016 we established an advisory board made up of foreign experts and others, in order to advance promotions from the local perspective.

In order to powerfully and strategically showcase the allures of Japan as a tourist destination, we took the opportunity of the Rio de Janeiro Olympic and Paralympic Games held in August 2016 and set up a Visit Japan Booth with other ministries inside the Japanese government area at the Tokyo 2020 JAPAN HOUSE to maximize increased attention as the next host country. Additionally, we used global media to disseminate to the world images of Olympic gold medalists' experiences of tourist destinations around Japan.

(7) Promotion of MICE

In order to promote international conferences and other MICE events, we provided support to five cities as "Global MICE Cities" that can win competitions with overseas competitors and supported the activities of persons certified as MICE Ambassadors, people who have influence over academic conferences and the like and are involved in the promotion of international conferences. We also promoted the use of unique venues that provide a sense of specialness, such as by holding receptions at historical buildings.

In September 2016, we established a support system for the development of conference and other facilities that underpin the business activities of global companies, and in December 2016, we newly organized the "Liaison Meeting for Promotion of MICE by Related Ministries," in order to establish a structure for promotion of MICE at the government level.

(8) Strategic Relaxation of Visa Requirements

Five countries (China, the Philippines, Vietnam, India, and Russia) have been chosen for a strategic relaxation of visa requirements under the Tourism Vision. With respect to the relaxation of visa requirements for China, India, and Russia, which was the goal for FY2016, the partial simplification of application procedures, the introduction of new multiple-entry visas, and the expansion of the kind of people eligible for multiple-entry business visas were achieved in coordination with relevant ministries.

(9) Increase School Trips to Japan

In light of the Tourism Vision, in April 2016, we set up a centralized point of contact at the JNTO and began inbound matching for educational travel to Japan. We also conducted invitation programs for educators and others from cities in Taiwan and elsewhere.

(10) Enhancement of Tourism Education

We collected case examples of children learning about attractive historical and cultural tourism resources in their communities and other parts of Japan and the communication of the appeal of those resources. We also began considering the production and spread of teaching materials.

(11) Stimulation of Outbound Travel by Young People

We analyzed the reasons outbound travel by young Japanese has not expanded, and developed and spread services such as discounts for young people to further encourage overseas travel in cooperation with travel industry organizations. We also coordinated with organizations such as the Outbound Promotion Council, established in February 2017 by the Japan Association of Travel Agents, with the participation of relevant parties, and considered promotion policies such as the conduct of annual exchanges with foreign papers aimed at stimulation of both the inbound and outbound markets.

3 Ensure All Visitors May Enjoy a Satisfying, Comfortable and Stress-free Sightseeing Experience

(1) Realization of Innovative Immigration Control Using Cutting-edge Technologies

In coordination with the relevant ministries, BioCart that use the waiting time for passport control to acquire biometric information in advance were installed at three airports, including Kansai International Airport, and system development began on a face authentication gate for Japanese people. Also, demonstration tests were conducted for measuring and disclosing the time for immigration procedures at Narita International Airport and Kansai International Airport.

Furthermore, in order to reduce the burden on travelers of aviation security screenings at the time of departure and to achieve smoother yet more rigorous screenings body scanners that have already been introduced in Europe, the United States, and elsewhere were installed at eight airports, including Haneda, Narita, Kansai, Chubu, New Chitose, and Fu-kuoka.

(2) Promotion of "Integrated Tourism/Town Revitalization" through Private Sector Town Development Activities

We promoted the establishment of networks of clear, easy-to-use walking spaces by supporting the development of information signs around terminal stations and barrier-free transportation facilities and walking spaces. Additionally, an amendment of the Act on Special Measures concerning Urban Reconstruction made it possible for tourist information centers, etc., to exclusively use city parks.

We also moved forward with examination of the tentatively named City Future Gallery concept for connecting the dissemination of information on the attractions of Japanese cities into inbound demand initiatives and overseas expansion of urban development.

(3) Developing the Environment for Receiving Foreign visitors

We provided support for multilingual services in public transportation and tourist information centers, and the development of free public wireless LAN environment.

Also, we provided support for costs to cope with inbound travelers in approximately 2,000 Japanese inns, hotels, and other accommodation facilities and, in order to make effective use of existing accommodation facilities, we supported projects to strengthen the ability to disseminate vacancy information at information centers, such as tourist information centers in stations and airports.

To further deploy tax-free shops and increase consumption in the countryside, the consumption tax-free system for foreign visitors was further expanded, including the reduction of the lower limit purchase amount for general goods.

We also carried out initiatives to make Michi-no-Eki (Roadside Stations) into sites for the dissemination of local information by encouraging support for inbound tour-



ism responses such as the establishment of tax-free shops and tourist information centers and the development of free public wireless LAN spots at Michi-no-Eki.

(4) Enhancing Systems for Receiving Foreign Patients to Enable Adequate Responses to Emergency and Non-emergency Cases

In FY2016, in coordination with the Ministry of Health, Labour and Welfare and with the cooperation of prefectural governments, we created and disseminated a list of approximately 900 medical institutions that can receive foreign visitors. Also, we encouraged foreign visitors to subscribe to travel insurance that they can get after arriving in Japan so that they can receive treatment without worrying about medical costs.

(5) Establishing "Regional Economic Development Corridors"

In March 2017, we began demonstration tests at various passenger railway companies to enable the purchasing of Japan Rail Pass tickets—which foreign travelers used to be able to purchase only at a limited number of overseas travel agents before departure—after arriving in Japan.

We also aimed to establish low-cost and continuous air networks from gateways to the countryside and linking countryside points by reducing the landing fees at regional airports. Furthermore, to create environment with a variety of easy-to-use transportation modes and encourage the flow of people and goods and local revitalization, we enhanced inter-modal connections, focusing on buses. In April 2016, the Shinjuku Expressway Bus Terminal, which is one of the largest bus terminals in Japan, opened at the Shinjuku Station South Exit, consolidating 19 expressway bus stops that had been scattered around the Shinjuku Station West Exit.

In order to create easy-to-understand road signs by adding route numbers to expressways, a Review Committee on Expressway Numbering was convened in April 2016, which compiled its recommendations the following October. In light of these recommendations, in February 2017, relevant ministerial ordinances were amended to newly establish signs with "Expressway Numbers," and Japan's first signs with expressway numbering were installed along the open section of the Ken-O Expressway (between Sakai-Koga IC and Tsukuba-Chuo IC). Additionally, to improve convenience for users, public and private entities cooperated to establish guidelines on how to display expressway numbers (excluding how to display numbering on road signs) and uniformity in readings. To provide appropriate directional guidance to foreign visitors, we improved the display of English on road information signs at 49 major tourist sites nationwide and other places in coordination with the information signs of various organizations.

Additionally, to encourage the creation of new services related to boat travel, in April 2016, we began operations to allow more flexibility in regulations on the passenger ship business in Model Zones for Boat Travel Revitalization (13 zones established as of the end of March 2017).

To secure means of transportation for tourists in depopulated areas, the "Private Car Compensated Passenger Transport System" was expanded to tourists, including foreign visitors, in National Strategic Special Districts.

(6) Functional Enhancement of Local Airport as Gateway to the World and the Promotion of Low-cost Carrier (LCC) Services

We carried out initiatives to expand the arrival and departure capacity at airports, including facility maintenance needed to revise flight routes at Haneda Airport, construction of rapid exit taxiways at Narita Airport, maintenance of CIQ facilities at Kansai Airport, and expansion of arrival and departure slots at New Chitose Airport.

Also, we proceeded with examination and preparation for consignment of airport operation to the private sector, including Takamatsu Airport and several airports in Hokkaido, with the aim of revitalizing airports by making use of private-sector wisdom and funds.

Furthermore, to encourage airlines to open new routes, we exhibited and engaged in business negotiations at business fairs, such as World Routes 2016, attended by major airlines and airports from around the world.

(7) Further Expanding the Ability to Receive Cruise Ships

To attain the goal of achieving five million foreign visitors from cruise ships in 2020, which was set out in the Tourism Vision, we carried out initiatives aimed at "zero rejections" of cruise ship port calls, including the upgrading of mooring posts and fenders for receiving large cruise ships using existing stock and starting the provision of a "matching service between cruise ships and ports of call" that attempts to match cruise ships companies and port administrators.

Also, we encouraged the use of a system to provide interest-free loans for the development of passenger facilities by newly established private businesses. In March 2017, we submitted to the Diet a bill to amend the Port and Harbor Act so as to create an arrangement system that would allow priority use of quays to private businesses that develop passenger facilities and make them available for use by the general public at international passenger ship hub ports designated by the Minister of Land, Infrastructure and Transportation.

Furthermore, we held seminars for local travel companies in Singapore and Thailand as well as business negotiation meetings between cruise ship companies and port administrators with the cooperation of the National Cruise Vitalization Conference. We also enhanced the website for centrally disseminating specifications of port facilities and tourist information around ports of call.

Column 5 Million Foreign Cruise Passengers to Japan by 2020

The population of cruise passengers has increased in Asia and throughout the world in recent years, and the number of passengers to Japan has also surged. The target of realizing "an era of a million cruise passengers to Japan in 2020," which was set forth in the 2014 Action Program toward the Realization of a Tourism-Oriented Country, was attained in 2015, five years ahead of time. Therefore, a new target to increase the number of cruise passengers to Japan to 5 million by 2020 was set forth in the Tourism Vision to Support the Future of Japan, compiled in March 2016.

The MLIT will make active efforts to realize this new target by improving existing stock to create an environment for accepting cruise ships that are becoming larger year by year, and implementing a variety of relevant measures, such as developing an international hub for cruise ships through private-public partnership.



(8) Innovating the Environment for Using Public Transportation

We launched the Highway Bus Information Platform –Japan Bus-Gateway–, an information site for foreigners, to encourage foreign travelers to use highway buses.

We also began examining methods of efficient delivery of the information needed for route searching between transportation operators and route searching service providers, in order to enable route searching that covers public transportation nationwide.

During FY2016, we completed the numbering of all railway stations in Tokyo's 23 wards. We also made progress in considering the implementation of alphabet/Roman numeral numbering of large city bus routes by FY2020.

In order to spur tourism demand among foreign visitors and everyday life demand among seniors by lowering the starting taxi fare, which is at a high level compared to major foreign cities, we conducted a demonstration test at four locations in Tokyo, after which starting taxi fares were lowered throughout the Tokyo area from January 2017.

To reduce foreign travelers' inconvenience of carrying large suitcases onto trains, we use a common Hands-Free Travel logo mark to encourage hands-free travel that offers temporary storage of luggage at airports and stations as well as delivery of luggage to airports, hotels, and homes outside Japan. (Use of the common logo mark has been approved at 163 Hands-Free Travel service counters as of March 2017.)

(9) Promoting Universal Design Ahead of the Olympics and Paralympics

In order to promote the development of a society that adheres to the precepts of universal design (Mental barrier-free, Universal design town building) in response to the upcoming Tokyo Olympics and Paralympics in 2020 and to leave behind a concrete legacy after the Games come to an end, we oriented alterations to be made to the barrier-free transportation standards and guidelines and conducted a model evaluation of the overall status of barrier-free arrangements at tourist destinations, based on the Universal Design 2020 Action Plan decided at the Ministerial Council on Universal Design 2020 held in February 2017.

We encouraged the introduction of barrier-free buses and taxis. We also gathered and disseminated information on good cases of barrier-free practices on passenger ships.

In January 2016, we formulated Tokyo the Policy on Road Sign Improvements toward the Tokyo 2020 Olympic and Paralympic Games. In September 2016, we formulated similar policies in Chiba, Saitama, and Kanagawa Prefectures and started improving road signs based on these policies, including the improvement of English signs, use of route numbers, use of pictograms and reversed characters, use of nicknames, enlarged letters, and enhancement of road signs for pedestrians.

Furthermore, with regard to roads around major railway stations and tourist destinations nationwide, we focused on supporting the adoption of universal design in walking spaces, such as the plazas in front of stations.

Additionally, we supported barrier-free improvements, such as the construction of elevators and platform doors at stations related to the 2020 Tokyo Olympic and Paralympic Games.

At airports, we established numerical targets related to the handling of passenger terminal buildings. In order to improve traveler convenience, we relocated the taxi stands at Haneda Airport's international terminal.

At tourist information centers, we worked on model structures that add a barrier-free travel consultation counter to create an environment that allows anyone, including the elderly and people with disabilities, to enjoy traveling.

Column Aiming to Realize an Attractive, World-Class Tourist Destination

The Japan Tourism Agency presents a Commissioner Award to individuals and organizations who have made an outstanding contribution to the promotion and development of tourism in Japan, such as by creating attractive tourist sites, disseminating information on such sites, or attracting foreign visitors to Japan. Below, we introduce the initiatives of the award-winning organizations of the 8th Japan Tourism Agency Commissioner Award.

[Preservation and utilization of historical buildings]

Founded in 1996, NPO Bunkyo Link for Architectural Preservation has paved the way for the preservation of the Former Kusuo Yasuda Residence, a valuable historical building built in 1919 (Sendagi, Bunkyo City, Tokyo), by conducting surveys of the building, proposing preservation measures, engaging in volunteer housekeeping work, and offering public tours of the house. For more than 20 years after its founding, it has continued to manage and run the house through a staff of volunteers, and spotlights the house as a tourism resource by participating in public activities and implementing events rooted in local culture. It also undertakes similar activities for the preservation of Shimazono House, a Registered Tangible Cultural Heritage of Japan, and the Komagome Village Headman's House, designated a historical site of Tokyo, and also makes a significant contribution to the revitalization of the Yanesen district in Tokyo.

The NPO also assumes the role of disseminating its expertise and skills nationwide as a pioneer in the preservation and utilization of historical buildings through citizens' efforts.





Former Kusuo Yasuda Residence, which was miraculously saved by the efforts of Bunkyo Link for Architectural Preservation

Hanayome Noren (bride's curtain) Exhibition (place: Former Kusuo Yasuda Residence)

[Revitalization of marginal villages and rural areas]

Since 2009, Note Inc. has engaged in activities for the revitalization of marginal villages and rural areas and the utilization of historical buildings, mainly in Sasayama City, Hyogo Prefecture. In Sasayama City, it has renovated more than forty traditional houses, and has invited entrepreneurs and businesses to create an attractive castle town environment that is now home to Hotel Nipponia, built under a distributed hotel concept that regards the entire historical district as a single hotel, as well as an assortment of restaurants, cafes, and craft workshops.

In the Maruyama district of Sasayama City, which used to be a marginal village with a population of only 19, the company launched "Maruyama Village" by transforming abandoned traditional homes in the village into lodging facilities for visitors. The initiative has lured back four residents who had previously moved away from the village, and is otherwise making a large contribution to regional revitalization through tourism.



A traditional Japanese house transformed into a hotel

Maruyama Village

[Local resources as tools for experienced-based school trips]

Since fiscal 2009, the Hiroshima Bay Area Marine Metropolis Research Council has utilized the diverse resources of the Hiroshima Bay area as tools for educational travel in combination with peace education, and welcomes homestay-type, experience-based school trips. The Hiroshima Chamber of Commerce and Industry assumes a central role in promoting the program via public-private partnership, and has established an "experience-based school trip invitation promotion office" within the chamber for interested travel agencies, as part of a one-stop coordination scheme for accelerating the initiative.

The number of participants has increased yearly, and surpassed 12,000 in fiscal 2016. The program not only makes a positive economic contribution by promoting the use of local inns and hotels before and after the homestay school trips and increasing the sales of goods accompanying these stays, but also makes a large contribution to promoting tourism and regional development by generating regional vitality through interactions between local residents and students on school trips.



Students on a homestay school trip





Kaidenma traditional rowing boat race experience in Osakikamijima Town on a remote island of Hiroshima Prefecture

[Inbound tours that highlight regional attractions]

Abercrombie & Kent USA, LLC is a long-standing tour operator founded in 1962. It is also one of the largest tour operators in the United States, and has promoted Japan as a travel destination for many years. Owing to its brisk sales of tours to Japan in recent years in particular, it is actively marketing exclusive Japanese tours, including luxury small group tours, arrangements for private travels to attractions throughout Japan, and arrangements for cruises in Japan.

a mountainous area of Hiroshima Prefecture

The company also organizes tours that highlight regional attractions in Japan (such as group tours that include visits to the remote islands of Okinawa, Sado, etc.), in an effort to cultivate new Japanese inbound demand and expand the upper-class market. In 2015, it partnered with the Visit Japan campaign to promote Japan travel, and has contributed to increasing the number of visitors to Japan from the United States.



Cruise ship for upper-class travelers



Regional tour routes



Joint campaign

Continued efforts will be made to identify and laterally share best practices throughout Japan, to realize Japan's vision of becoming "a World-Class Tourist Destination."

Section 3 Building a Beautiful Nation Blessed with Pleasing Landscapes, etc.

1 Pleasing Landscape Formation

(1) Accelerating Community Development Leveraged by the Landscape Act, etc.

Efforts to form pleasing landscapes have been accelerated by landscape administrative bodies^{Note} based on the Landscape Act, which numbered 681 groups as of the end of March 2016, with 523 of them pursuing their own landscape

Note A landscape administrative body is a prefecture, government-ordinance-designated city, core city or any municipality that handles landscape administrative affairs (those based on the provisions of Section 1 to 4 of Chapter 2 and Chapters 4 and 5 of the Landscape Act) upon prior consultation with the governor of its prefecture.

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plans. Further, the number of municipalities that formulated ministerial ordinances pursuant to the Outdoor Advertisement Act, which is prefectural administrative affairs, by becoming landscape administrative bodies, rose to 85 groups as of October 1, 2016, and comprehensive formation of pleasing landscape is ongoing.

(2) Approaching Landscape Discussions as Part of Social Capital Development

To move ahead with landscape-conscious social capital development, a scheme of making post-project predictions and assessments of landscapes and factoring them into project plans while hearing diverse opinions from the local residents, academic experts and others has been pursued.

(3) Accelerating Removal of Utility Poles

From the viewpoints of creating pleasing landscapes, promoting tourism, keeping the driving environment safe and comfortable, and making roads that are prepared for disasters, we are removing utility poles by promoting simultaneous development when constructing new roads or widening existing roads and implementing model construction works for introduction of low-cost methods.

Also, the Act on Promoting Removal of Utility Poles was enacted and took effect in December 2016.

(4) Promoting the "Japan Scenic Trails" campaign

The "Japan Scenic Trails" campaign has been promoted with the view of furthering roadside landscape designs and greening by leveraging regional resources and col-



laborating with various entities in order to help realize a tourism-oriented country and contribute to regional revitalization. As of the end of March 2017, 138 routes had been registered as Scenic Trails. Activities include those that help form pleasing landscapes and add to the charms of roadside localities by working in conjunction with Michi-no-Eki (Roadside Stations).

(5) Promoting the Development of Waterfront Spaces, etc.

The practice of the concept of nature-rich river works has been promoted in all river restoration projects to preserve and create the habitat, growing and breeding environments of living organisms inherent in rivers and diversities of river landscape while keeping the rivers in harmony with local livelihood, history, and cultures with the workings of nature taken into consideration. In order to revitalize rivers and towns connected to them from the mouth of river to the source, we use "resources" such as regional landscape, history, culture and tourism infrastructure and "wisdom" with regional ideas, formulate river-town planning with coordination among municipalities, private businesses, local residents, and river administrators, and promote the formation of favorable spaces where rivers and towns integrate. Specifically, we provide support through the river environment project to preserve/restore and create a favorable river environment, make exceptions to the permission rules on exclusive use for river sites in order to open river spaces, create a water resource area vision that aims to revitalize water source regions leveraging dams, and promote the Mizubering Project, which provides the wide public with opportunities to find value in rivers.

Other ongoing efforts directed at regenerating and creating waterside environments include development of babbling water streams taking advantage of storm sewers and that of facilities for putting sewage plant effluents to use as babbling

water. The conservation and creation of excellent waterside environments is also ensured by the implementation of appropriate wastewater treatment.

Column

Traveling from Haneda to the City Center via Boat and Enjoying the Attractive Waterfront Environment in Tokyo (Tokyo Waterways Pilot Project)

Waterfront areas in Tokyo are full of charm. For example, traditional yakatabune boats and boathouses create a nostalgic atmosphere of Edo, while historical bridges that were constructed more than 90 years ago provide an insight into the history of Tokyo and waterfront landscapes offer a view of a new Tokyo.

The Tokyo Waterways Pilot Project was implemented from autumn of 2015 to autumn of 2016 on four separate occasions, connecting the Tokyo city center with the coastal areas of Tennozu Isle and Haneda Airport, to study the possibility of creating new waterway routes as a means of waterborne transportation for carrying tourists and demonstrating Japanese hospitality.

In the fourth segment of the project, implemented from October to December 2016, long-distance main routes linking Akihabara and Yokohama at the longest and relatively short branch routes through Tokyo's rivers were established. Test runs of services that allow passengers to board without booking in advance were also conducted as a test of what actual services would eventually be like. The "Regional Support Team" initiative that commenced from the third segment of the project began to see an increase in its membership as the project



<Administrative bodies>Chiyoda Ward, Bunkyo Ward, Shinagawa Ward, Ota Ward, MLIT <Related institutions>Chiyoda City Tourism Association, Akihabara Town Management, Tennozu Comprehensive Develop ment Council, Japan Airport Terminal Co., Ltd., Atomi University <Operating companies>Zeal Corporation, Funasei Ltd., Galleon Co., Ltd., JTB Japan Travel Corp.*, Tokyo Water Ways, Pokekaru-Club, Inc.*, Isetan Mitsukoshi Travel*, KMC Corporation, Haneda Passenger Service Co., Ltd. <Support team>Tokyo Dome Corporation, Akiba.TV Co., Ltd., Mansei Co., Ltd., Tennozu Comprehensive Development Council, Warehouse Terrada, Keihin Electric Express Railway Co., Ltd., mAAch ecute Kanda Manseibashi, Koishikawa Korakuen (Tokyo Metropolitan Park Association), Hotel Metropolitan Edmont Tokyo, Tennozu Canal Side Association, Nakagawa Special Steel, Inc., Minato Travel and Tourism Association, Tokyo Monorail Co., Ltd.

Source) MLIT

took on momentum. It has now been launched full scale, with more than 20 participating stores distributing discount coupons and otherwise promoting the region. By the time the project was over, the participants of the project grew to 31 organizations, and some 5,000 people had boarded 275 boat services over a total of approximately 80 days during the four segments of the project.

It is hoped that the project will further bring together the passionate feelings of people who wish to promote awareness of Tokyo's waterfront attractions and invigorate the city, and ultimately realize regular boat services at the initiative of local communities and the private sector.

2 Community Development Leveraging Nature and History

(1) Developing National Government Parks to Contribute to the Preservation, Utilization, etc., of Japan's Indigenous Culture

The development of National Government Parks has been driven to ensure the preservation, utilization, etc. of Japan's superb indigenous culture. A total of 17 National Government Parks are already open. In FY 2016, Nara Palace Site Guidance Center and other facilities were constructed in Asuka-Nara Palace Site Historical National Government Park (Nara Palace Site).

(2) Preserving Historic Landscapes in Ancient Capitals

In Japan's ancient capital, such as Kyoto, Nara, and Kamakura, restrictions are placed on constructing new buildings, etc., making additions and modifications to existing ones, developing housing land and so on under the Act on Special

Measures for Preservation of Historic Natural Features in Ancient Cities (Ancient Capitals Preservation Law). The Act also provides for the implementation of ancient city preservation projects, such as purchasing land, and publicity, educational and other activities, to help preserve historic landscapes in these cities.

(3) Preserving and Utilizing Historic Public Buildings of Historical Value, etc.

With the aim of contributing to regional town development, we are promoting the preservation and utilization of historic government facilities locally known for a long time. We have developed the environment of historic sediment control facilities (Two Important Cultural Properties and 191 Registered Tangible Cultural Properties as of March 31, 2017) by positioning them and their surrounding environment as a core of tourism resources, thereby enFigure II-3-3-2

Inariyama Sediment Control Dams (Nikko, Tochigi): Promoting Tourism and Exchange Activities Using Historic Sediment Control Facilities that Protect Communities



couraging efforts that contribute to the formation of a new forum of human interaction.

(4) Community Development Leveraging Histories and Cultures

Historic landscape maintenance and improvement plans for 62 municipalities (as of March 31, 2017) have been accredited in order to promote community development leveraging local histories and traditional cultures and approaches pursuant to the plans supported, based on the Law on the Maintenance and Improvement of Historic Landscape in a Com-

munity (Historical Urban Development Law). In addition, we have provided renovation and other support for buildings that serve as landscape and historic resources in order to encourage the formation of pleasing scenic and historic landscapes.

(5) Promotion of Mizubering Project

Mizubering is an initiative to provide opportunities to find a new value in rivers from outside to people and private companies leading daily lives or engaging in economic activities without being conscious of rivers around them.

Mizubering is an activity taking place in more than 50 locations nationwide aimed at realizing regional revitalization, starting from waterfronts across Japan, while creating a new social design that uses rivers as a new frontier and has various entities collaborating with each other.

The MLIT will support efforts of regional people and private companies through Mizubering so that the value of rivers can be leveraged further in order to allow them to serve their roles as regional treasures.

(6) Promoting Green Infrastructure Initiatives

Green infrastructure aims to utilize the natural environment's diverse functions (e.g., providing habitats for wildlife, forming pleasing landscapes, and controlling atmospheric warming) and obtain diverse effects such as



Source) Junior Chamber International Takavama



Source) Junior Chamber International Takavama

improving local charm and the living environment and preventing/reducing disasters, in terms of both structural and non-structural issues, such as social infrastructure development and land use. With regard to this, we carry out initiatives in various fields, including the creation of rich river environments and the development of green coastal levees as well as parks and greenery that function to prevent the spread of fires.

Chapter 4 Promoting Regional Revitalization

Section 1 Approaches to Regional Revitalization

In order to properly respond to the declining birth rate/aging population to put a brake on population declines, while correcting the excessive concentration in Tokyo Area and maintaining vitality of Japanese society in the future by securing a comfortable living environment in each region, the Basic Policy for Overcoming Population Decline and Vitalizing Local Economy in Japan 2016 was formulated in 2016 and the Overcoming Population Decline and Vitalizing Local Economies: Comprehensive Strategy was revised, in accordance with the Act for Overcoming the Population Decline and Vitalization, the relocation of governmental organizations and the promotion of local universities has been examined, and information, personnel and financial support for the promotion of specific initiatives based on the regional comprehensive strategy has been provided to local governments.

In April 2016, revisions to the Regional Revitalization Act were passed. The revisions incorporate such things as the establishment of a Regional Revitalization Promotion Fund that encourages forward-thinking elements of local government projects undertaken voluntarily and independently, the establishment of a Regional Revitalization Support Tax System that encourages corporate donations to regional revitalization projects implemented by local governments, and measures to promote a Japanese version of Continuing Care Retirement Communities that aim to build communities that enable middle-aged and elderly people to relocate as they desire, and to live healthy, active lives as they interact with local residents of multiple generations.

With respect to the regulatory National Strategic Special Zones, the two years before the end of fiscal 2015 were designated as a Concentrative Initiative Period to achieve regional revitalization through regulatory reforms, so-called "reforms of regulations that had been difficult to change due to stiff opposition" have been realized in various fields such as medicate, childcare, employment, education, agriculture, urban renaissance or community development. In addition, a total of 10 districts were designated and specific projects that use these regulatory reform items have been visibly implemented in these districts. Furthermore, the two years before the end of fiscal 2017 were designated as a Concentrative Reform Enhancement Period, six fields to be tackled on a priority basis were defined, and the remaining reforms of regulations, which had been difficult to change due to stiff opposition, have been implemented.

The MLIT pushes forward the development of tourism regions, having the Japanese version of the Destination Marketing/Management Organization (DMO) as its core, creating various regional contents and establishing an environment to receive tourists to realize a "world-class tourist destination" under the keywords of "region" and "consumption." The MLIT also drives efforts to create jobs by promoting the securing and development of human resources engaged in the construction, shipbuilding, transportation and other industries that underpin regional economies.

Furthermore, with the aim of reviving regional communities, we are pushing forward efforts to make regional cities compact and create transportation networks, form small stations in hilly and mountainous areas, and develop houses and towns for multi-generation residents in coordination with the comprehensive regional care system in suburban metropolitan areas. We are also promoting multi-habitation in earnest and establishing an environment for making relocation easier by facilitating the distribution of existing housing in order to create new flows of people into rural areas.

The MLIT has also been driving nationwide urban renaissance, as through the development of public and public-benefit facilities in a public-private partnership, as well as urban renaissance aimed at enhancement urban international competitiveness leveraging private vitalities. Chapter 4 Promoting Regional Revitalization

Section 2 Promoting Measures Supporting Regional Revitalization

Efforts Directed at Augmenting Regional and Private Self-reliance and Discretion

(1) Supporting Local Regional Revitalization Efforts

Regional revitalization is not an effort to be taken uniformly throughout Japan; it involves individual regions capitalizing on their distinct resources and characteristics to tackle their own distinct challenges to overcome depopulation. As local governments continue to devise plans for measures, promote projects and verify effects in line with their own individual strategies, the national government has continued to play the supporting role of providing assistance on information, personnel and financial aspects.

To provide assistance on information aspects, the government provides the Regional Economy and Society Analyzing System (RESAS), which takes big data from the public and private sectors regarding regional economies and makes it visible and intuitive. The system is used to fully understand the current state and challenges of each region; analyze strengths, weaknesses and future visions; set basic targets and KPIs, and establish PDCA cycles, thereby supporting the regional revitalization efforts of local governments, private companies, residents, NPOs and others.

To provide assistance on personnel aspects, regional revitalization colleges train and secure the human resources required for regional revitalization, while the government provides support through the regional revitalization concierge, which sets up a consultation desk at each ministry and the regional revitalization personnel support system in which government, private company and other organizations' personnel are dispatched to small local governments.

To provide assistance on financial aspects, we are providing support through such efforts as a regional revitalization promotion subsidy that consistently and continuously supports multi-year, forward-thinking projects undertaken by local governments, and a regional revitalization support tax system that provides preferential treatment in the form of tax credits for corporate donations to regional revitalization efforts undertaken by local governments (a corporate version of *furusato nozei*, which is a system of remitting local taxes to regional municipalities of the remitters' choice), thereby enabling regions to make consistent efforts toward regional revitalization from medium- and long-term perspectives.

The MLIT is engaged in similar efforts as well. To promote further approaches to individualistic and charming regional planning across Japan, the MLIT awards regional activities related to favorable social overhead capital with Handmade Hometown Prizes (Minister of MLIT Prizes). In FY2016, the MLIT hosted the "Handmade Hometown Prize Grand Prix 2016: Refined, Shining, Hometown Pride," the first event of its kind. At the event, 22 prize-winning groups (2 for grand prize division, 20 for general division) gathered to give presentations, and judges selected the Grand Prix and best presentation prizewinners in each of the grand prize and general division. Furthermore, the information was sent by newsletter as good case examples that are useful for regional development^{Note}.

(2) Promoting Use of Know-how and Funds Originating from Private Sectors

In order to enhance the growth and competitiveness of local cities, excellent private urban redevelopment projects, such as those linked with an urban renaissance and development project undertaken by a local public entity and accredited by the Minister of MLIT are entitled to investment, joint implementation or any other form of support granted by the general incorporated foundation Organization for Promoting Urban Development (hereinafter simply called MINTO). Support is also extended to a resident participation community development fund, which subsidizes community development projects carried out with local resident perception or the like.

In its bid to realize and maintain the concept of sustainable community development with community participation through maintenance and betterment of community charms and vitalities, the MLIT supports projects related to the diffusion and promotion of know-how, etc., that is possessed by private associations with experience in the practice of community development activities and that leads to continuing sources of certain profitability in the course of such activities, so that such knowledge can be horizontally extended to other associations about to embark on similar activities, or to experimental approaches, etc., relevant to ingenious, advanced private community development activities.

In addition, consideration is in progress toward the realization of measures aimed at combatting aging expressways

Note Regional Planning Information System-Repis website: http://www.mlit.go.jp/sogoseisaku/region/chilki-joho/index.html As of the end of FY2016, there were 1,899 subscriptions to the online magazine (as of the end of March 2017).

Example of a Private Urban Redevelopment Project

in conjunction with urban redevelopment, using the Tsukiji River and other sections of the Metropolitan Expressways as model cases, on the basis of the Road Act amended in FY 2014 that allows for usage of upper open spaces over roads.

Moreover, public-private partnership efforts leveraging road spaces are pushed forward in order to create forums for regional activity/exchanges and maintain/improve road quality.

In FY2015, the Act to Partially Amend the Act on Special Districts for Structural Reform, which enables private-sector operators to operate toll roads managed by public corporations, was passed and enacted. Since October 2016, toll roads in Aichi Prefecture have been operated by the Aichi Road Concession Corporation, established by Maeda Group which is represented by Maeda Corporation.



Source) MLIT

2 General Endeavors to Build an Intensive Urban Structure

Compact cities and development of surrounding transportation networks such as by rebuilding public transportation networks should be worked on continuously with the mid- to long-term perspectives as they are effective policy means to realize specific administrative purposes such as maintaining and improving convenience of lives of residents, revitalizing regional economies by enhanced productivity in the service industry, and reducing administrative costs by improved efficiency in administrative services.

With the aim of pushing forward initiatives of municipalities toward the realization of compact cities, the Act on Special Measures concerning Urban Regeneration was amended in 2014 to create the appropriate location plan system for encouraging establishment of residential and urban functions with economic incentives. As of the end of FY 2016, 348 municipalities made specific efforts on creating appropriate location plans, of which 100 cities prepared and published the appropriate location plan.

In addition, we are working to improve support measures in line with actual needs, formulate and horizontally develop model cities, and make the outcomes of efforts visible through the Compact City Formation Support Team (secretariat: MLIT), which comprises relevant ministries and agencies, so that these initiatives of municipalities will be promoted as comprehensive efforts in coordination with various relevant measures concerning healthcare/welfare, housing, realignment of public facilities and the optimum use of government owned facilities.

In FY2016, we organized the overall collection of support measures into a list, which was provided to municipalities, and worked to improve the required support measures based on actual needs and other information obtained through briefing sessions for local governments, block consultation meetings and the like. In addition, we released the "Collection of Cases of Preceding Efforts," a collection of positive cases from individual projects that contribute to the formulation of compact cities, and provided consulting toward the formulation of model cities in response to the sizes of cities and the core themes of town building. Furthermore, we created and publicized guidelines regarding the numbers of steps taken by pedestrians, a piece of data that could serve as an indicator of the effects of compact cities, and created guidelines regarding the full understanding of demographically categorized behavior data to encourage the establishment of optimal facilities and the like by government and private-sector operators alike.

3 Urban Planning and Infrastructures Development Taking Advantage of Regional Characteristics

(1) Emergency Development of Urban Planning Roads Instrumental in Encouraging Private Investment

The development of urban planning roads is instrumental in facilitating urban reconstruction because it encourages the reconstruction, etc., of roadside buildings. For those routes under construction whose completion is bottlenecked because of small plots of land yet to be purchased, the local governments (project-implementing entities) have announced their pledges to complete the construction within a certain period of time (completion time declaration routes; as of April 2016, 142 routes were declared by 70 project-implementing entities) to speed up the development of the project benefits.

(2) Developing Transport Nodes

Transport nodes, such as railway stations and bus terminals, are very convenient and have great potential as the core of urban reconstruction, because they attract numerous people to use the various kinds of transport facilities that converge upon them.

The MLIT leveraged the implementation of transport node improvement projects, urban and regional transport strategy promotion projects, integrated railway station improvement projects, and other projects at the transport nodes, such as the Shinjuku St. South Exit District, and in the surrounding areas, in order to improve the ease with which passengers transition from one means of transportation to another, to consolidate the urban areas disrupted by railways, to improve station functions, and to streamline urban traffic and augment the functions of these transport nodes.

The MLIT also encouraged the upgrading the station facilities for the general goals of safe and comfortable regional living through building child-support and medical facilities on the premises of existing railway stations. This idea was developed from the viewpoint of regional concentration, which brings medicine, work, and living into closer vicinity.

(3) Strengthening Connections between Modes of Transportation (Modal Connections)

The MLIT is enhancing inter-modal connections, focusing on buses, to create environment with a variety of easy-to-use transportation modes and encourage the flow of people and goods and local revitalization.

Compared to other countries and other transportation modes (i.e. railway and aviation), environment for buses in Japan is very poor from the users' point of view. When promoting user-oriented road measures for boosting stock effects in the future, it is important that the road measures also include efforts to accelerate the improvement of the convenience of public transportation, including buses, while taking into account the state of the network between expressways, railways, Shinkansen and other modes of transportation in regional areas.



Under these circumstances, as an effort focused on buses, we implemented the Basuta (Shinjuku Expressway Bus Terminal) Project to improve the convenience of bus hubs by making full use of ITS and PPP, thereby strengthening inter-modal connections, realizing the revitalization of regions, and improving productivity in the strengthening of disaster responses.

In Ichihara City, Chiba Prefecture and Hamamatsu City, Shizuoka Prefecture, car-sharing vehicles are available in parking lots near expressway bus stops to strengthen the connection between expressway buses and car-sharing. This serves

as a pilot program to verify the possibilities of regional revitalization and tourism promotion through the expansion of the areas frequented by expressway bus riders.

In April 2016, Shinjuku Expressway Bus Terminal, the largest bus terminal in Japan, opened at the South Exit of Shinjuku Station. Shinjuku Expressway Bus Terminal was developed through a public-private partnership initiative in which infrastructure was developed under a road project (for National Route 20), while the private bus terminal operates the facility. The bus terminal is directly connected to railways, and 19 expressway bus stops formerly located near the West Exit of Shinjuku Station are now concentrated in one place. This initiative will continue into the future, further improving convenience through the full-scale operation of convenience stores and the addition of benches and the like, and strengthening measures against traffic jams on National Route 20.

As for car-sharing and bicycle-sharing, which are new modes of transportation, we are promoting efforts that strengthen connections with other modes of public transportation while making effective use of roadway spaces.

We built Japan's first on-road car-sharing station adjacent to the Otemachi Subway Station in Chiyoda City, Tokyo, and are implementing a pilot program to verify the possibilities of encouraging the use of public transportation. We are also implementing a separate pilot program to verify the effects of locating a bicycle-sharing port, which would be the first in the metropolis, on the national route near this car-sharing station. We will take into account the results of these pilot programs while continuing discussions toward improving convenience for road users through the effective use of roadway spaces.

(4) Wide-area Development of Infrastructures to Induce Firm Location

Competition, collaboration, and regional buoyancy in East Asia should benefit greatly by inviting and accumulating internationally competitive growing industries in the individual regions. Motivated by this recognition, measures have been promoted to support expanding regional employment and more buoyant economy by concentrating investment on the development of those infrastructures that are truly needed to carry out unique regional approaches, such as developing airports, ports and harbors, railroads and wide-area expressway networks.

(i) Airport development

Aviation network connecting distant cities at home and abroad are greatly instrumental in revitalizing regional communities, boosting the tourism industry and corporate economic activities. It is expected that the aviation sector will play a key role to boost Japanese economy taking advantage of global economic growth, in particular booming economy in Asia. In an effort to enhance Japan's international competitiveness and regional competitiveness in the hinterlands of the airports, MLIT has been making efforts to enhance airport capacities and relocate or change the internal layout of airport terminal area in order to improve user-friendliness.

(ii) Port and harbor development

In Japan, which is surrounded by the sea, the majority of international trades are conducted by marine transportation, and domestic marine transportation serves important roles in logistics and interactions between regions. Ports and harbors are the gateway for international trades and support Japanese industries as places of corporate activities. In order to enhance international competitiveness of Japanese industries by improving logistics efficiency and to maintain and create employment and income, international logistics terminals are being developed at ports and harbors that underpin regional key industries.

(iii) Railway development

The nationwide network of trunk railways is the lifeblood of passenger and freight transport, accelerating interaction between blocks and between regions, encouraging industrial location, and activating regional economies to energize regional living. Rail freight transport, in particular, plays a dominant role in moving industrial commodities that support regional economies.

(iv) Road development

The MLIT is strengthening Japan's international competitiveness by accelerating and facilitating logistics, and from

the perspective of regional revitalization, is forming a new network of trunk highways, such as high-standard arterial highways.

(5) Accelerating the Development of Transport Infrastructures

Regarding the method for determining whether considerations for awarding sectional surface rights, etc., related to projects authorized to use the deep underground pursuant to the Act on Special Measures Concerning Public Use of Deep Underground (Deep Underground Act) are to be treated as transferred income or not, the FY2015 tax reform has taken measures to have such considerations set based on the vertical range of the sectional surface rights, etc., in which the profit from use is limited, instead of one-fourth of the land price. This measure taxes, as transfer income, a certain amount of the considerations for awarding sectional surface rights, etc., relevant to the projects that are implemented as an integral part of a project accredited under the Deep Underground Act. Granting a special credit of 50 million yen for exchanges on expropriation, etc., promotes the earlier appearance of project effects.

(6) Promoting Community-conscious Projects and Programs

(i) Michi-no-eki (Roadside Station)

Located roadside, a Michi-no-eki is a facility that combines a mix of roadside amenities, including parking spaces and restrooms, sources of information, including highway and regional information, and a forum of regional partnerships, which encourages interaction between a region and users of the roads in that region and between regions. As of October 2016, there were 1,107 registered Michi-no-eki.

Efforts have progressed in recent years to set up Michi-no-eki as hubs of regional revitalization nationwide, attracting many visitors by featuring local specialties and tourist resources, thereby creating regional employment, reactivating economies, and helping improve resident services. As a framework to provide focused support to



these efforts in coordination with relevant organizations, the priority Michi-no-eki system was created in FY2014. In addition to six national model michi-no-eki and 35 priority michi-no-eki selected then, 38 priority michi-no-eki were newly selected in FY2015. In FY2016, a new theme (category) "services for residents" was added, and six model Michi-no-eki were selected for this theme.

(ii) Creation of hubs through the use of expressway rest areas

Expressway rest areas originally designed only for users of expressways are now used for local areas through "welcome gates," "highway oases," and the like in recent years to promote regional revitalization. To encourage those efforts, we are collaborating with relevant organizations to provide support in line with the progress of those efforts.

(iii) Improvement of road management through public-private partnerships

Past efforts to work together with regions in the course of road management include cooperation with private groups and others through the Volunteer Support Program (VSP) and the like. In April 2016, the Road Act was amended and a road cooperation organization system was created in an effort to further improve road management through cooperation with private groups and others who would resolve common road-related problems, take targeted action to address the needs of road users, and voluntarily implement other activities.

Road cooperation organizations can enhance road management by implementing activities for raising public awareness of benefits of roads and through profits from these activities. In addition, road cooperation organizations are undertaking measures to streamline and facilitate administrative procedures regarding the construction and maintenance of roads and their exclusive use of roads.

(iv) Support system for river-town planning

In order to revitalize rivers that show various shapes from the mouth to the source and communities connected to them, we are promoting the formation of favorable spaces where rivers and towns integrate by formulating plans for river-town planning that utilizes rivers with practical use of resources; such as landscape, history, culture and foundation for tourism; and inventive wisdom of the district, under coordination among municipalities, private businesses, local residents, and river administrators. By FY2016, 169 locations had been registered in the support system for river-town planning.

(v) Managing rivers with resident participation to suit regional characteristics

Those individuals who possess an expert knowledge of river environments and who are zealous for the good river development are appointed as river environment preservation monitors to help create and preserve river environments and carry out meticulous activities aimed at ensuring and promoting orderly river usage. Love river monitors are also at work in order to gather information about river management, such as illegal garbage dumping in to river or defects in river facilities, to report that information to river administrators and to promote the philosophy of river protection.

Furthermore, the MLIT designates private organizations, etc., that pursue voluntary activities relevant to the maintenance of rivers, the preservation of river environments, or other types of river management as river cooperation organizations, and legally accredits them as organizations working in conjunction with river administrators, with a view to promoting organized voluntary activities and driving diverse modes of river management tailored to specific regional conditions.

(vi) Supporting efforts to take advantage of the regional features of the seaside

With the aim of stimulating the use of the seaside and enhancing its charm as a tourist resource, we support seaside environment development projects in which seaside preservation facilities are developed according to active seaside usage plans.

Since a seaside cooperation organization designation program was inaugurated, the MLIT will designates those corporations and associations that are accredited to be capable of voluntarily conducting various activities, such as cleaning and planting seashores for preservation, protecting rare species of animals and plants along the seaside, getting prepared for natural disasters and hosting sessions of environmental education, and implementing proper and positive coastal management, as seaside cooperation organizations to reinforce the ties of collaboration with localities and thus to enhance coastal management to suit regional characteristics.

(vii) Regional promotion built around ports

Those facilities at which continuous approaches to regional development are performed have been accredited and registered as Minato (Port) Oases by the Port and Harbor Bureau Director General in order to promote community development around core ports to help revitalize local areas through exchange among local residents and promotion of tourism (93 ports as of March 31, 2017).

Diverse events with resident participation taking advantage of regional characteristics and ingenuities are being held at the Minato Oases nationwide, bustling with numerous local residents and tourists.

In addition, the All Japan Sea-kyu Gourmets Competition, an event featuring local specialty food, held at the National Council on Minato Oases, an organ aimed at encouraging exchanges, etc. among the administrators of the Minato Oases nationwide, attracted a large number of participants.

With the aim of regional revitalization, further utilization as venues for providing services to increasing numbers of passengers from oceangoing cruise ships and the like is expected, while "Operating Guidelines for Minato Oases" were developed to encourage registration and boost recognition of Minato Oasis facilities, and to contribute to further regional development.

Additionally, efforts are ongoing to develop livelier cooperation between the public and private sectors, including

discussions about policies for varied and effective use of harbor facilities, namely breakwaters and green spaces, in pursuit of the effective use of existing stock.

(viii) Building centers of marine leisure

The MLIT has driven the construction of Umi-no-Eki Stations as marine leisure sites that leverage existing port facilities, marinas, fish arenas (fishing + arena) and the like. In FY2016, nine stations were newly accredited, and as of the end of March 2017, 163 Umi-no-eki were open for use. In addition, support is provided for diverse, regionally distinctive efforts in progress at Umi-no-eki, such as cruising in rental boats, the sale of marine products, hands-on experience with fishing, and sponsoring of events.



(7) Promoting the Active Maintenance of Cadastral Maps

Cadastral surveys are conducted by municipal authorities to determine the boundaries of individual lots of land, and contribute to the promotion of prevention measures to be taken in advance of major disasters, faster restoration and reconstruction after disasters, smoother infrastructure development and the promotion of private urban development. The MLIT not only provides financial support to cadastral surveys, develops public-private boundary information in urban areas and preserves boundary information in mountain villages under direct state control to accelerate cadastral surveys, but also promotes the utilization of non-cadastral survey results.

The MLIT supports the implementation of cadastral surveys in the regions devastated by the Great East Japan Earthquake in conjunction with restoration and reconstruction projects. Near the epicenters of the Kumamoto Earthquake, complicated crustal deformation occurred, but the MLIT also supports restoration of cadastral maps by municipalities. The MLIT promotes initiatives for prompt restoration and reconstruction projects.

(8) Deep underground utilization

Regarding deep underground utilization, a deep underground utilization council exchanges information on deep underground space, in addition to technical discussions on smoother tests.

4 Self-Reliance and Revitalization of Wide-Area Blocks, and Formation of National Land

(1) National Land and Regional Development for Creation of Convection Promoting National Land

To achieve regional revitalization and sustainable growth, it is important to deploy measures in an integrated manner while drawing out regional wisdom and devices. Therefore, with the aim of forming convection promoting land that encourages innovations by dynamically inducing convection across Japan under the National Spatial Strategies and Regional Plans, measures are being taken according to the characteristics of regions while working to form multi-layered national land and regional structures. The MLIT also works on strategies for regional revitalization through public-private partnerships and government support in developing foundations that underpin private sector activity and measures to drive forward autonomous and sustainable regional development with cooperation among various entities.

(i) Promotion of infrastructure development for wide-area regions and revitalization

To implement structural and non-structural mixes of efforts designed to form self-reliant wide-area blocks and to revitalize the regions through buoyant human or material traffic, the MLIT has granted subsidies to 163 plans on the basis of wide-area regional revitalization infrastructures development plans prepared by prefectures. Of these plans, 88 have been worked out by multiple prefectures working in accord and cooperation in a bid to revitalize even wide areas.

(ii) Promoting the development of infrastructures for regional revitalization with partnership between the public and private sectors

In order to implement smooth and speedy transition from the planning stage to the implementation stage, at the time of private sector decision-making without missing opportunities for infrastructure development projects that have been worked out in a partnership between the public and private sectors to contribute to wide-area regional strategies, subsidies were provided to local governments in 2016 for 34 feasibility studies including outline designs and implementation of PPP/PFI.

(iii) Promoting regional planning with diverse entities interworking

In its bid to further self-supporting, sustainable community development through the interworking of local diverse entities, the MLIT supports efforts to: (a) gain absolute assessments of the social values of community development activities, and (b) build a support system with various entities interworking with one another to craft project-type community development activities (regional businesses).

(iv) Formation of vibrant economic and living zones through allied core metropolitan areas

In metropolitan areas that have a certain size of population and economy, the formation of allied core metropolitan areas that aim to lead economic growth, consolidate and strengthen high-level city functions and enhance services related to people's daily lives is promoted.

Originally metropolitan areas in scope (61 areas) were mainly regional ordinance-designated cities and core cities (population of 200,000 or more), in FY 2015, the Overcoming Population Decline and Vitalizing Local Economies: Comprehensive Strategy (revised in 2015, adopted by a Cabinet decision on December 24, 2015) added metropolitan areas centering on adjacent two neighboring cities with population of more than 100,000 each to the scope under certain conditions.

(2) Promotion, etc. of regional center formation

(i) Developing centers of self-reliant growth of diverse wide-area blocks

In core cities^{Note} based on the Multi-Polar Patterns National Land Formation Promotion Act, business facilities are being relocated and various other functions are being concentrated as we continue to promote development. In addition, the MLIT has driven the construction of Tsukuba Academic City to pursue urban revitalization by taking advantage of an accumulation of science and technology in accordance with the Act on Construction of Tsukuba Science City. Furthermore, environmentally friendly cities are being built along the Tsukuba Express railroad line by leveraging the characteristics of Tsukuba Science City as the pace of urban development accelerates. In the Kinki Metropolitan area, on the other hand, the construction of Kansai Science City is underway to form a new foothold for the deployment of cultural, academic and research activity in accordance with the Kansai Science City Construction Promotion Act. Further efforts to promote the science city continue in a partnership among the ministries concerned, local governments, economic circles and so on pursuant to the Basic Policy for the Construction of Kansai Science City. In addition, the MLIT promotes the implementation of a development plan based on the Act on Development of Osaka Bay Areas to create a district that is replete with the facilities of a global city, good living amenities and more.

Note A core city is a city located outside the wards of Tokyo that should serve as the core of a reasonably wide area surrounding its location. (There are 14 core cities.).

(ii) Promoting Small Station development within a village area

In some hilly and mountainous areas and other regions with declining and aging population, it is increasingly difficult to maintain life service functions, including shopping and healthcare, and community functions. Therefore, in regions that have multiple villages, including elementary school districts, we are promoting the formation of small stations in which required functions and bases of regional activities are concentrated within walking distance, and transportation networks with nearby villages are secured.

Specifically, we support the realignment and consolidation of life service functions leveraging unused facilities, and are working on penetration and boosting awareness in coordination with relevant ministries.

(iii) Reviews of the relocation of the Diet and other organizations

The MLIT aids the Diet in its reviews of the relocation of the Diet and other organizations based on the Act for Relocation of the Diet and Other Organizations by conducting surveys on the relocation of the Diet, disseminating information to the nation and so on.

(3) Actions on Land for Which Owners and Their Whereabouts Are Difficult to Find

A review meeting organized by MLIT for measures on Land For Which Owners and Their Whereabouts Are Difficult to Find published Guidelines, which help local governments make it easier to find ways to detect owners of lands and utilize the lands, and proposed summaries of countermeasures in March 2016.

The meeting revised the guidelines and implemented a follow-up to the proposal in March 2017, and the MLIT took action to raise public concerns of the guidelines.

5 Promoting Regional Partnerships and Interaction

(1) Forming a Trunk-line Network to Support Regions

To achieve safe, comfortable travel to the central part of an area that has urban functions, such as medical care and education, the MLIT supports the elimination of bottlenecks by widening existing roads and developing road networks. Furthermore, in order to promote the integration of merged municipalities, the development of roads that connect the central area of a municipality to each of its centers, such as public facilities, bridges, and so on, is being promoted by implementing municipal merger support road development projects in collaboration with the Ministry of Internal Affairs and Communications.

(2) Promoting Human Interaction between Cities and Rural Agriculture, Forestry and Fisheries Communities

The MLIT forms axes of human wide-area interaction and partnership through the development of trunk road networks, supplies housing and housing land to help realize country life, develops ports and harbors to serve as centers of human interaction, and more. It also promotes the creation of new types of tourism, such as green tourism, and the activities of "All Right! Nippon Conference" and so on in collaboration with the Ministry of Agriculture, Forestry and Fisheries and other ministries concerned, to promote human interaction between rural agriculture, forestry and fisheries communities.

(3) Promoting Regional Settlement, etc.

In order to support information dissemination by municipalities that work on expanded interactions and relocation to rural areas through hands-on exchange programs for young people in rural areas, such information is put together in the MLIT website. Information about dual habitation is also being disseminated^{Note}.

The MLIT also supports the utilization of vacant houses and buildings by local governments through the appropriation of General Social Infrastructures Development Subsidies to address a wide range of regional issues.

(4) Introduction of Local Design License Plate

To promote regions and tourism and to foment a sense of unity in regions, and based on proposals from municipal governments, we have decided to allow individual regions to issue license plates with designs that feature regional characteristics, starting around October 2018.

6 Securing Means of Regional Transport

(1) Securing, Maintaining and Improving Means of Regional Transport

Maintaining day-to-day means of regional transport is of vital importance to the revitalization of regional communities. Out of this recognition, the MLIT supports efforts directed at forming comfortable and safe public transport, as by securing and maintaining community transport, such as regional bus routes and sea and air routes to remote islands, in collaboration with diverse stakeholders, developing facilities that help add to the safety of local railways, and implementing barrier-free measures. In FY 2016, we facilitated the realization of efficient and sustainable local public transportation by enhancing support in the realignment of local public transportation, leveraging the framework of the Act on Revitalization and Rehabilitation of Local Public Transportation Systems.



(2) Activating Regional Railroads and Supporting Safety Assurance, etc.

While regional railroads not only support the livelihood of the local residents living along the railroads as a means of their daily transport but also play an important role in providing them with public transport of critical importance in

supporting regional interaction between tourist resorts. However, their management is in an extremely tough situation. For this reason, the MLIT supports not only the maintenance of safety facilities by implementing local public transport securing, management and improvement projects or offering tax incentives, but also the construction, etc., of new stations on local routes that have high potential needs for railway use by implementing projects designed to activate trunk railways, etc.

(3) Subsidizing Local Bus Routes

Securing and maintaining a means of local public transport, such as public buses, for the benefit of local residents, particularly those with limited access to transport, such as elderly people and schoolchildren, is of critical importance. To help secure and maintain optimal networks of local transport tailored to specific regional characteristics and conditions, the government has a policy of providing integrated support for the availability of local transport services (such as interregional bus transport networks^{Note} or buses, demand-responsive and other forms of local transport closely related to trunk transport networks) under a scheme of shared responsibility with local governments. For other routes, relevant financial measures are taken to enable local governments to maintain them at their own discretion.

(4) Maintaining and Revitalizing Regional Air Routes

Regional air routes face many challenges. Regional airlines must deal with vulnerable business infrastructure, high cost structures due to operating small numbers of aircraft, canceled flights due to problems with aircraft and other factors, and a limited ability to expand due to their collaboration with certain major airlines. Major airlines must deal with mismatches between aircraft and demand, such as when they use large craft that seat over 100 people, and limits to internal support as a result of intensifying competition on high-demand routes.

Furthermore, there is concern over a variety of issues that could appear in the future, including updating old, small aircraft once they are no longer being manufactured, the increased supply of aircrafts inevitably due to those updates, and the difficulty of securing pilots and other human resources.

In response to the need to seek out some way for regional airlines to engage in initiatives better than those taken in the past to make regional air routes sustainable, and in light of the issues described previously, a Committee on Sustainable Regional Air Transportation was formed and has continued discussions since June 2016.

(5) Supporting Transport to and from Remote Islands

Air routes to remote islands are vital means of transportation in the daily lives of islanders, but transport demand on the 292 routes totaled 43 million passengers in FY2015, a 12% decrease over the past decade. Furthermore, depopulation and aging of the population is more severe on remote islands than in mainland Japan, making it extremely difficult to operate these routes. Therefore, the running costs of those sea routes that are anticipated to be in the red and for which no alternative routes are available are subsidized by local public transport securing, management and improvement projects (121 subsidized routes). Also, fare discount subsidies for island residents and support in building ships with better operational efficiency are provided.

Furthermore, based on the Basic Plan on Transport Policy (February 2015), the operation of bus transportation with land and sea connection that enables the elderly and those who have walking problems to use a ferry while riding a bus began in April 2015, and 10 business operators were providing this service as of the end of FY2015.

To sustain air transportation to remote islands, air carriers extending their air routes to remote islands are granted comprehensive support (budget: airframe purchase grants, operational cost grants, tax and public dues, landing fee alleviation, aviation fuel tax alleviation and so on). Starting from FY2012, airfare discounts for isolated islanders have been subsidized on the air routes eligible for operational cost grants as part of expanding support to transport to and from remote islands.

In FY2016, 54 remote island air routes were in service.

Note Broad-area trunk bus routes whose maintenance has been justified at a conference and that meet government-established criteria (spanning multiple municipalities, with at least three runs of service a day)

Section 3 Promoting the Private Urban Development

Promoting Urban Development by Private Sectors

(1) Promoting Urban Development by Private Sectors Based on the Specific Urban Renaissance Emergency Development Area Program

While rapidly growing Asian nations have resulted in a proportionate decline in Japan's international competitiveness, it has become an essential task to provide a powerful boost to the development of the urban areas in the nation's major cities, a source of impetus to the national growth, in a partnership between the public and private sectors to turn them into attractive urban centers that lure businesses, human resources and more from overseas. To this end, the MLIT established the system of Specific Urban Renaissance Emergency Development Areas to enhance urban international competitiveness of the designated areas, and 13 areas nationwide are now designated as such (as of March 2017). In 10 of them (as of the end of March 2017), development plans were for-



mulated by councils formed in a partnership between the public and private sector. The International Competition Base City Development Project has also been launched to provide prioritized, concentrated support to the development of urban center infrastructures in accordance with development plans.

Financial support (mezzanine support services^{Note}) that is extended by MINTO (Organization for Promoting Urban Development) to private projects that develop functionalities for augmenting the international centripetal force of foreign language-ready medical care facilities and the like was enhanced to support the formation of global business and living environments. At the same time, we are providing comprehensive support for the improvement of urban functions that contribute to improving international business environments, etc., in terms of both non-structural and structural measures, through the Project Supporting the Enhancement of International Competitiveness and City Sales.

As of the end of March 2017, a total of 59 Urban Renaissance Emergency Development Areas were registered in government-ordinance-designated cities and prefectural capitals, including Tokyo and Osaka, hosting a variety of urban development projects by private sectors in steady progress. Mezzanine support services supporting the procurement of middle-risk funds are carried out by MINTO.

The bill to amend the Act on Special Measures Concerning Urban Renaissance etc. enacted in June 2016 includes such measures as extending the application deadline for minister approval of private urban reconstruction projects, providing financial support on international conference and other venues that contribute to enhanced international competitiveness, establishing a system for the arrangement of continued supply of energy to buildings and hospitals within the areas not only during peace times but also times of disasters, and expanding the deregulation measure of allowing construction of buildings above roads or underground to cover all Urban Renaissance Emergency Development Areas.

Note A mezzanine support service is defined by MINTO as being all services that involve the development of public facilities with environmentally friendly architectural structures and sites, those that are accredited by the Minister of Land, Infrastructure, Transport and Tourism and that are entitled to the procurement of a middle-risk fund (such as a loan granted with an option to leave principal and interest subordinated)
(2) Status of Application of the Measures to Support Urban Reconstruction Projects

(i) Zoning for Special Urban Reconstruction Districts

A Special Urban Reconstruction District is a new concept of an urban district, with greater latitude for zoning (exempt from existing zoning restrictions). A total of 81 Special Urban Reconstruction Districts were zoned as of the end of March 2017, 56 of which had been proposed by private entrepreneurs, etc.

(ii) Accreditation of private urban reconstruction project plans

Private urban reconstruction project plans accredited by the Minister of Land, Infrastructure, Transport and Tourism (107 plans as of the end of March 2017) are financially supported by the Organization for Promoting Urban Development or by granted tax incentives.

(3) Promoting the Formation of Larger Blocks

Since many of the central areas of Japan's major cities have been organized into blocks through the implementation of postwar reconstruction land adjustment projects, etc., the scales of these blocks, with the structure of the local streets, are not fully responsive to the prevailing needs for land usage, transport infrastructure, and disaster preparedness. To reinforce the international competitiveness of large cities, revitalize local cities, and seek advanced and effective land usage to fill present-day needs, the MLIT promotes the aggregation of land that has been segmented into multiple blocks, the consolidated usage of sites, and the restructuring of public facilities.

2 Approaching National Strategic Special Districts

In addition to the special exemptions from the Building Standards Act, the Road Act, the City Planning Act and the like introduced as regulatory reforms in the Act on National Strategic Special Zones passed in December 2013, the amendment to the Act on National Strategic Special Zones passed in July 2015 includes special exemptions concerning the establishment of nursery schools in city parks. Utilizing these special exemptions, specific projects are being implemented in the Tokyo area, the Kansai area, Fukuoka City, and Okinawa Prefecture, visibly driving forward reforms of regulations that had been difficult to change due to stiff opposition.

Section 4 Promoting Localized Promotion Measures

1 Measures Directed at Heavy-snowfall Areas

The MLIT promotes the availability of transportation, the development of facilities related to living environments and conservation of national land, and the availability of people responsible for snow disposal and other measures for heavy-snowfall areas based on the Act on Special Measures concerning Countermeasures for Heavy-snowfall Areas in an effort to contribute to the economic development and improvement of residents' lives in regions where the inevitable, annual accumulation of snow inhibits improvement of residents' standards of living and industrial development. Note that 532 municipalities have been designated as heavy-snowfall areas (201 of which have been designated as special heavy-snowfall areas), and that these municipalities account for the vast area of 51% of Japan's land area (the special heavy-snowfall areas account for 20%).

2 Promoting Remote Islands Development

The MLIT is supporting remote islands development pursuant to the remote islands development plans formulated by the prefectures in accordance with the Remote Islands Development Act not only by appropriating lump-sum budgets for the implementation of public works projects, but also extending Remote Islands Rejuvenation Grants, to encourage settlement in remote islands, as by fostering industries and increasing employment, accelerating the scope of exchanges, as by promoting tourism, improve and consolidate safe and secure settlement conditions and so on.

Column "Shimatching"—Matching remote Islands and Companies

Description of "Shimatching"

The remote islands of Japan face various issues, such as the decline and aging of their populations, but at the same time, they are blessed with rich natural environments, time-honored cultures, and other such treasures that are not found on the main island. To revitalize the remote islands, it would also be effective to incorporate outside knowledge to utilize their unique regional resources.

Based on this awareness, an initiative was launched in 2016, with the aim of revitalizing the remote islands by providing a matchup forum that enables remote islands and companies to connect with each other and launch new businesses. The initiative was called "Shimatching," a term that combines "shima," the Japanese word for island, and "matching."



Source) MLIT, Shimatching special website (http://shimatching.mlit.go.jp/)

The Shimatching system

In a workshop held in September 2016 in preparation for holding a matchup and exchange event for remote islands and private companies, MLIT coordinators visited the islands to gain each understanding of their present situations and the issues they face, identify the advantages of the islands, and provide support in creating visions and projects that would effectively convey the thoughts of the islands to interested companies.

The Shimatching 2016 (Autumn) exchange event that was organized in Tokyo in October was attended by a total of 89 participants, including representatives from 12 remote islands and 45 companies and organizations. Business talks and exchanges were held regarding the development of new products, tourism promotion, and the development of successors, with a view to commercializing the ideas in the next fiscal year and beyond.

Overview of the Shimatching 2016 (Autumn) exchange event

- 1. Date & time: Oct. 29, 2016 (Sat.), 13:00 17:30
- 2. Place: Yahoo! JAPAN Coworking Space LODGE 3. Participation: Remote islands – 31 members from 12 remote islands
- A Participation: Nerrote islands 3 internibers from 12 remote islands
 Companies and organizations 58 members from 45 companies
 and organizations Total 89 participants
 Participating islands
- (1) Hishirib Island (Rishiri Town, Hokkaido Pref.) (3) Sadogashima Island (Sado City, Nigata Pref.) (5) Kasaoka Islands (Kasaoka City, Ckayama Pref.) (7) Kutsuna Islands (Matsuyama City, Ehime Pref.) (9) Kinoshima Island (Iki City, Nagasaki Pref.) (11) Fukugima Island (Cato City, Nagasaki Pref.)
- Sakushima Island (Nishio City, Aichi Pref.)
 Osakikamijima Island (Osakikamijima Town, Hiroshima Pref.)
 Ainoshima Island (Kitakyushu City, Fukuoka Pref.)
 Nakaoshima Island (Shikhushu City, Fukuoka Pref.)
 Jojima Island (Mishima Village, Kagoshima Pref.)

(2) Teurito Island (Haboro Town, Hokkaido Pref.)

*Members from remote islands included administrative personnel, members of regional revitalization teams, NPOs, local businesses, fishery cooperatives, and representatives of community associations 5. Description:(1) Presentations by remote islands(3) Matchup exchange meeting

(2) Presentations by companies





Source) MLIT

Achievements of Shimatching

Okishima Island (Omi-hachiman City, Shiga Pref.) participated in Shimatching, and subsequently commercialized an ice cream product called "Okishima no yasashii ice cream" through the coordinated efforts of Okishima Elementary School, the local government, local councils, Coop Okinawa, Coop Shiga and Ikeda Bokujo, a dairy farm. As the children of the island originally came up with the idea for the product, they staffed a special sales event and sold all 600 items that were prepared for the event on the same day. The project members said part of the sales will be used to promote the island.

In this way, Shimatching provides a forum for matchups, exchanges, and information dissemination and sharing as a means for supporting people who are striving to revitalize the remote islands of Japan.

3 Promoting and Developing the Amami Islands and Ogasawara Islands

In addition to implementing the development of social infrastructures through promotion and development projects, etc., based on the Act on Special Measures for Promotion and Development of the Amami Islands and Act on Special Measures for Promotion and Development of the Ogasawara Islands, the MLIT leverages grants, etc., to assist with regional efforts directed at boosting employment and encouraging settlement by promoting tourism, agricultural and other industries suited to regional characteristics in pursuit of more self-supporting, more sustainable growth.

4 Promoting Peninsulas

To support peninsula promotion measures through peninsula promotion plans developed by prefectural governments based on the Peninsular Areas Development Act, the MLIT implements projects to encourage wide-area cooperation on peninsular development in peninsula promotion measure implementation areas (as of April 2016, 23 areas (194 municipalities in 22 prefectures)), assists efforts to contribute to the facilitation of exchanges that leverage resources and characteristics of peninsular areas, promoting industry and regional settlement, and promoting industry and developing roads that encircle peninsulas.

Section 5 Promoting Comprehensive Development of Hokkaido

Promoting the Hokkaido Comprehensive Development Plan

(1) Promotion of the Hokkaido Comprehensive Development Plan

Japan has pursued an active policy of developing Hokkaido to help resolve the problems facing the nation and to achieve powerful regional growth by taking advantage of the excellent resources and characteristics of Hokkaido.

Presently, under the 8th term Hokkaido Comprehensive Development Plan, which covers the period from FY2016 to

roughly FY2025 and was adopted by a Cabinet decision in March 2016, the government is promoting various measures with the goals of creating local communities where people can shine, industries that look to the world, and strong, sustainable national land that presents an image of Hokkaido that is recognized the world over.

The Hokkaido Development Subcommittee, which conducted investigations and reviews toward the development of the plan, put forth important points to remember, such as "establishing a system that faithfully inspects and maintains the progress status of new plans through the activities of the Hokkaido Development Subcommittee and others, and in so doing, strives to share numerical targets so that stakeholders, namely residents of Hokkaido, can work together to push forward with efforts toward the realization of the new plans, in referring to those numerical targets in the course of inspecting and maintaining the progress status."

Toward that end, a plan promotion task force was established under the direction of the Hokkaido Development Subcommittee, and was convened in December 2016 and March 2017. The task force reviewed numerical targets for efforts to support food, tourism and production spaces, as well as challenges and the measures to take to achieve the targets, planned progress management and other matters, and organized numerical targets and other data to report to the subcommittee.



(2) Promoting Measures that Support Plan Realization

The new plan was formulated to respond to various impending issues facing Japan, namely the coming of an era of fullscale population decline, further development and changes to the international environment due to globalism, and major disasters. We are promoting the following types of measures.

(i) Local communities where people can shine

In addition to establishing regional social structures that enable people to continue to live a long time across Hokkaido, covering vast production spaces that form communities dispersed in wide areas on a scale different from other regions, to city areas, it is also important to promote lively convection by attracting a variety of people to Hokkaido, where the population is declining faster than in other regions in Japan. To this end, we will drive forward with measures such as the formation of wide-area transportation networks, including national-grade trunk highways, focused support for Michi-no-eki (roadside stations), the development of comfortable living environments better suited to raising children and caring for elderly people, the consistent provision of transportation to and from remote islands, and the development of the Hokkaido Value Creation Partnership Activity, which is a wide-area, cross-cutting support and cooperation system for human resources engaged in regional development.

(ii) Industries that look to the world

Hokkaido has competitive advantages in the agriculture, forestry, and fishery industries; the food and tourism related industries; and other industries for export to other regions in the country and other countries; and it is important to develop these industries. Therefore, we are promoting, among other measures, the enhancement of productivity through a larger division of farmland and other means, creation of a comprehensive base for food by attracting food companies from outside Hokkaido, development of inbound tourism through the Scenic Byway Hokkaido program, which implements the creation of scenery, regions and tourism spaces, holding international conferences (MICE) in Hokkaido, and strengthening the functions of the New Chitose Airport and strategic international bulk ports including Kushiro Port.

(iii) Strong and sustainable national land

Hokkaido, which has beautiful and magnificent natural environments and abundant renewable energy sources, is expected to take a leading role in forming a sustainable regional society. Ensuring safety and security is the foundation of economic social activities, and it is important for the region to minimize damages in the event of a disaster and contribute to strengthening Japan as a whole. Therefore, we are promoting, among other measures, the preservation and regeneration of lakes and wetlands; public awareness related to the formation of a hydrogen society through Hokkaido's platform for developing hydrogen communities; fundamental flood control measures, namely the Hokkaido Emergency Flood Control Project devised in response to damage caused by a series of typhoons in August 2016; anti-seismic social infrastructure; regional support in the event of a disaster by dispatching TEC-FORCE (Technical Emergency Control Force); establishment of maintenance cycles aimed at extending the service life of social infrastructures; and efforts to enhance the safety and reliability of transportation in winter.

Column Promoting Driving Trips to Foreign Visitors

Hokkaido is a popular tourist destination, particularly for visitors from East Asia and Southeast Asia, and received some 1.9 million foreign visitors in 2015. Accompanying the recent increase in travelers who prefer independent trips, a rapidly increasing number of visitors is opting to tour the sights of Hokkaido by rental car. To ensure that foreign visitors enjoy a safe, comfortable and pleasant driving trip, the Hokkaido Bureau and the Hokkaido Regional Development Bureau of MLIT are implementing various initiatives in cooperation with relevant authorities in both the public and private sectors.

In addition to distributing a "Must-have Handbook for Driving in Hokkaido," prepared last fiscal year, the bureaus opened an English version of the "Road Information in Hokkaido" website in fiscal 2016 that pro-

vides information about road closures along national roads in Hokkaido, and have also begun to display road information boards in English.

Furthermore, given the increasing numbers of foreign visitors making driving trips in Hokkaido, a two-year experiment was launched in 2016 to more equally spread the travel demand among the regions and across the seasons. By offering special benefits to travelers visiting rural tourist facilities by rental car, the experiment aimed to attract more foreign visitors to the rural areas of Hokkaido. In the first year, a preliminary experiment was conducted from October to November. According to questionnaire responses, some travelers modified their travel plans after learning about the experiment, so it could be said that the experiment had a definite effect in attracting visitors. Based on this result, the experiment is planned to be implemented in fiscal 2017 on a larger scale.

Approximately 10% of all foreign visitors to Japan visit Hokkaido, and the number of visitors making driving trips in the prefecture is expected to increase in the future. In order for Hokkaido to become a worldclass tourist destination and to play a major role in promoting Japan as a leading tourism country, steady improvements will continue to be made to accommodate the increasing number of foreign visitors on driving trips.



2 Promoting Distinctive Regions and Cultures

(1) Promoting the Regions Neighboring the Northern Territories

Targeting the Northern Territory's neighboring regions where desirable development of regional society is inhibited because of unresolved territorial issues, we are promoting necessary measures in a comprehensive manner under the Seventh Northern Territory Neighboring Regions Revitalization Plan (FY 2013 to FY 2017), which is based on the Act on Special Measures concerning Advancement of Resolution of Northern Territories Issues.

More specifically, the MLIT pursues a mix of structural and non-structural measures to build appealing regional communities in these neighboring regions, including the promotion of agricultural and fishery industries, implementation of public-works projects for development of transportation systems, supporting the implementation of non-structural measures by providing subsidies for project implementation expenditures, such as for Northern Territory neighboring region revitalization.

(2) Promoting the Ainu Culture, etc.

In accordance with the Basic Policy on the Development, Management, and Administration of a Space Symbolic of Ethnic Harmony for Promoting the Restoration of Ainu Culture adopted by a Cabinet decision on June 13, 2014, we will

continue with the development of symbolic spaces toward the realization of 1 million visitors, through such efforts as opening a National Park for Ethnic Harmony and memorial facilities by 2020, and with the dissemination of information to people outside Japan in an effort to strengthen PR activities for the Ainu culture and the like toward the opening of the symbolic spaces to the public.

In accordance with the Act on the Promotion of Ainu Culture, and Dissemination and Enlightenment of Knowledge about Ainu Tradition, we are working on public awareness activities, such as the creation of Space Symbolic PR posters or the expansion of exhibitions of Ainu craftworks, etc., at airports under the "I ran karap te" (an Ainu greeting meaning "how are you") Campaign implemented through industry-academia-government collaboration.



Source) Ainu Museum

Chapter 5 Creating a Comfortable Living Space

Section 1 Realizing Affluent Residential Living

1 Securing Stability of Residential Living and Advancing its Betterment

The Basic Housing Policy (National Plan), which covers the period from FY2016 to FY2025 and was adopted by a Cabinet decision in March 2016, was devised in light of changes to the socioeconomic climate, namely the full-scale emergence of an aging society with falling birth-rates and declining population and families. The plan sets out eight targets and fundamental measures: From the perspective of inhabitants, (i) Anxiety-free housing situation for child-rearing households and member of young generation wishing to marry and have children, (ii) Housing that allows the elderly to live independently, and (iii) Ensure a steady supply of housing for individuals requiring special consideration from the perspective of housing stock, (iv) Structure a new housing circulation system exceeding the property ladder, (v) Upgrade to safe and higher-quality housing stock through rebuilding and renovation, (vi) Promote use or elimination of increasing vacant homes; and from the perspective of industry and community, (vii) Housing industry growth that contributes to a strong economy, and (viii) Maintain or improve the appealing aspects of residential area. Based on this plan, the MLIT is driving forward with efforts to provide residential living that meets the needs of each and every citizen, as well as measures toward the realization of safe, secure, high-quality living environments.

(1) Goals and Basic Policies

 (i) Anxiety-free housing situation for child-rearing households and member of young generation wishing to marry and have children

To establish an environment in which child-rearing households and member of generation wishing to marry and have children can choose and be ensured of obtaining desired housing, we are executing support to enable them to live in a house meeting the required quality and area according to the income of household.

In addition, in order to establish an environment that enables people to want to have and raise children, leading to desired birthrate of 1.8, we are promoting measures to ensure families the ability to live with or near grandparents to enable childrearing with the help of grandparents.

(ii) Housing that allows the elderly to live independently

To improve and supply housing that elderly individuals can live in safety without anxiety, we are continuing work to promote barrier-free homes and heat shock measures (the effects of sudden increases in temperature on the human body), and promoting elderly housing with supportive services attached for elderly life support facilities.

We are also working to ensure housing in the area in which elderly residents wish to live and on environment where elderly individuals receive nursing, medical and life services.

(iii) Ensuring a steady supply of housing for individuals requiring special consideration

We are striving to establish an environment in which individuals with difficulty ensuring residence in the housing market independently can find housing and live without anxiety. Such individuals include low-income earners, elderly, handicapped, single-parent household, multiple birth households, public financial support recipient, foreigners, homeless, etc. (persons requiring special assistance in securing housing).

a. Creating a new housing safety net that comprises private rental housing and vacant houses

To promote the supply of rental housing to people requiring special assistance in securing housing, the Bill to Partially Amend the Act on Promotion of Offering of Rental Housing to People Requiring Special Assistance in Securing Housing was adopted by a Cabinet decision in February 2017 and submitted to the Diet. The bill proposes measures for the creation of supply promotion plans by local governments, and the creation of a rental housing registration system for encouraging smooth move-ins by people requiring special assistance in securing housing.

b. Supplying public rental housing

To adequately support the delivery of public housing supplied by local governments to low-income earners in serious need of housing, and to promote the supply of quality rental housing to households consisting of elderly people who need special consideration to stabilize their housing in each area, the MLIT set up the Regional Excellent Rental Housing Program as a scheme that complements public housing by subsidizing the expenses required to develop public rental housing and reduce rents.

	Purpose	Number of houses managed
Public housing	Supplies quality rental housing to low-income earners who are in serious need of housing with low rent.	About 2.17 million houses (FY2015)
Improved housing	Supplies public rental housing to existing residents who are in serious need of housing in a deteriorating residential area.	About 150,000 houses (FY2015)
UR Rental Housing	Supplies quality rental housing that is conveniently located for access to work, focusing on family-oriented rental housing not in ample supply from private business entrepreneurs, in major urban areas, as well as develops residential districts (In FY2002, a privately supplied support rental housing program was launched to support the supply of family-oriented rental housing from private business entrepreneurs.)	About 740,000 houses (FY2015)
Agency rental housing	Supplies quality rental housing to meet the regional demand for rental housing	About 130,000 houses (FY2015)
Quality regional rental housing	Provides subsidies to private land owners to fund maintenance and other expenses and cover rent cuts to provide quality rental housing for households consisting of elderly people, childraising families, etc.	 About 108,000 designated quality rental houses (FY2015) About 42,000 designated quality rent al houses for elderly people (FY2015)

3 The Render of public ferral housing to the include openine duality herital housing and outside duality herital housing for the Elderly. 3 The Specified Quality Rental Housing Institution and Subsidized Quality Rental Housing for the Elderly Institution was established in FY2007. Source) MLIT

c. Using private rental housing

In order to facilitate the promotion of smooth move-in to private rental houses by elderly handicapped, foreigners, families with small children and others in similar circumstances, we are providing housing assistance such as information services and consultation services through Residential Support Councils (66 councils (47 prefectures and 19 municipalities) established as of the end of FY2016), which is made up of regional public organization, real estate related organizations and housing assistance organizations.

(iv) Structuring a new housing circulation system exceeding the property ladder

The revitalization of the existing housing circulation market is crucial toward effectively using housing stock, creating economic effects from market expansion, and realizing prosperous residential living through the streamlining of the process of moving in different life stages; thus, we are developing measures to improve the quality of existing housing, to form markets that properly appraise high-quality existing housing, and to develop environments in which people can confidently purchase and sell existing housing.

a. Improving the quality of existing housing

The MLIT pursues the dissemination of housing that is structured and equipped to meet or exceed certain levels of performance requirements, such as durability and ease of maintenance and management ("Long-life Quality Housing") under the Act on the Promotion of Dissemination of Long-life Quality Housing. (Certified houses in FY2015: 104,633). In addition, in FY2016, we launched a system for certifying Long-Lasting Quality Housing regarding renovations and additions to existing housing.

Furthermore, we provide support concerning aid and taxes for renovations that strive to extend the life, strengthen the earthquake resistance, or improve the energy efficient performance of existing housing.

b. Formation of markets that properly appraise high-quality existing housing

The general thinking in Japan is that housing has absolutely no market value 20 to 25 years after it is built; it is important to correct this convention and create an environment in which high-quality existing housing is properly appraised.

Toward that end, we are continuing to define and diffuse proper appraisal methods for real estate brokers and appraisers so that the performance and renovated condition of buildings is properly reflected in their appraisals.

We are also providing support for efforts to develop and diffuse comprehensive mechanisms for maintaining, improving, appraising, circulating and financing housing stock in collaboration with stakeholders, including financial institutions, so that high-quality housing stock throughout the entire market, including the financial market, is properly appraised.

c. Developing environments in which people can confidently purchase and sell existing housing

A 10-year defect liability obligation has been mandated for the basic structural part of new housing in accordance with the Housing Quality Assurance Promotion Act. In addition, a housing performance marking program has been put into effect to objectively assess the basic performance characteristics of new and existing houses, such as earthquake-resistance, energy-saving measures, preventing measures against deterioration, etc.

Additionally, the Act to Partially Amend the Real Estate Brokerage Act was promulgated in June 2016 to allay concerns over transactions involving existing housing and provide consumers with accurate information about the quality of housing by having real estate brokers encourage the use of experts to perform building inspections.

(v) Upgrade to safe and higher-quality housing stock through rebuilding or renovation

Housing investment has major ramifications for the economy, and plays a substantial role as a key element of internal demand. We are driving forward with housing investment to improve housing quality by encouraging the improvement of earthquake resistance, insulation and other energy-efficient properties, and durability through such efforts as rebuilding housing that is not sufficiently earthquake resistant and otherwise updating old stock, and renovating housing to make it universally accessible.

In addition, the Act to Partially Amend the Act on Special Measures concerning Urban Reconstruction, etc., for encouraging the reconstruction of housing complexes was established in June 2016 and enacted in September of that year.

a. Preparing the market environment in which consumers can remodel their homes without worry

Consumers planning to remodel their homes are concerned about how much the remodeling will cost them and how to select the right contractors. Reassuring worried consumers is essential to expanding the home remodeling market.

Efforts currently taken in this regard include the Check Quoted Remodeling Costs for Free service available from the Housing Telephone Consultation Desk at the Center for Housing Renovation and Dispute Settlement Support, in which consumers can receive consultation on specific quotations, and Free Expert Consultation Programs at local bar associations.

In addition, the MLIT is promoting initiatives so that consumers can remodel their homes without worry, such as the Remodeling Defect Liability Insurance Program, an insurance package that combines an inspection on remodeling works in progress with warranties against possible defects in the works or the large-scale repair work liability insurance program for large-scale apartment building repairs.

Contractors seeking to be insured are registered with the Housing Defect Liability Insurance Corporation, subject to their possession of a construction business license, proven performance, etc. The Program allows consumers to browse through a list of registered contractors at an Association of Housing Warranty Insurance website as a helpful tool in choosing contractors.

Further, under the "Housing Renovation Business Organization Registration System," we are working on building an environment in which there is a healthy development of the housing renovation business and consumers renovate their homes with confidence, by having housing renovation business operators that meet certain standards registered to ensure that the work of housing renovation businesses is properly managed and information can be provided to the consumers.

(vi) Promote the use or elimination of increasing vacant homes

The MLIT encourages municipal governments to develop the Vacant Housing Countermeasure Plan, depending on their local circumstances, based on the Vacant Houses Special Measures Act, which was fully enforced in May 2015 (357 municipalities have completed their plans (as of March 31, 2017)), which promotes the use and removal of vacant houses and buildings, and reinvigorates circulation of housing.

(vii) Housing industry growth that contributes to a strong economy

To contribute to the realization of a strong economy, we are encouraging the expansion of the housing industry by promoting the development of high-quality wooden housing and buildings, supporting the cultivation of skilled woodworkers and other people to build them, the development and diffusion of new technologies such as cross-laminated timber (CLT), and the creation and expansion of new business markets involving housing, such as the use of IoT.

(viii) Maintain or improve the appealing aspects of residential areas

In line with the features of the region, including nature, history, culture etc. aiming to create not only individual houses but also to enrich the living environment and the community and are striving to maintain and improve the appeal of residential areas by forming prosperous communities and improving the safety of residential areas by improving densely-populated urban areas and the like.

(2) Comprehensive, Systematic Promotion of Measures

(i) Housing finance

It is important that a variety of mortgages, which are short-term adjustable-rate or long-term fixed rate, are stably available so that consumers can choose and obtain houses in the housing market.

The Japan Housing Finance Agency offers securitization support businesses to support the availability of long-term, relatively low fixed-rate mortgages from private financial institutions. Its operations include Flat 35 (Purchase Program), which consolidates housing loan receivables of private financial institutions, and Flat 35 (Guarantee Program), which supports private financial institutions themselves becoming originators^{Note} to handle the securitization. For houses that are entitled to Flat 35, property inspections are carried out against a defined set of technical requirements, such as durability, to assure their quality. In addition, the framework of the securitization support service has been leveraged to launch Flat 35S, which reduces the interest rate of loans on the acquisition of houses that meet any one of the performance requirements: earthquake-resistance, energy-saving performance, barrier-free readiness, and durability/modifiability, for the first 5 years of repayment (for the first 10 years for Long-Lasting Quality Housing).

The Agency also provides direct financing services in those areas that are politically significant but that cannot be easily conducted by private financial institutions, such as financing housing designed for disaster recovery or elderly rental housing with supportive services.

Note A business enterprise that possesses assets to be liquidated. An originator raises funds by securitizing its assets, by transferring its credit, real-estate properties, etc., to a special-purpose company.

(ii) Housing tax system

The FY2017 tax reform expanded the scope of tax credits for renovations to include repairs to improve durability in addition to repairs to improve earthquake resistance and energy efficiency in an effort to encourage the formation of a high-quality housing stock of superior durability and other attributes toward revitalizing the circulation of existing housing and the renovation market. This broad expansion created a tax credit for renovations to improve housing to the level of Long-Lasting Quality Housing, and streamlined requirements regarding improvements of energy efficiency. The tax reform also extended the application period of preferential measures for both real estate acquisition taxes imposed on acquisition of housing through buyback/resale, and registration license taxes imposed on registrations of property ownership of buildings to be used as housing and the like.

Furthermore, as the timing of the planned consumption tax increase to 10% has changed, the application period for the home buyer's tax break, housing cash benefit and tax-free measure for gift tax has been extended by two and a half years to December 31, 2021, and the timing of the expansion of the housing cash benefit (raising the maximum amount from JPY 300,000 to JPY 500,000) and the tax-free measure for gift tax (raising the maximum amount from JPY 12 million to JPY 30 million) has been extended two and a half years to April 2019. It is hoped that with these measures in place, housing acquisition by the younger generation will be promoted and predictability will increase for those who are considering housing acquisitions, and that these factors will contribute to the stabilization of the housing market.

2 Supply and Utilization of Good Housing Land

(1) Land Price Trends

The official land prices in Japan for 2017 (as of January 1, 2017) showed that the average residential land price held steady against decline for the first time in nine years, while the average prices of commercial land and all categories of land use increased for the second consecutive year. In the three major metropolitan areas, the average residential land price increased very slightly from the previous year, while the average commercial land price increased more robustly (except in Nagoya). In regional cities, the decline of average prices of all categories of land use slowed, and in the four cities of Sapporo, Sendai, Hiroshima and Fukuoka, the increase in the average prices of all categories of land use outpaced that of the three major metropolitan areas.

(2) Present Status and Problems in Housing Land Supply

We are steadily implementing housing land measures based on population and household trends. The Urban Renaissance Agency now works only on the new town projects that have already been initiated. The MLIT also supports the development of public facilities relevant to the development of housing land, and offers preferential tax measures to promote the supply of housing land furnished with a good dwelling environment.

(3) Using Fixed-term Land Leases

A fixed-term land lease—in which the land lease ends for certain at the determined contract term and there is no renewal of the land lease—is an effective system for making residential acquisition at a low cost possible.

In order to spread this system smoothly, we are conducting the Fact-finding Investigations of the Use of Fixed-term Land Leases by Public Entities.

(4) Revitalizing Aging New Towns

The large-scale urban housing areas (New Town) that were systematically developed mainly in the suburbs of the metropolitan areas during the economic boom period are facing issues of decline in community vitality resulting from the quickly aging population and the continued decrease in population. There is a growing need for renewing the dilapidated housing and communal facilities as well as improving the functions that support daily life, in order to renovate these new town areas into cities that are easy to live in for everyone.

Also, with the aim of contributing to the revitalization of aging new towns, we are providing information on the methods and case examples of initiatives by residents, business proprietors and landowners/leaseholders for maintaining and enhancing a good regional environment and regional value.

Section 2 Realizing Comfortable Living Environments

Developing City Parks and Creating a Good Urban Environment

City parks are key urban facilities that fulfill a wide variety of functions, from serving as recreation spaces for people and as hubs for regional tourism and activity to creating good urban environments and improving urban disaster preparedness. Thus, we are systematically establishing national parks throughout Japan, and using general subsidies for social infrastructure development to support local governments' efforts to establish city parks and the like.

In addition, in April 2016, Subcommittee for Urban Management for a New Era under the Panel on Infrastructure Development set out policies for improving stock effects, accelerating public-private collaboration, and creating more flexible usage of city parks and the like to realize the potential of city parks of the future.

As of the end of FY2015, city parks were maintained at 106,849 locations nationwide, covering approximately 124,125 ha, or about 10.3m² per capita. In FY2016, 38.98 million people visited national parks, with 17 locations being developed and maintained.

Regarding green spaces, etc., in urban areas, the MLIT is providing comprehensive support in financial and technical aspects, pursuant to the initiatives based on the "Green Master Plan" formulated by municipalities to properly respond to global environmental issues, such as global warming and biodiversity preservation, and to aim at realizing green-rich city environments by preserving and creating good natural environments.

In addition, we are driving forward with efforts to realize city development in which cities coexist with greenery and agriculture, such as by surveying initiatives that contribute to the formation of good urban environments that are in harmony with green spaces and farmland and the exhibi-



tion of the multitude of functions of urban agriculture. In addition, along with holding events such as national "Protecting Greenery" gatherings and National City Greening Fairs to gain public awareness regarding greening, the MLIT is working on various measures such as awarding certificates of commendation for people promoting greening, as well as evaluating/ certifying greening/green area conservation efforts by businesses.

To intensify efforts to form a green urban environment, open spaces such as parks, green spaces and farmland must exhibit a multitude of functions, and measures must be taken to tackle various challenges, such as the existence of areas with low parkland area per capita, the progression of the deterioration of park facilities, and the decrease of urban farmland that constitutes valuable green space in cities. In addition, the Basic Plan on Promotion of Urban Agriculture was adopted by a Cabinet decision in May 2016, and urban policy has changed to include urban farmland as a crucial part of cities, while indicating the direction of important measures.

In light of the above, the Bill to Partially Amend the Urban Green Space Conservation Act was adopted by a Cabinet decision and submitted to the Diet in February 2017, with the goals of further promoting the conservation of green spaces in cities, the greening of cities and the appropriate management of urban parks, and contributing to the formation of quality urban environments through efforts to systematically conserve farmland within cities. The bill contains provisions to, among other things, relax area requirements in production green zones and to establish several systems, including a system to certify plans to establish and manage green spaces opened to citizens through the establishment of green spaces on the same level as parks by NPOs and other private entities using open land and the like, a system to determine through

public invitation who can establish and manage park facilities, and a rural residential area system for preserving good living environments in harmony with agriculture.

2 Advancing Roads that Prioritize Pedestrians and Bicycle Riders

(i) Creating people-oriented, safe, and secure walking spaces

To achieve social safety and security, it is important to make people-oriented walking spaces that assure pedestrian safety. In particular, based on the results of an emergency joint inspection that was carried out in FY2012, we are advancing efforts to improve school routes used by children who walk to school. Schools, the Board of Education, road administrators, police, and other related organizations have worked together to implement traffic safety measures such as maintaining sidewalks, painting colors on curbs, and installing guardrails, as well as implementing joint periodic inspections based on the "School Route Traffic Safety Program" to ensure the safety and security of children through these enhanced measures.

(ii) Creating a safe and comfortable cycling environment

Over the past 10 years, the total number of fatal and injury traffic accidents has decreased by 40%. However, the number of accidents made by bicycles hitting pedestrians has decreased only by 20%, which indicates that a safer, and more comfortable cycling environment is needed. Therefore, the MLIT is working together with the National Police Agency to revise and popularize Guidelines for Creating a Safe and Comfortable Cycling Environment. In addition, with the Act on Promotion of Use of Bicycles promulgated in December 2016, we continually make efforts to promote the use of bicycles, by preparing bicycle network plans, improving bicycle lanes, mainly in roadways, and disseminating of information about utilizing bicycles to promote tourism in regions.

(iii) Developing quality walking spaces

The MLIT supports the development of pedestrian roads and rest facilities that create high quality pedestrian environments and that also tie together rich scenery and abundant nature with historical sites, in order to develop regions that are attractive and that promote health through walking.

(iv) Developing road signs that are easy to understand

The MLIT is working on the installation of road signs that are easy to understand to help guide pedestrians who are in an unfamiliar place to their destinations.

(v) Building a flexible system of road administration

To implement a flexible system of road administration that provides a diversity of road functions tailored to the needs of the local residents -- including safe walking spaces and places of regional buoyancy and human exchange, and making motor-vehicle traffic smoother and safer -- the MLIT is implementing: (a) preferential measures, such as the construction of new sidewalks on national or prefectural highways by municipalities other than the designated cities; (b) a system for suggesting that municipalities refurbish pedestrian safety facilities; (c) preferential measures for road occupancy, such as boulevard trees planted by NPOs or others, street lamps, etc.; (d) preferential measures for the administration of offstreet convenience facilities to keep roads and roadside facilities under integrated management; (e) preferential measures for road occupancy of facilities installed by road cooperation groups; and (f) flexible management of permits for road occupancy pation for regional activities involving the use of roads.

Section 3 Realizing Traffic with Enhanced Convenience

(1) Advancing Implementation of Integrated Urban/Regional Traffic Strategies

Intensive city planning that ensures safe, smooth traffic requires a cross-sectional approach to the available transportation modes—such as cycling, railway, and bus—from the users' standpoint, rather than reviewing the transportation modes or their operators individually. To this end, each local government should inaugurate a council composed of public transportation operators and other stakeholders and allow the council to define a future vision of its cities and regions, and the types of transportation services to be made available, so that it can formulate "Integrated Urban/Regional Transportation Strategies" that cover relevant traffic measures and working programs, with the stakeholders taking their respective shares of responsibility for implementing measures or projects. (As of March 2017, Integrated Urban/Regional Transport Strategies had been formulated or were being formulated in 88 cities.) The national government is expected to support the implementation of integrated and strategic packages of traffic projects, such as the development of LRT^{Note} pursued according to the Strategies, as well as city planning programs.

(2) Approaches to Improve Public Transportation Usage Environment

For local public transportation, the MLIT supports the deployment of LRT, BRT, IC cards and other less constrained systems through the implementation of local public transportation assurance, maintenance and improvement projects, etc., to accelerate the improvement of local public transportation usage environment as part of its barrier-free community planning effort. In FY2016, the Kagoshima City Transportation Bureau deployed light rail vehicles.

(3) Upgrading Urban Railway Networks

Traffic congestion in the major metropolitan areas during commuting to and from work and school by train is improving substantially as a result of efforts such as establishing new lines, quadruple tracking and adding cars onto trains. However, the rate of congestion on some routes exceeds 180%, and requires continued efforts to mitigate congestion. Efforts in progress include quadruple tracking of Odakyu Electric Railway's Odawara Line and the like funded by the Designated Urban Railway Development Reserve Program.

In addition, we are driving forward with efforts to improve user convenience by, among other things, continuing to develop the Kanagawa Eastern lines (Sotetsu - JR/Tokyu Through Line) by leveraging the Act on Enhancement of Convenience of Urban Railways, etc., a piece of legislation aimed at upgrading the speediness of existing urban railway networks, to further enhance the urban railway networks.

In April 2016, the Council of Transport Policy issued a report regarding the future of urban railways in the Tokyo Metropolitan Area, which sets out ways for urban railways and the like to contribute to the strengthening of competitiveness on the world stage and other ways for the urban railways of the Tokyo Metropolitan Area to reach their potential, and we are engaged in efforts to realize that potential.

Note Short for Light Rail Transit. A next-generation rail transit system that offers excellent characteristics derived from the use of light rail vehicles (LRV), improvements to rails or stops, such as ease of getting on and out, punctuality, speediness and passenger comfort.



(4) Development of Urban Monorails, New Transport Systems, and LRTs

The MLIT promotes the development of LRTs to encourage users' migration to public transportation facilities in order to streamline urban traffic flow, lighten environmental loads, and revitalize central urban areas, while keeping vulnerable road users assured of mobility in this era of aging population and falling birthrates. In March 2016, Fukui City completed the extension of the streetcar line into the plaza in front of JR Fukui Station and the development of mutual accessibility for the streetcar and railway lines. In other cities, efforts also continue to rebuild public transportation networks through initiatives such as making streetcar services universally accessible.



(5) Augmenting the Convenience of Bus Usage

The convenience of bus usage has been augmented by improving the punctuality and speediness features of bus services by using a Public Transportation Priority System (PTPS) and bus lanes, introducing bus location systems that provide information about the location of buses in service, and IC card systems that facilitate smooth boarding and disembarking.

Chapter 6 **Building Competitive Economy and Society**

Section 1 Constructing Traffic Networks

Developing Trunk Road Networks

(1) Developing Trunk Road Networks

Since the First Five-Year Road Construction Plan formulated in 1954, Japanese highways have been continually constructed. For example, the construction of national highway networks, including expressways, has provided a major impetus in the rejuvenation of regional economies by encouraging plant locations near expressway interchanges. Additionally, it has helped enhance the quality and safety of national life by making broad-area medical services accessible to rural areas and allowing broad rerouting to avoid highway disruption by natural disasters.

An example includes the Sakai-Koga IC to Tsukuba Chuo IC segment of the Metropolitan Intercity Expressway (Ken-O Expressway) opened on February 26, 2017, which resulted in roughly 90% connection of the 300 km of total roadway on the Expressway. This development is expected to attract more businesses and promote sightseeing activities.

On the other hand, there are still missing links of expressways and arterial road networks in other parts of the country, which we plan to develop in a systematical manner.



Note 2: "Other major routes" shown on this map show major roads in the region (including those under development and in-service routes) and not the necessity of or order of priority for individual routes Source) MLIT

(2) Promoting Smart Use of the Roads

In the interest of improving productivity and thereby achieving economic growth and improving traffic safety, efforts are under way to make intelligent use of all road network functions by developing necessary networks, as well as improving operations and small-scale enhancements. Electronic toll collection (ETC) 2.0 is one of these efforts, which started full service in August 2015.

(i) ETC 2.0 that supports smart use

With data communication in both ways between about 1,700 roadside units across Japan and vehicles on road, ETC 2.0 compared to the previous version of ETC is capable of:

- Sending and receiving a large volume of data

- Capturing route information, in addition to IC entry/exit data

With these much more advanced functionalities, ETC 2.0 greatly contributes to the promotion of ITS.

(ii) Smart toll system

Regarding expressway tolls in the Tokyo Metropolitan Area, new tolls were introduced in April 2016 aiming at relieving traffic congestion in the urban center. We will continually verify effects of attracting traffic through central Tokyo to the outer ring roads. New expressway tolls for the Kinki region will go into effect in June 2017 based on, among other policies, the Policy Concerning New Expressway Tolls for the Kinki Region (Draft), which was announced on December 16, 2016.

In Japan, there are 77 sections of expressways that have no gas stations at intervals of 100 km or more.

Given that many drivers run out of gas on sections of road due to lack of gas stations (particularly on stretches greater than 150 km), active efforts are under way to completely eliminate such sections by fiscal 2017.

Another effort includes a testing, which allows vehicles equipped with ETC 2.0 de-



*Also, vehicle classifications are consolidated into five categories (to be implemented for Metropolitan Expressway in phase) Source) MLIT

vices to temporarily exit to rest facilities outside of expressways on a trial basis. The intention is to eliminate sections of road with no rest facilities or gas stations nearby to improve the driving environment.



(iii) Smart toll stations

Towards introduction of stress-free smart toll stations based on ETC, we are experimenting with the operation of keeping ETC bars open at Ken-O Expressway toll stations and mainstreaming the use of ETC lanes at Metropolitan Expressway toll stations.

(iv) Smart investments

As part of efforts to achieve maximum effect with the existing networks at minimum cost, we are implementing congestion measures focusing on specific loca-



tions to identify places where deceleration or traffic congestion occurs from structural factors, such as uphill sections and tunnels, by using detailed deceleration, acceleration, and other big data collected through ETC 2.0 and other means for effective measures. Until now, additional lanes have been provided within the existing road width at three locations, including Ebina Junction on the Tomei Expressway. Our congestion relief measure is currently focusing on 14 locations, including in the vicinity of the Yamato Tunnel on the Tomei Expressway.

(v) Enhancement of smart functions

Provisional two-lane expressways create various problems including safety of two-way traffic, driving performance, and large-scale disaster preparedness. In order to enhance the safety, comfort of drivers and driving performance, a Cabinet Order to Partially Amend the Enforcement Order for the National Expressway Act came in effect on November 18, 2015. In addition, pilot programs are conducted to verify the creation of additional lanes to deal with slowing traffic on four routes across Japan. Also, verification tests for wire rope's safety effect to prevent head-on collisions are conducted for a total of approximately 100 km of expressways across Japan.

(vi) Other initiatives

In order to promote cooperation among local areas, the MLIT is improving accessibility, including direct connections between expressways and facilities. By being flexible in building additional Smart ICs, we are increasing accessibility to the distribution centers and tourism hubs from expressways through the consolidation and sophistication of measures based on the concept of "compact" and "networked" roads and reducing traffic congestion around the existing ICs. In view of pro-



moting the use of expressways and improving usability, the MLIT is organizing new rules, such as directly connecting expressways and large-scale distribution centers, industrial complexes, and commercial facilities near the expressways by using Smart ICs and other means with appropriate assumption of burden. Based on preparation phase surveys, the national government is implementing the preparation and examination of Smart ICs in systematic and efficient manner in places where necessity is found.

The Council for Traffic Congestion Relief Measures was established in order to institute effective measures for congested areas around the country. Comprising road administrators, police departments, and other organizations at the prefectural level, the council deliberates on and carries out all necessary measures. In the future, it will more closely coordinate with groups who use trucks, buses, and other modes of transportation to identify and promote necessary measures from the standpoint of those users.

Advanced traffic assessments targeting developers of commercial facilities and other structures, as well as new initiatives for requesting additional measures after siting, are being planned with the goal of reducing congestion as more people begin to use the land along roads.

2 Constructing Arterial Railway Networks

(1) Development of Shinkansen Railways

A rapid transit system of vital value to Japan, Shinkansen [bullet train] Lines significantly cut the time spent moving from region to region and help greatly boost regional activities and rejuvenate local economies. Shinkansen Lines feature safety (no record of passenger death accidents since opening of the Tokaido Shinkansen Line in 1964) and eco-friendliness (the railway CO₂ emissions per unit of energy (g-CO₂/passenger-kilometer) being one fifth of aircraft and one sixth of automobiles). As New Shinkansen^{Note}, Tohoku Shinkansen (between Hachinohe and Shin-Aomori) opened in December 2010 and the Kagoshima Route (between Hakata and Shin-Yatsushiro) of Kyushu Shinkansen opened in March 2011, and Hokuriku Shinkansen (between Nagano and Kanazawa) in March 2015 and Hokkaido Shinkansen (between Shin-Aomori and Shin-Hakodate Hokuto) in March 2016.

Steady improvements are being made in preparation to complete and open the Hokkaido Shinkansen line (between

Note Five routes that are stipulated in the Development Plan approved in 1973 pursuant to the Nationwide Shinkansen Railway Development Act.

Shin-Hakodate Hokuto and Sapporo), the Hokuriku Shinkansen line (between Kanazawa and Tsuruga) and the Kyushu Shinkansen line (between Takeo Onsen and Nagasaki), in accordance with the Handling of New Shinkansen Lines (agreed upon between the government and the ruling party on January 14, 2015). With respect to the Hokuriku Shinkansen Tsuruga – Osaka section, a section scheduled for construction, a survey was conducted by the MLIT that looked at matters requiring consideration concerning route selection, including the estimated project cost. Discussions were then held by the ruling coalition's project team to promote Shinkansen development based on the results, and the decision was made to create a route connecting Tsuruga Station – the Obama (Higashi-Obama) area – Kyoto Station – the Kyotanabe (Matsuiyamate) area – Shin-Osaka Station.

The Transport Policy Council, which had debated Chuo Shinkansen since March 2010, came up with recommendations in May 2011 to affirm the appropriateness of Central Japan Railway Company as an entity of its operation and construction, the superconducting maglev method of train operation and the Southern Alps of Japan route. The MLIT responded to name Central Japan Railway Company as an entity of operation and construction for Chuo Shinkansen in accordance with the Nationwide Shinkansen Railway Development Act, and decided on the Development Plan and directed Central Japan Railway Company to embark on construction. Central Japan Railway Company publicized and made available for public inspection an environmental assessment report edited and finalized under the he Environmental Im-



pact Assessment Act in August 2014 and, at the same time, filed an application for Plan for Constructing the Chuo Shinkansen Line Section between Shinagawa and Nagoya Stations (No. 1) to the MLIT, which was approved by the Minister of Land, Infrastructure, Transport and Tourism in October of the same year. Plans call for putting the Shinagawa – Nagoya route into service in 2027, and currently, construction of the Shinagawa Station and of the tunnels of the Southern Alps is ongoing. All routes to Osaka will be put into service up to eight years ahead of the original schedule (2045), using the Fiscal Investment and Loan Program for construction of routes between Shinagawa and Nagoya. Pursuant to revisions made to the Act on the Japan Railway Construction, Transport and Technology Agency, an Independent Administrative Agency at an extraordinary Diet session in 2016, fiscal loan funds are being provided to JR Central, the entity of construction from November 2016.

(2) Driving Technical Development

(i) Superconducting maglev trains

Efforts to develop SCMaglev technology were assessed as follows at a February 2017 meeting of the Superconducting Magnetic Levitation Technological Practicality Evaluation Committee: "Technologies needed for routes open for traffic have been developed. Efforts going forward will focus on developing technologies aimed at achieving further maintenance efficiency and improving comfort." Based on this assessment, changes to basic plans for the technological development of the superconducting magnetically-levitated transport system (drafted by the Railway Technical Research Institute and Central Japan Railway Company) were thereafter approved by the MLIT in March 2017.

(ii) Free gauge trains

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Based on results of deliberations held by the Free Gauge Technology Evaluation Committee in November 2016, discussions concerning cutting costs and developing technologies to improve durability will be held to deploy free gauge technology on the Kyushu Shinkansen Nishi-Kyushu Route. At the same time, to deploy free gauge technology on the Hokuriku Shinkansen, we will drive forward technological development activity meant to address snow hazards (snow and cold resistance) for the sake of greater safety.

Constructing Aviation Networks

The Basic Policy Committee, Aviation Group, Transport Policy Council had explored the future directions of Japan's aviation in recurring sessions of discussions since October 2012 and finally came up with a report in June 2014. The report sets forth mid- and long-term directions in the three areas of aviation: laying a firm ground for building an aviation network, building an enhanced aviation network and developing aviation demand, and providing quality aviation and airport services. Based on this direction, we are working on developing specific measures.



(1) Expanding Aviation Networks

(i) Enhancing metropolitan airports functionalities

To beef up Japan's competitiveness in the global arenas of business and tourism, enhancements to the functions of the metropolitan airports were made, thereby achieving the annual total number of arrival and departure slots at Tokyo International Airport and Narita International Airport of 750,000 in March 2015.

Additions to the international passenger terminal building at Haneda Airport elevated the number of boarding/alighting

slots on the international lines by 30,000 to 450,000 a year from March 2014. Narita international Airport realized 300 thousand arrival and departure slots a year in March 2015 thanks to the development, etc. of an LCC terminal.

Having achieved the number 750,000, the focus will be on smoothly holding 2020 Tokyo Olympic and Paralympic Games and looking further ahead. This will involve increasing the international competitiveness of the Tokyo Metropolitan Area, achieving the numbers of foreign travelers visiting Japan set forth in the New Tourism Strategy to Invigorate the Japanese Economy, which are, for example, 40 million by 2020 and 60 million by 2030, and regional



revitalization. Achieving these aims will require strengthening the functions of both airports, and work is underway to increase the total number of annual departures and arrivals to and from Haneda and Narita Airports by approximately 80,000 by 2020 by, among other means, reviewing flight paths to and from Haneda Airport.

Approval was received in July 2016 from all local governments involved concerning the government taking budgetary measures for project costs and environmental costs related to developing the facilities needed to enhance Haneda Airport functions. Along with making steady progress on environmental measures and developing the facilities needed to review Haneda Airport flight paths, information will continue to be disseminated effectively by means that include holding regular information sessions.

Regarding 2020 and after, approval was granted to explain measures to further enhance functions, including the development of a third runway at Narita Airport, to community members at a September 2016 meeting between local governments and the Council, so briefing to community began.





(ii) Enhancing functions at Kansai International Airport and Chubu Centrair International Airport

At Kansai International Airport, Kansai Airports started doing business after obtaining concession rights in April 2016. Passenger numbers continued to increase even after the company started its business, with a new record set in 2016 that broke the record set in 2015.

In addition to expanding the immigration check area and adding more checking booths at Terminal 1, a new terminal exclusively for low-cost carriers, Terminal 2 International, was put into service in January 2017 by Kansai Airports. These measures aim to improve the system to accommodate the growing number of foreign travelers visiting Japan.

At Chubu Centrair International Airport, an apron that was being renovated to accommodate new LCC and other flights was put into service in March 2017. The development of an LCC terminal (scheduled to be put into service in fiscal 2019) has begun as a means to make the airport a hub for LCC service.

(iii) Enhancing functions at regional airports

For further revitalization of Okinawa at Naha Airport, which plays critical roles as a travel and logistics base connecting Okinawa and mainland Japan/overseas, the project to increase runways was carried out. At Fukuoka Airport, the project to increase runways continued with the aim of fundamentally resolving the issue of chronic airport congestion at peak times. Measures taken at New Chitose Airport include greatly expanding access to foreign aircraft beginning at the end

of October 2016, and increasing the number of departures and arrivals per hour from 32 to 42 at the end of March 2017. Additionally, in order to relieve facility congestion caused by a sudden increase in international flight passengers, among other factors, and to accommodate greater demand for international flights, development projects are underway to expand the apron for international flights, construct a new taxiway, and improve the functions of the terminal building servicing those flights (CIQ facility). At regional airports, as well, apron expansions and CIQ facility renovations are among the efforts being made to bring in more aircraft and accommodate new flights.

Also, the MLIT has been implementing countermeasures against aging airport facilities based on strategic maintenance to ensure safe flights of airplanes, while pushing forward with quake-resistant technologies and structures at airports so that airports can maintain their operations in the event of an earthquake.

(iv) Driving the Open Skies strategically

The Ministry has strategically pursued the Open Skies ^{Note 1}, including a metropolitan airport (Narita Airport), to respond to changes in the competitive climate resulting from global trends towards air services liberalization while accommodating vigorous economic leaps in Asian and other overseas nations. Open Skies with a total of 31 nations and regions ^{Note 2} were realized by March 2017. Also, discussions with ASEAN are ongoing with a view to concluding a regional air service agreement between Japan and ASEAN.

(v) Fostering and securing aircraft pilots, etc.

In the Japanese aviation industry, while drastic leaps in the demand for aviation focusing on international lines and massive retirement of pilots in their 40s, who form a primary workforce at present, are predicted in the future, it would be difficult to fully fill the future demand for pilots with the present yearly supply of new pilots. Hence, a solution to middle- and long-term shortages of pilots is sought.

To this end, the Joint Subcommittee for Studying Crew Policies was formed under the Basic Policy Taskforce and Technology and Safety Taskforce, Aviation Group, Transport Policy Council in December



2013 to explore directions in the specific measures to address shortages of pilots, and a report was put together in July 2014. Subsequently, the following initiatives have been taken in accordance with the report. The Aircraft Pilot Training Liaison Conference consisting of relevant stakeholders including airlines and training organizations was launched in August 2014, and various challenges in training and securing pilots are being examined utilizing such a conference.

Note 1 An agreement on mutually removing bilateral constraints on the number of operators, that of routes and that of flights in international air transportation to enhance the quality of services, such as cutting airfares by encouraging the entry of new airlines, increasing the number of flights and stimulating competition between airlines. In recent years, many countries in the world pursue its implementation.

Note 2 The number of passengers flying to and from the 31 nations and regions accounts for about 95% of the total number of passengers departing from and arriving at Japan. In order to secure pilots ready for work, we are promoting such efforts as using Self-Defense Force pilots or foreign pilots by relaxing residency status requirements or hiring active pilots under enhanced health management by raising the age limit for airline pilots.

Figure II-6-1-12

(Number of pilots)

Also, a unified website Skyworks (http:// www.skyworks.info) that shows the appeal of aviation related jobs was launched in December 2015 while we promote efforts in such areas as efficient pilot training by airlines, expanding the supply capacity of private sector training institutions including private universities, and further utilization of Civil Aviation College.

 and intervention of four LCCs (APJ, JJP, VNL, SJO)

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Age Compositions of Japan's LCC Pilots

The target numbers of foreign travelers visiting Japan set forth in the New Tourism Strategy to Invigorate the Japanese Economy are set at the double of the previous

number, i.e. 40 million by 2020 and 60 million by 2030. In this respect, fostering and securing aircraft pilots are becoming much more important, and we are planning to expand the training capacity of the Civil Aviation College from FY2018 (from 72 to 108 trainees).

(2) Enhancement and Optimization of Airport Operations

(i) Driving airport management reforms

Using the Act on Operation of National Airports Utilizing Skills of the Private Sector (Private Utilizing Airport Operation Act), the MLIT is committed to driving airport management reforms at national airports and the like to suit specific local conditions through utilization of private-sector capabilities, integrated management of airline and nonairline businesses and so on in order to expand the amount of population who are engaging in domestic and international interactions, etc. on the support of the airports and thus to encourage regional revitalization.

Amid these initiatives, in July 2016, Sendai Airport became the first of Japan's national airports to begin undergoing privatization. Steps are now being taken to privatize a number of other airports, including Takamatsu Airport, Fukuoka Airport, and airports in Hokkaido.

(ii) Efforts to achieve sustainable growth for LCCs

An LCC originating from Japan went into service in March 2012. As of March 2017, Peach Aviation operated 14 domestic routes and 13 international routes; JetStar Japan, 16 domestic routes and eight international routes; Vanilla Air, seven domestic routes and seven international routes; and Spring Airlines, four domestic routes and four international routes.

Japan's domestic and international air travel network is being pressed to make upgrades in order to accommodate an increasing number of passengers traveling to Japan and to achieve regional revitalization. In response, more robust LCC service is now seen as an important aspect of aviation administration, and a range of policies



are being introduced with the goal of bringing the percentage of LCC passengers on domestic flights to 14% and on international flights to 17% by 2020.

Plans are being developed and carried out based on these three policies: (1) reducing landing fees and other airport fees, (2) reforming airport management, and (3) upgrading facilities. Measures to reduce airport fees include stimulating the local economy by maintaining local roads around national airports and joint-use airports and supporting low-cost carriers. To this end, landing fees for the equipment most often used (equipment weighing 100 tons or less) were reduced starting in fiscal 2013, with further reductions planned for fiscal 2016. Furthermore, continuing efforts that began in 2015, airport fees-including landing fees at Narita International Airport and Kansai International Airport-are also being reduced and reviewed. Regarding airport management reform, efforts that include having private enterprises operate runways and other facilities, along with airport buildings, will revitalize airports through strategic fee systems and business activities made possible by utilizing private sector knowledge and funding. The first airport management privatization in Japan began with Kansai International Airport in April 2016, which was followed by a similar move at Sendai Airport that July. Regarding upgrading facilities, LCC-dedicated terminals are being constructed. FY2012 witnessed the launch of an interim LCC receiving facility at Narita International Airport, Japan's first LCC-dedicated terminal (Terminal 2 Domestic) at Kansai International Airport and an interim LCC terminal leveraging existing facilities at Naha Airport. Terminal 3 (an LCC terminal) went into service at Narita International Airport in April 2015. In addition, a new LCC-dedicated terminal (Terminal 2 International) went into service at Kansai International Airport in January 2017. The development of an LCC terminal has also begun at Chubu Centrair International Airport.

LCC domestic and international passenger share in Japan in 2015 was 10% and 13.5%, respectively.

(iii) Accelerating the reception of business jets

A business jet is a small aircraft with the capacity to hold a few to more than a dozen passengers at the most. Business jets are typically used by businesspersons valuing time because they are able to adjust times according to their schedules or utilize the plane as a secure space to carry on business meetings and such on board.

Business jets have become a means of global corporate activity in the U.S. and Europe. As Japan's economy goes on global, further capitalizing on economic growth in Asia through mainly Tokyo International Airport and Narita International Airport has been an important aim, recent years have seen greater importance placed on winning more affluent passengers and otherwise capturing inbound tourism demand.

These conditions are prompting powerful efforts to collaborate with related ministries and agencies and take measures that include structural development and the relaxing of regulations in order to get better prepared for hosting business jets. Particularly at Tokyo International Airport, where many aircraft wanted to use the airport but could not do so, there was a major expansion of departure and arrival slots for these jets in April 2016 (from a maximum of 8 departures/day to 16 departures/day, while the 4 arrivals /day limit was eliminated), priority was raised for departures and arrivals of these aircraft, and the number of business jet parking positions was increased.

These efforts have made it easier to use these airports, and similar efforts will be taken to achieve further improvements.

(iv) Promotion of international flight services at regional airports

Although the number of foreigners visiting Japan is steadily increasing, most of them are entering the country through the country's major airports, including Narita, Haneda, and Kansai. The New Tourism Strategy to Invigorate the Japanese Economy lays out goals concerning the numbers of foreign travelers visiting Japan, including 40 million visitors by 2020 and 60 million visitors by 2030. Essential to achieving this goal will be promoting flights into regional airports serviced by LCCs and other carriers, and encouraging travel to rural areas as well as metropolitan areas.

For national airports and joint-use airports, landing fees of international flights have already been reduced by 30% for regular flights and by half for charter flights. New measures were taken in fiscal 2016 to reduce international flight landing fees a further 50% in cooperation with efforts being taken by regional airports looking to be added to flight routes. These fee reductions will occur when new routes are created or additional flights are added for international passengers at regional and national airports and joint-use airports. From in fiscal 2017, in order to aggresively expand the number of international flights serviced by LCCs and other carriers to regional airports in Japan, regional airports that undertake sophisticated measures to attract more passengers and aircraft will be designated as airports that help encourage travel to Japan. Whether a national airport or regional/second class airport, they will receive subsidies along with landing fee, ground handling fee, and other fee reductions with the aim to promote new or additional services. In addition, such airports will be able to receive support for efforts such as improving CIQ facilities and building boarding bridges in order to improve convenience and relieve bottlenecks in accommodating the growing number of air travelers.

(3) Building a New Air Traffic System

In FY2010, air traffic experts from the industrial, academic and governmental sectors formulated a long-term vision for future air traffic systems as CARATS (Collaborative Actions for Renovation of Air Traffic Systems) with a view to realizing a globally interoperable air traffic system and addressing increases in long-term demand for air traffic capacity and diversified needs. Studies are underway to make this vision a reality in conjunction with ICAO's Global Air Navigation Plan (GANP).

In FY2016, we began using the advanced observational capabilities of the Himawari 8 and 9 weather satellites to visually represent phenomena that are difficult to identify and provide a greater range of information regarding cumulonimbus clouds. Also, with the aim of realizing the use of precision landing, which is currently limited to straight lines, we are examining the introduction of the Ground Based Augmentation System (GBAS) to allow for curved lines to improve safety and convenience.

(4) Strategic Promotion of Overseas Aviation Infrastructures

The Asia and Pacific region is expected to grow into the world's largest aviation market before too long. Under these circumstances, important issues for the growth strategy of Japan are not only to contribute to strengthening of the aviation networks in this region, but also to actively capture the impetus of the emerging countries in which numerous aviation projects are in progress.

An important aspect of winning projects will be strengthening the aviation industry's structure and expertise, with a central focus on airport operators, while engaging in public-private partnerships aimed at discovering new projects and enhancing the consulting structure. The Council for International Deployment of Aviation Infrastructure, which comprises numerous enterprises engaged in these endeavors, is leading the way in gathering information and strengthening bilateral relations between countries.

Sales activities and invitations to key government officials (February 2017) were among the efforts made in fiscal 2016 to encourage Japanese enterprise involvement in improving and operating the domestic terminal at Khabarovsk Novy Airport in Russia, the Long Thanh International Airport in Vietnam, the Hanthawaddy International Airport in Myanmar, the New Ulaanbaatar International Airport in Mongolia, and the New Manila Airport in the Philippines.

4 Facilitating Traffic Access to Airports

With respect to the rail networks for accessing these airports, efforts have been made to further improve railway access to international hub airports in accordance with the Approaches to Future Urban Railways in the Tokyo Area Report from the Council of Transport Policy, which was put together in April 2016. This includes promoting barrier-free construction at stations providing access to airports, as well as promoting specific discussions between stakeholders regarding project implementing entity, project schemes, and other matters, with the goal of improving access routes to major airports in the Tokyo Metropolitan Area and Kansai International Airport, among others.

In addition, to improve bus access to airports within National Strategic Special Zones, all necessary measures are being taken to ensure greater procedural flexibility, including shortening the time given to submit fare and service schedule plans.

Section 2 Implementing Comprehensive and Integrated Logistics Policies

In accordance with the Comprehensive Logistic Policy Guidelines (2013-2017), logistics policies are implemented in a comprehensive and integrated manner in coordination between the public and private sectors. A logistics productivity revolution is also being advanced in order to improve logistics business efficiency and provide added value.

Implementing Logistic Policies to Correspond with Deepening Global Supply Chains

To keep up with deepening global supply chains, efforts directed at reinforcing Japan's international logistic facilities are underway, including driving overseas deployment of the nation's logistic systems.

(1) Promoting Overseas Deployment of Japan's Logistics Systems

1

As supply chains continue to get globalized at a deeper level than ever, grabbing the evolving Asian markets would be essential to sustaining and enhancing the international competitiveness of Japan's industries. The formation of a sophisticated international logistics system should be of prerequisite importance to meet this urge. Capturing the Asian markets has become an urgent task for Japanese logistics companies that support the business expansion of the nation's industries in Asia.

However, the existence of institutional and customary constraints in the partner countries is posing challenges to Japan in expanding its high-quality logistics systems into Asian nations. Therefore, the MLIT is developing an environment to encourage overseas expansion of Japan's logistics systems in collaboration with the private sector through logistics pilot projects, bilateral logistics policy dialogues, projects for development of human resource, international standardization of logistics systems, and other means.

(2) Strengthening the Functioning of the International Marine Transportation Network

As the globalization of economy progresses, the volume of international marine transportation continues to grow year to year. From the perspective of optimizing marine transportation through large bundle shipments, container carriers and bulkers continue to grow in size. In the meantime, key Asian ports have successfully increased their volumes of freight handling, resulting in concentrated ports of call, international trunk routes making fewer calls at Japan. Furthermore, slow responses to larger vessels to carry bulk cargo^{Note} raise concerns over diminishing competitiveness in domestic industries forced into a mutually disadvantageous business environment.

In light of such conditions, Japan carries on its effort to streamline the flow of logistics that supports economic activity in Japan and life of citizens, improving the shipping entities at their location at home, which would in turn augment Japan's industrial competitiveness and realize economic reconstruction by maintaining and expanding the calls of international trunk routes at Japanese ports and simplifying and stabilizing imports of lifeblood materials, such as resources and energies.

In parallel with these approaches, efforts to shape an efficient network of marine transportation in which international and domestic transport services are integrated will be carried on, and relevant measures will be enhanced and developed at a deeper level of refinement.

(i) Enhancing the facilities of International Container Hubs

To strengthen Japanese economy's international competitiveness and to maintain and create citizens' employment, the international shipping trunk routes that directly connect Japan to North America, Europe, and other places need to be consistently maintained and even expanded.

For this purpose, the government of Japan chose Hanshin Port and Keihin Port as International Container Hubs in August 2010 to implement a full package of structural and non-structural measures. However, tumultuous change has been the defining feature of conditions surrounding Japanese ports: the size of container vessels are becoming larger and alliance between shipping companies is progressing. Based on these, the government of Japan promotes the policy of International Container Hubs that consists of three measures: (1) "Cargo collection" at International Container Hubs from

wide area, (2) "Cargo creation" through industry accumulation behind International Container Hubs, and (3) "Reinforcing the competitiveness" of International Container Hubs by, among other efforts, strengthening the functions of deep-water container terminals, collaborating with port authority and port operating company.

At Hanshin Port, the government of Japan gives "Kobe-Osaka International Port Corporation" – port operating company which is partially invested by the government – subsidy for projects to collect cargo. As a result, the number of domestic feeder services connecting between Hansin port and ports in western Japan increased about 50%, from 68 to 99 per every week. The container throughput at the port of Kobe in 2016 recorded high in two consecutive years since the Grate Hanshin-Awaji Earthquake in 1995.

At Keihin Port, the government of Japan gives "Yokohama-Kawasaki International Port Corporation" – port operating company which is partially invested by the government – subsidy for projects to collect cargo, and it contributes to opening new direct shipping routes between Japan and North America at the port of Yokohama since April 2017.

Meanwhile, maritime situations grow harsher, which saw the collapse of Hanjin Shipping Co. Ltd. in August 2016, and the formation of new integrated container shipping business among Japan's three largest shipping companies. Based on these conditions, the government of Japan continues to promote measures strongly to maintain and expand international trunk routes including cargo collection from Asian ports to International Container Hubs.

(ii) Development of an LNG Bunkering Hub

In response to developments such as a tightening of regulations on SOx in general sea areas after 2020 by the International Maritime Organization (IMO) in October 2016, it is predicted that the number of vessels fueled by LNG (liquid natural gas) will increase, which produces cleaner emissions. The international competitiveness of ports may be largely determined by whether or not it has an LNG bunkering (fuel supply) hub. Japan is the world's second largest LNG importing country and MLIT launches a feasibility study for LNG bunkering in the port of Yokohama where 'several' LNG tanks already located in June 2016 and established a steering committee in December 2016. Based on these results, collaborating with the port of Singapore, MLIT promotes measures to build LNG bunkering hubs at Japanese ports to reinforce the competitiveness of Japanese ports.

(iii) Forming a marine transportation network for moving resources, energy sources and so on with stability and efficiency

Supply-demand balances for resources, energy, and so on, assuring Japan of stable, low-cost imports of these substances to build up industrial competitiveness of the nation's industries and to maintain and even create employment and revenues should be one of the tasks of foremost importance as the nation depends on imports for virtually 100% of its requirements.

Ten "strategic international bulk ports" were therefore chosen in May 2011 to serve as bases for resources and energy. In order to enhance the functions of these ports to allow them to serve as marine transport network hubs for bulk freight, the development of quays that can accommodate large vessels and the promotion of cooperative transportation using large vessels through corporate partnerships are being targeted, and both structural and non-structural measures are being taken with the help of subsidies and preferential tax measures.

At Onahama Port, construction of an 18 meter-deep international logistics terminal started in FY2013 as a base for handling coal imports, and it was designated as Specified Cargo Import Hub Port in December 2013. Development of another international logistics terminal with a water depth of 18 m was begun in fiscal 2014 at Tokuyama-Kudamatsu Port.

At Kushiro Port, construction of a 14-meter-deep international logistics terminal started in FY2014 as a base for handling grain imports, and it was designated as a Specified Cargo Import Hub Port in February 2016.

The goal is to realize a stable, low-cost supply of imports and thus build up Japan's industrial competitiveness, create more employment and prevent outflow of earnings abroad.

(iv) Building functionally core ports on the Japan Sea

Among the ports located on the coastal line of the Japan Sea geographically close to the fast economically growing nations across the sea, core ports were selected in November 2011 in an effort to capture the economic booms in these nations into Japan's growth through selection of functions and concentration of measures and through port-to-port linkage and to build a disaster-resistant logistics network following the Great East Japan Earthquake. We will continue to follow up on the progress and other aspects of the plans formulated by port management bodies.

(v) Building an integrated logistics information platform

An integrated logistics information platform that reflects Nippon Automated Cargo Consolidated System (NACCS), with Container Logistics Information Service (Colins) is being built in order to improve the efficiency of system administration and user convenience.

(vi) Enhancing functionalities of international ports

The MLIT not only develops international physical distribution terminals, etc. in the international maritime transport network or at regional hub ports for consolidated competitiveness, etc. of local key industries but also pushes efforts directed at enhancing the functionalities of these ports, as by pushing their migration to ICT. To address increasingly sophisticated and diversified needs for East Asian logistics, which is not much different from domestic logistics in both terms of time and distance and build a low-cost logistics system, the Ministry pushes ahead with functional enhancements to unit loading terminals^{Note} and with the construction of facilities designed to smooth the flow of cargo transshipment.

(vii) Developing a marine transportation environment

Among all international backbone routes, those that could interfere with bay navigation because of shallow waters, etc. have been improved and Aids to Navigation have been established to develop a marine transportation environment that combines the safety of navigation with the efficiency of marine transportation.

Column

Toward the Development of an LNG Bunkering Hub

In recent years, the number of vessels fueled by liquefied natural gas (LNG) is expected to increase in response to the strengthening of international regulations on gas emissions from ships, as LNG emits clean gases. Under these circumstances, whether a port has an LNG bunkering (fuel supply) hub now has a major influence on international port competitiveness.

Japan is the world's largest importer of LNG, and LNG bases, which are very expensive to develop, have already been constructed at many ports. Additionally, in September 2015, a private shipping company began operation of an LNG-fueled tug boat and a bunkering service that supplies LNG from an LNG tank truck to a tug boat at the port of Yokohama, and other such initiatives are being implemented to accumulate expertise on LNG bunkering. Japan is thus in a position to lead the world in the development of an LNG bunkering hub. Against this backdrop, the MLIT established a steering committee in June 2016 with the Ports and Harbours Bureau as the secretariat, with an eye toward the possibility of developing an LNG bunkering hub at the port of Yokohama as a model case, and compiled a report by that December. Furthermore, in August of the same year, initiatives for the development of ports in cooperation with Singapore as an LNG bunkering hub were included in "Economic Measures for Realizing Investment for the Future" (approved by the Cabinet on August 2, 2016).

Cooperation is also being strengthened with the Maritime and Port Authority of Singapore (MPA), which

Note A unit loading terminal is a terminal ready for the scheme of transportation in which freights are loaded and unloaded, unitized, in chasses, containers or the like, to make their physical distribution faster and more efficient.

is also the operator of the world's largest heavy oil bunkering port. In July 2016, Mr. Keiichi Ishii, Minister of MLIT, attended and gave a speech at "Port of Yokohama LNG Bunkering Mini Seminar in Singapore" (sponsored by the MLIT and the Japanese Embassy in Singapore), and shared an understanding with the MPA Chief Executive of MPA of the need to cooperate in developing an LNG bunkering hub.

Furthermore, during the Singapore-Japan Summit Meeting held in September 2016 (Japan side: Prime Minister Shinzo Abe; Singapore side: Prime Minister Lee Hsien Loong), Mr. Abe expressed his wish to strengthen cooperation with Singapore in the development of an LNG bunkering hub, and Mr. Loong said he also wished to seek cooperation in the development of an LNG bunkering hub.

The following October, eight parties from seven countries, including the MLIT Ports and Harbours Bureau and MPA, signed a Memorandum of Understanding (MOU) in relation to the cooperation on the development of LNG as a marine fuel to promote the introduction of LNG-fueled ships, and opened the way to constructing a worldwide network of LNG bunkering ready ports.

In April 2017, MLIT and METI: Ministry of Economy, Trade and Industry sponsored the "LNG bunkering International Symposium in Yokohama," bringing together stakeholders from around the world who are involved in promoting LNG bunkering, including shipping companies, energy businesses, and port and harbor authorities (approx. 550 participants from Japan and overseas), to share awareness of the general course of action that must be taken toward the development of an LNG bunkering hub and a worldwide LNG bunkering network.

The government of Japan will continue to play a leading role in developing an LNG bunkering hub in Asia, while strengthening cooperation with Singapore, with the aim of maintaining and expanding container and other services to Japan's ports and enhancing the international competitiveness of the Japanese economy.



Mr. Ishii, Minister of MLIT, giving an opening speech at the "Port of Yokohama LNG Bunkering Mini Seminar in Singapore" (Friday, July 22, 2016)



The prime ministers of Japan and Singapore shaking hands at the Japan-Singapore Summit Meeting (Wednesday, Sept. 28, 2016) (Photo provided by: Cabinet Public Relations Office)



MOU signing ceremony (Wednesday, Oct. 5, 2016)



Fuel supply during cargo loading/unloading (image)



Commemorative photo of the sponsors, co-sponsors, and speakers of the international symposium (Monday, April 3, 2017)

Source) MLIT

(3) Developing Advanced Aviation Logistics Facilities to Pursue Increased International Competitiveness

The MLIT pushes efforts to consolidate the functionalities of the metropolitan airports, drive an airfreight hub implementation of Japan's hub airports, such as Kansai International Airport and Chubu International Airport, and simplify the transportation process flow in its bid to positively capture airfreight originating from and arriving in Asia as it promises further leaps.

(4) Improving Logistics for Promoting Exports of Agricultural and Marine Products and Food Products

The exports of agricultural and marine products and food products reached 750.3 billion yen in FY2016, updating the record high for the past. With a view to achieving the government's target of ¥1 trillion in exports of food and other agricultural products, forestry, and fishery products by 2019, efforts are being made to spread and promote technologies and devices for preventing those products from perishing during transportation and keep them fresh and expanding transportation of large-volume shipments by combining different items of cargos. These efforts, along with efforts to create international standards for refrigerated delivery services, are some of the attempts being made to maintain the quality of food and other agricultural products, forestry, and fishery products and strengthen cost competitiveness.

(5) Strategic Development and Utilization of a Logistically Important Road Network

Building an efficient logistics network is of crucial importance to motor-truck transportation, which accounts for about 90% of domestic transportation. For this reason, the construction of ring roads in the three major metropolitan areas, access roads to airports and ports is underway. In fiscal 2016, a new individual subsidy program was launched to support the development of roads for accessing interchanges on regional high-standard highways, and the "international strategic and hub port" designation was granted to the last-one-mile of "road network for vehicles exceeding the weight and size limits," which take large vehicles onto routes suited to their size. In addition, we are steadily pushing forward with initiatives using ETC 2.0, such as the simplification of the overweight/oversize vehicle passage permit for vehicles. In addition, a strategy to save labor in truck transport and improve productivity saw the November 2016 launch of a demonstration project for double-trailer trucks (trucks pulling two trailers) in the field, primarily on the Shin-Tomei Expressway. Efforts are also underway to utilize and upgrade existing road networks, including the construction of smart ICs.

(6) Measures That Help Strengthening of International Logistics Facilities

To meet the needs for the improved international logistics network where all modes of land, sea and air are efficiently combined, we are driving forward the realization of the mutual access of chasses (trailers that have no power drive) to and from Korea and China.

The MLIT will push the development and redevelopment of physical distribution sites and facilities around international ports, etc., which are nodal areas for international physical distribution in metropolitan zones. They will also undertake this at the ports that are the strongpoints of physical distribution and industry. This will be done to build up international competitiveness and form an efficient network of physical distribution as an integral part of urban environment improvement activity, while also seeking better disaster preparedness to deal with massive disasters as they occur.

2 Measures Aimed at Building an Efficient and Sustainable Logistics System in Japan

Additional approaches are underway to build an efficient and sustainable logistics system at home to toughen Japan's industrial competitiveness and increase logistics productivity while easing environmental loads.

(1) Flow of Interregional Logistics

The MLIT proceeds to develop nodal points of logistics, such as ports and freight stations, to drive combined multimodal transportation. Cargo transportation by rail can be used more efficiently by utilizing the facilities that have been developed to increase capacities of cargo transportation by rail. The construction of combined multimodal transport terminals is also being proceeded at Toyo Port and elsewhere to consolidate coordination between marine transportation and other modes of transport. Also, we have supported the development of low floor type railroad cars that meet the height restrictions of existing structures such as tunnels with the aim of promoting modal shift of 40 feet container to railway transportation in domestic transportation of import/export container cargos.

Key road networks will also be constructed to streamline the flow of truck transportation.

(2) Optimizing Local Logistics in Cities, Depopulated and Other Areas

Urban distribution centers^{Note} have been developed in 20 cities and 29 locations (27 of which were already in service by the end of March 2016), in accordance with the Act on the Improvement of Urban Distribution Centers, to enhance the urban functions of logistics and streamline road traffic through the intensive location of distribution facilities.

To prevent roadside parking for cargo handling purposes, the Ministry has encouraged local governments to include the mandatory installation of parking spaces for cargo handling in their municipal parking ordinances. As of the end of March 2016, municipal ordinances that stipulate mandatory installation of parking spaces for cargo handling at commercial facilities of above certain size were established in 89 cities.

A handbook for designing and operating buildings that takes logistics into account has been drafted and provides hints as to the kinds of initiatives that will take place in the future. Thanks to this handbook, steps will be taken to more smoothly unload cargo at buildings and transport cargo within buildings, while it is expected that the burden placed on traffic and the environment will be limited and harmony with urban development efforts such as creating pleasant scenery will be achieved.

Measures taken to optimize traffic flow include making focused attempts at eliminating congestion bottleneck points, constructing graded intersections, and resolving railway crossings that are closed at nearly all times. In parallel, nonstructural measures, such as those aimed at encouraging joint transportation and delivery pursuant to the Low Carbon City Promotion Act to boost loading efficiency, have been promoted.

Furthermore, while the number of people having difficulty in daily shopping is increasing in depopulated and other areas, the logistics efficiency is on the decline. Therefore, a model project on achieving sustainable logistics was conducted in fiscal 2015 that has led to the accumulation and spreading of practical expertise with respect to problems and solutions that have been brought to light.

A report was issued in September 2015 by the Panel for Reducing Redeliveries through the Promotion of Greater Parcel Receiving Method Diversity, which comprises delivery businesses, mail order businesses, and other industry players. Its findings have prompted efforts to reduce redeliveries as recommended in the report through means that include making delivery lockers available at the offices of the MLIT for one month starting in July 2016 as a measure to promote more widespread usage of such lockers. In addition, October 2016 saw the installation of lockers for missed deliveries at Michino-eki, a place of central significance in the region, and the start of a public-private partnership for studying the potential for these lockers to reduce redeliveries in other regions.

Unmanned aircraft (i.e. drones, etc.) have the potential to be used for transporting cargo to remote islands and depopulated rural and urban areas, as well as for transport when natural disasters occur. However, when used for transporting goods, they must be capable of performing complex processes with accuracy and safety while flying outside of visual range. This includes flying to their destinations as well as taking off and landing in order to load and unload cargo. The development of a logistics drone port system was therefore launched in fiscal 2016, which enables unmanned aircraft to make safe and autonomous takeoffs and landings even outside of the operator's visual range. The system was used in a cargo delivery trial wherein unmanned aircraft transported goods to special housing for the elderly at Michi-no-eki in Ina, Nagano, in March 2017. This initiative exemplifies current efforts to make cargo delivery via unmanned aircraft a reality.

(3) Further Efforts to Implement Logistic Services That Are More Sophisticated, Comprehensive, and Efficient

In response to a declining labor force and a rising volume of frequent, small-lot deliveries in the logistics sector, efforts are under way to economize on labor in and reduce the environmental impact of logistics business. The Act to Amend the Act on Advancement of Integration and Streamlining of Distribution Business, which seeks to support a wide range of logistics integration and streamlining efforts taken through collaboration by industry players, went into effect in October 2016. The act has certified and provided the necessary support to a total of 19 (as of March 31, 2017) integration and

Note A large-scale urban distribution center intensively equipped with distribution facilities, such as truck terminals and warehouses, which is conveniently located for ready access to an expressway interchange, for example.

streamlining plans that detail initiatives pertaining to, among other things, cooperative delivery, modal shifts, and consolidating transport networks using warehouses equipped with truck scheduling systems and other software. As of the end of September 2016, 301 certifications had been made under the unamended system^{Note}.

(4) Measures for Labor Shortage in Logistics Sector

Under the influence of falling birthrates with aging populations, concerns over shrinking workforces are looming mainly in the trucking and domestic shipping sectors. Amid these circumstances, in order to secure the human resources needed in logistics and enhance logistics efficiency/labor saving, we have worked to facilitate modal shifts and joint transportation and to reduce redeliveries of home delivery services, while striving to promote social significance of logistics business effectively, in accordance with the Action Plans for Measures for Labor Shortage in Logistics Sector (March 2015 by the MLIT). Also promoted were efforts to use AI and other technologies to streamline logistics operations and economize on labor.

In addition, based on a report complied in December 2015 at a joint meeting with the Logistics Task Force of the Transport System Subcommittee of the Council of Transport Policy and the Basic Policy Taskforce under Road Subcommittee of Infrastructure Development Council, we are working to increase productivity of logistics business, while promoting development of working environments where everyone can work and take active roles regardless of gender and age as well as creation of attractive workplaces where people can keep motivated to work with pride, such as by reducing long work hours and increasing wages.

Section 3 Reactivating Industries

1 Trends in Railway Industries and Measures

(1) Railway Business

(i) Trends and measures in the railway business

The number of railway passengers carried in FY2015 increased from its year earlier level. At Japan Railway, transportation on the Shinkansen increased and as did transportation on conventional railway lines, with transportation on private railways on the increase, too.

In FY2015, the annual volume (tons) and distance (kilometers) of railway freight increased from the previous fiscal year for container freight, while carload freight slightly decreased.

The railway operators are working on such initiatives as presenting guidance information in multiple languages, showing route and station names along with their alphanumeric notation and offering free public wireless services in order to enhance railway competitiveness, increase convenience in coordination with livelihood services and be better prepared in receiving inbound foreign tourists.

Additionally, traffic IC cards continue to gain growing popularity across the nation since their pioneer "Suica" was launched by JR East in 2001. Since March 2013, 10 kinds of traffic IC cards used by JR and major private railways and the like have been made interoperable. As IC cards penetrate more railway operators and areas, they could help improve passenger convenience and reactivate regional economies.

(ii) Initiatives towards the complete privatization of Japan Railways

Japan's national railways were once operated as a centrally-managed organization run under a state-owned corporation. Improper business management and a failure to account for actual conditions in the areas of service led to high levels of long-term debt and eventual bankruptcy. This led to the division and privatization of Japanese National Railways in April 1987 and a rebirth of the rail business in Japan. April 2017 marked 30 years since the formation of the JR companies.

The breakup and privatization of Japanese National Railways resulted in the formation of a system characterized by efficient and responsible management. This led to dramatically improved comfort, convenience, and trust in rail services as a whole. The East Japan Railway Company, West Japan Railway Company, and Central Japan Railway Company became fully private entities by 2006, and JR Kyushu Railway Company was listed on the Tokyo Stock Exchange in October 2016. The intended purpose of national railway reform is on the road to being achieved.

The government is also helping Hokkaido Railway Company, Shikoku Railway Company, and Japan Freight Railway Company—all of which have yet to announce plans to be listed on a stock exchange—to achieve business independence in a number of ways, including assistance with capital investment and the provision of interest-free loans.

Hokkaido Railway Company is facing particular difficulties in maintaining profitability as more train lines find it difficult to capitalize on their unique characteristics. Factors include rapidly declining numbers of train passengers as more people move out of rural areas and begin driving cars or using other forms of transportation. For its part, the national government is working with the Hokkaido Government Office, taking part in discussions between stakeholders and planning solutions that involve building sustainable traffic systems in rural areas.

(2) Railway Vehicle Industry

The volume of newly built railway vehicles by value moved flatwise for domestic shipment and varied depending on the status of orders for overseas shipment. Production by value in FY2015 stood at 181.6 billion yen (1,737 vehicles.) Production by value was broken down into 80.6% (146.3 billion yen) for domestic-bound and 19.4% (35.3 billion yen) for export-bound, the former declining by 6.7% over FY2014 and the latter rising by 205.2% over FY2014.

Production of railway vehicle parts (such as power generators and bogies) was 323.6 billion yen by value and that of signal protection devices (such as automatic train control devices and electrical interlocking devices) was 114.5 billion yen.

Rolling stock builders and others are working to develop rolling stocks that fill diverse social needs, such as speed, safety, passenger comfort, low noise and being barrier-free, by partnering with railway operators and also to set up and even expand local production and service sites in the U.S., U.K. and elsewhere with the recent order taking for overseas projects as an impetus.

2 Trends in Motor Truck Transport Business and Measures

(1) Passenger Vehicle Transport Business

(i) Motor bus business

While motor buses in major cities in which populations have increased have seen slight increases in passenger volume and revenues, factors that include increasing ownership of private vehicles in rural areas continue to push down the demand for public transport. The climate surrounding the motor bus business remains extremely harsh.



(Notes) 1 Numeric data above has been collected from the bus operators who own a fleet at least 30 motor buses. The parenthesized value for each fiscal year denotes the total number of bus operators who own a fleet at least 30 buses for that fiscal year. 2 The number of passengers carried in the three major metropolitan areas is an aggregate total for Saitama,

Chiba, Tokyo, Kanagawa, Aichi, Mie, Gifu, Osaka, Kyoto and Hyogo. Source) MI IT

(ii) Chartered bus business

Since deregulations in February 2000, the chartered bus business has sponsored low-cost, diversified bus tours in its effort to deliver better user services, but competition is stiffening with increase in the population of operators in play. Meanwhile, chartered bus industry conditions are improving: Despite a previous downward trend for transport revenues due to developments such as smaller group sizes for group tours and lower prices for travel packages, revenue growth is now being seen as a result of factors that include new fares and costs systems being implemented that properly factor in safety costs and the increasing number of foreign travelers visiting Japan.

The Committee of Experts to Investigate Measures in Response to the Ski Bus Ac-

cident in Karuizawa put together comprehensive measures in response to the Karuizawa ski bus accident that occurred in January 2016. Based on these measures, efforts are being made to ensure safe and secure chartered bus services that include strengthening rules for charter bus operators.


(iii) Taxi business

In the taxi business, the Act on Special Measures Concerning the Optimization and Revitalization of the General Passenger Car Transportation Business in Specified and Semi-Specified Areas was put into effect in January 2014 in order to, among other things, improve working conditions for drivers while providing better taxi services.

Pursuant to provisions of the law, the MLIT has designated 27 specified areas and 116 semi-specified areas, working to improve taxi business productivity by making efforts to rectify the current oversupply and stimulate demand.



(2) Replacement Driver Service

The replacement driver service is used as an alternate means of transport for drunken drivers. As of the end of December 2016, 8,916 replacement driver service providers are in operation. Keen to add to further soundness of the replacement driver service, the MLIT has formulated "Measures for Making the Replacement Driver Service More Sound for Added Safety and Security" in collaboration with the National Police Agency in March 2012 as part of its continuing effort to drive various relevant measures. Furthermore, the MLIT developed "measures to address issues concerning user protection toward appropriate operation of replacement driver services" in March 2016 in order to further ensure protection of users in replacement driver service, and these measures were implemented from April 2016.

(3) Truck Transport Business

The number of motor truck carriers had been on the rise for long, but the number of carriers has been moving crabwise at about 63,000 since 2008.

Since about 99.9% of truck transport business operators are small and medium sized businesses, they are in a weak position in relation to shippers and other business partners and thus subject to such issues as not being able to receive appropriate fares and being forced to accept waiting time for convenience of shippers. Therefore, as part of a framework devised by a council that has been meeting since FY2015, a pilot program was conducted in FY2016 to shorten the currently long working hours through efforts that include decreasing standby time through collaboration between shippers and truck transport business operators. At the same time, the Investigative Commission for Proper Trucking Industry Fares and Fees has begun holding discussions aimed at ensuring that the proper fares and fees are received.

Efforts have also been made toward improving business terms for truck transport business operators and conducting projects that seek to improve productivity.

As changing working arrangements is important to make working in the truck transport industry more attractive, efforts will continue to carry out these policies on a comprehensive scale.



(4) Securing and Fostering Bearers of Motor Carrier Businesses, etc.

Motor carrier businesses that undertake the movement of people and goods (trucking, bus and taxi businesses, and automotive maintenance business that contributes to safety assurance in these businesses) are a social infrastructural industry of vital importance to sustaining Japan's economy and means of regional transportation.

A look into the employment structure of the motor carrier businesses, however, suggests that the workforce more or less depends on middle-aged and elderly workers, with female workers accounting only for about 2%. If this condition lasts, a serious shortage of bearers of these businesses is feared to occur in the future.

In the light of these circumstances, the MLIT has defined the year 2015 as the "first year of human resources securing fostering" and worked out its future approaches to analyzing current status across these businesses, identifying problems,

encouraging the work of younger and female workers and so on.

With regard to trucks, along with addressing issues concerning and carrying out policies aimed at driving a wider adoption of and achieving the practical application of relay transport, we are working on measures to secure bearers by, for example, disseminating information about the license for quasi-medium-size trucks program, enhancing information dissemination and awareness of business managers, leveraging "Female Truck Driver Promotion Project Site."

The bus industry is advertising the job of bus driver as a choice for employment, and is creating flyers and leaflets targeting young female jobseekers. Bus companies are also working to recruit and train more

Figure II-6-3-	5 Emplo	oyment Struc	ture of the M	otor Carrier Bu	isinesses, etc.		
	Bus	Taxi	Truck	Automotive maintenance	Total industry average		
Number of drivers and	130,000	320,000	830,000	400,000	—		
maintenance technicians	(FY2015)	(FY2015)	(2016)	(2016)			
Female ratio	1.5%	2.5%	2.4%	1.3%	43.5%		
	(FY2014)	(FY2014)	(2016)	(2015)	(2016)		
Average age	49.9	58.7	47.5	44.3	42.2		
	(2016)	(2016)	(2016)	(2016)	(2016)		
Working hours	210 hours	193 hours	217 hours	189 hours	177 hours		
	(2016)	(2016)	(2016)	(2016)	(2016)		
Annual income	JPY 4.49 million	JPY 3.32 million	JPY 4.47 million	JPY 4.17 million	JPY 4.90 million		
	(2016)	(2016)	(2016)	(2016)	(2016)		

Notes) 1 The ratio of female in automotive maintenance is that for second level automotive mechanics

2 Prepared by the MLIT's Road Transport Bureau for Average Age for Total industry Average from the FY2016 Basic Survey on Wage Structure and for Working hours and Annual income from figures of investigated ndustry total in the FY2016 Basic Survey on Wage Structure

3 Figures for working hours were estimated by the MLIT's Road Transport Bureau from scheduled hours worked + nonscheduled hours worked in the Basic Survey on Wage Structure. Scheduled working hours indicate the number of hours actually worked during the hours from start time and finish time on

scheduled work days in June each year as stipulated in employment rules or other such documents of the business office. Nonscheduled working hours indicate the number of hours actually worked outside the scheduled working hours and the number of hours actually worked on prescribed days off.

- A Annual income is the figures estimated by the MLIT's Road Transport Bureau from regular salary paid in cash x 12 + annual bonuses and other special salary in the Basic Survey on Wage Structure. Regular salary paid in cash means six-months' worth of salary paid in cash (before deducting income tax, social insurance premiums, etc.) and includes base salary, rank allowance, attendance allowance, commut-
- ing allowance, family allowance, overtime allowance and the like

Annual bonuses and other special salary means the amount of bonuses and special salary such as fiscal year-end special allowance paid during the January-December period of the year preceding the survey year. Source) Prepared by the MLIT's Road Transport Bureau from Labor Force Survey by the Ministry of Internal Affairs and Communications, Basic Survey on Wage Structure by the Health, Labour and Welfare Ministry, Japan's Bus Service by the Nihon Bus Association and Hire-Taxi Year Book by the Japan Federation of Hire-Taxi Associations, and Automotive Maintenance White Paper by the Japan Automobile Service Promotion Association.

bus drivers by creating recruiting and training handbooks.

In the taxi industry, June 2016 saw the launch of the Female Driver Support Enterprise certification program, which seeks to get and keep more women in the taxi workforce by supporting and advertising efforts aimed at improving female driver employment and by businesses trying to make it easier for women with children to continue working.

The automotive maintenance industry is targeting women and younger people, working to advertise and improve the perception of being a mechanic by working with public and private entities through efforts that include visiting high schools and putting up posters. Based on the results of a survey conducted by a panel of experts that looked at work environments as well as compensation and benefits, further measures are being planned according to business type, size, etc., in collaboration with the industry players involved.

3 Trends in Maritime Industries and Measures

(1) Achieving Stable Marine Transportation

(i) Achieving Japanese-flagged vessels and Japanese seafarers

As Japan is a nation with limited resources surrounded by the sea in all its sides, international shipping, which depends on 99.6% of the Japan's trade, plays a significant role in ensuring the country's economic security. As such, even in times of emergency, it is critical to maintain a sufficient number of Japanese vessels and Japanese mariners to eliminate jurisdictional competition with the country of vessel registry, and these numbers have been in decline as a result of weakened cost competitiveness brought about by a yen that has appreciated since the Plaza Accord.

To address this situation, a tonnage tax system^{Note} went into effect in FY2009 for Japanese vessels owned by Japanese overseas ship operators who have been certified under the Japanese-flagged Vessels and Japanese Seafarers Securing Plan in accordance with the Marine Transportation Law.



In FY2013, the system sought to supplement the number of Japanese vessels by expanding the scope of the system to vessels that are owned by subsidiaries of Japanese overseas vessel operators and that have taken measures to be flagged as Japanese-flagged vessels when navigation orders are given (referred to as semi-Japanese-flagged vessels). These efforts are helping to increase the number of Japanese vessels and mariners.

Furthermore, as a move to more quickly achieve stable marine transport in the face of a rapidly changing landscape concerning waters around Japan in recent years, a bill to enact the Marine Transportation Law and Mariners Act was submitted to the Diet in February 2017. This law would, among other things, add foreign vessels that are owned by the subsidiaries of Japanese vessel owners to the list of deemed-Japanese-flagged vessels, if the vessels satisfy certain conditions.

Note A tax system that calculates the amount of corporate tax on the basis of a predetermined deemed profit according to vessel tonnage, rather than yearly profits. Similar tax systems are already introduced in the world's major nautical nations.

These initiatives aim to stabilize the marine transport business in Japan as quickly as possible.

(ii) Acquiring and fostering seafarers (Seamen)

Acquiring and fostering Japanese ship's seafarers, human resources of marine transportation, is of essential importance to boosting Japan's economy and maintaining and upgrading national life. Coastal shipping sailors are aging with about 50% of them being 50 years of age or older, and it is necessary to secure and foster a sufficient number of young seafarers so that



bearers' shortages will not occur when old seafarers retire in a large number. In response, efforts are under way to expand employment opportunities for new seafarers. One such effort involves strengthening the system for supplying seafarers by making it easier for seafarers to find employment through such means as providing support for conducting short-term training courses and offering direct invitations to participate in employment seminars at culinary schools for people who have not graduated from a mariner training institute. Another effort involves supporting business operators that employ new seafarers in a systematical and holding job interviews for new graduates by working with the organizations involved to encourage participation by graduates whose schedules have so far prevented them from attending.

On the other hand, a certain number of ocean-going Japanese sailors need to be secured and fostered from economic security and other perspectives. Therefore, we are making efforts to secure Japanese seafarers, including steady implementation of the plan to secure Japanese vessels and seafarers.

As Asian seafarers account for a greater proportion of the total seafarers aboard Japanese merchant fleet, training aimed at improving the skills of mariner's instructors in the developing nations has been conducted to help secure and foster more capable Asian seafarers.

The I.A.I. Japan agency of Maritime Education and Training for Seafarers (JMETS) is the seafarers training institutions over which the MLIT holds jurisdiction. JMETS, which was established through an April 2016 merger between the I.A.I. National Institute for Sea Training and the I.A.I. Marine Technical Education Agency, is the largest seafarer training institute in Japan. It provides new seafarers training, practical training according to sea freight company needs, and sailing training for students of mercantile marine universities and colleges of technology.

Going forward, JMETS is steadily pushing forward the securing and fostering young seafarers by advancing training contents and making the best use of its resources.

In addition to these efforts to secure and foster seafarers, continued efforts will be directed at promoting On-board Occupational Health and Safety Management System and Work Improvement on Board (WIB), a continual approach to reducing seafarers accidents to add to the vocational charms of the job of being a seafarer.

(iii) Promotion of the understanding of ocean by the public

While achieving stable marine transportation is crucial in supporting the Japanese economy and national life, the understanding of sea by the public is not necessarily sufficient. To this end, the MLIT is working with local governments, businesses, related groups, schools, boards of education, and other organizations to promote the understanding by the public—young people in particular—on maritime affairs, through initiatives that include Ocean Month, the Sea-Festa (held in five cities, two towns, and one village, including Toyohashi City, in 2016), and commending those who have been instrumental in helping Japan to grow into a maritime nation (Prime Minister's Commendation).

In addition, in an address delivered on Marine Day in 2016, Prime Minister Abe announced the launch of the "Nippon Platform for Marine Education" an organization promote marine education. In response, the MLIT has furthered its plans for efforts such as marine education programs for elementary and secondary school education. Following this, in August

2016, regional transport bureaus and related organizations have collaborated with boards of education to provide secondary school students with career education that teaches the benefits and importance of maritime work, while opening up related jobs as career choices, with the goal of increasing the maritime industry workforce in the future.

Column Historical Maritime Depression and Integration of Regular Container Services of International Shipping Companies in Japan

International shipping could be said to be an industry in which a gap tends to emerge between demand and supply. This is because ocean-going ships require several years from placing an order with a shipyard to completion, and also because they have a long service life until they are scrapped.

The large number of ships that were ordered during the maritime boom before the Lehman Crisis have been launched on the market in recent years, but ocean-going ships have fallen into a state of considerable oversupply, due to the declining volume of seaborne trade throughout the world accompanying the slowdown of China's economy.

Such aggravation of the demand-supply environment was reflected in the Baltic Dry Index (BDI; first published on January 4, 1985, at a level of 1,000 points), an index that measures the transport cost of bulk carriers that transport dry cargo such as iron ore, coal, and grains, which recorded a lowest-ever value of 290 in February 2016. The China Containerized Freight Index (CCFI; first published on January 1, 1998, at a level of 1,000 points), an index of container freight cost, also marked a record low in the same year on North American and European routes, and illustrated the severity of the business environment surrounding international shipping.

Under this situation, on October 31, 2016, the three shipping companies of Nippon Yusen, Mitsui O.S.K. Lines, and Kawasaki Kisen announced that they will be establishing a joint venture that integrates their regular container services as a measure to ensure efficient business operations and to pursue economy of scale.

The MLIT expects that the integration of the three companies' regular container services will strengthen the competitiveness of Japanese international shipping companies and lead to the provision of stable services to users, and is thus prepared to respond to consultations from the three companies so that the integrated business can produce the expected effects.



Source) Developed by the MLIT from Nippon Yusen Kabushiki Kaisha, Factbook

(2) Marine Transportation Industry

(i) International shipping

The volume of cargo movement on ocean in the world for 2015 stood at 10.718 billion tons (up 2.0% year-on-year) with Japan's volume of seaborne trade for the same year at 0.94671 billion tons (down 1.2% year-on-year).

Despite a mild recovery of the economy and a decline in fuel oil prices in the U.S., overall international shipping business conditions were severe in FY2015 due to a slowing of economic growth and an oversupply of seagoing vessels in emerging nations.

(ii) Domestic passenger shipping business

Domestic passenger shipping business demand was 88 million passengers in FY2015, a 2% increase over the previous year. The trend is, however, downward on a long-term basis attributable to changes in Japan's demographic structure, among other factors. Fuel prices are now in a downturn after attaining peak level in 2014, a development that continues to make for a difficult business environment. The domestic passenger shipping business plays an important role as a means to transport people and daily commodities from region to region, and holds promise as a way to increase tourism among those interested in maritime scenery and other opportunities. The ferry business has modal shift potential and serves a key role in providing transport after natural disasters occur.

This has prompted the MILT to provide support for the construction of highly energy-efficient vessels through preferential tax measures and a joint shipbuilding program administrated by the Japan Railway Construction, Transport and Technology Agency. At the same time, the MLIT is supporting the development of new tourism-related services under the Model Zone for Sea Travel Revitalization Program, which was launched in April 2016 (13 zones as of the end of March 2017). Support is also being provided for seagoing vessel construction to facilitate a modal shift under the joint shipbuilding program, with the goal of achieving the modal shift

Trends in the Number of Domestic Passenger Ship Opera-Figure II-6-3-8 tors and Number of Passengers Carried (Million) (Number of operators) 160.0 1,200 144 9 Number of operators Number of passengers carried 48.8 148.1 140.0 127.4 985 1,000 970 953 967 968 964 120. 888 120.0 800 100.0 100.8 99 100.9 600 87. 80.0 88.0 85.0 60.0 400 40.0 200 20.0 0 0.0 1995 1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 (Notes) 1 Sum total for general passenger liner routes, specified passenger liner routes and passenger non-liner routes 2 Number of operators as of April 1 of each year (as of August 1 for 1965-1969) Source) MLIT



targets (coastal shipping volume: 36.7 billion ton-km by FY2020; FY2015 volume was 34.0 billion ton-km) set forth in the Basic Plan on Transport Policy, which was ratified by the Cabinet in February 2015. This is taking place alongside efforts to implement a system for certifying total efficiency plans in accordance with the Act on Advancement of Integration and Streamlining of Distribution Business, which was revised in October 2016.

In addition to the above, the MILT is working with concerned ministries, agencies, and private ferry operators to formulate measures aimed at quickly dispatching regional support teams via private ferry when the Nankai Trough Mega Earthquake occur. In connection with this, the Minister of Land, Infrastructure, Transport and Tourism sent a request concerning preferential transport for regional support teams to passenger shipping business operators in order to ensure seamless transport in the event of a natural disaster.

(iii) Coastal shipping

The coastal shipping volume in FY2015 was 180.3 billion ton-km, a 1.5% decrease over the previous year. Although recent years have not seen any significant decline, the long-term view trends downward for transport demand for industrial base materials, in particular, due to factors that include a stagnant domestic economy, intensifying international competition, and business mergers among shippers. Coastal shipping accounts for 44% of domestic logistics and roughly 80% of industrial basic materials transport, and constitutes a core transport infrastructure supporting Japan's economy and the lifestyles of its people. Along with ferry transport, it is a key element for achieving modal shift. However, overage vessels comprise 70% of all domestic vessels at sea and more than 50% of seafarers are 50 or older. This "dual aging" of vessels and seafarers presents a systemic problem.

In response, meetings of the Panel to Consider Future Measures for Coastal Shipping Revitalization have been held since April 2016. Participants have begun discussing the ideal path forward for achieving coastal shipping industry growth that ensures the sustainable provision of safe, high-quality transport services. In July 2016, the panel released a midterm report detailing initiatives to be undertaken immediately. The panel is now discussing specific efforts aimed at ensuring transport reliability and improving productivity as medium- to long-term goals, and plans to present its conclusions in June 2017. Also, the smooth and steady implementation of provisional measures for coastal shipping^{Note} is also supported.



Note A system that grants a certain subsidy to those who have dismantled and removed their ships and that demands the shipbuilders pay fees (grant of subsidy ended by the end of FY2015).

(iv) Port and harbor transportation business

The port and harbor transportation business plays a significant role as an interconnecting node between marine sea and land transportation in support of Japan's economy and national life. As of the end of March 2016, there were 868 transporters (0.7% down from the previous year) in the general port and harbor transportation business at the 93 ports nationwide that are governed by the Port and Harbor Transportation Business Act. Vessel loading and unloading volumes for FY2015 were approximately 1,399 million tons nationwide (down 2.7% from the previous year).

(3) Shipbuilding Industry

(i) Present status of the shipbuilding industry

Japan's shipbuilding industry is an extremely important industry that contributes to regional economy and employment by providing a stable supply of quality vessels tailored to ship owner's varied needs. Japan possesses a clustered integration of maritime industries in which the marine transport business, shipbuilding business and ship machinery business are closely linked to one another.

In the shipbuilding industry, while order volume has remained sluggish since the 2008 financial meltdown due to stagnant growth of the global economy and over-tonnage, a weaker yen has provided a tailwind that has led to a recovery of the market for high-performance, high-quality Japanese vessels. As a result, since hitting bottom in 2012, order volume in Japan has increased for the past three years in a row. Orders worldwide dropped precipitously in 2016 due to, among other factors, a downturn in economic growth in emerging nations. However, as a result of orders received up until 2015, a trade balance has



been carried over and business operations are maintaining positive performances. The 2016 domestic construction volume was 13.31 million gross tons (versus 68.16 million gross tons globally), giving Japan 19.5% of the global market (a 0.6% year-over-year increase). The production of ship machinery products for 2015 was valued at 1,221 billion yen (up about 5.1% from its year earlier level), with an export amount of 352.5 billion yen (down about 6.7% from its year earlier level). This was the second consecutive production increase owing to rising orders for new ships in recent years.

Source) Prepared by MLIT from IHS (former Lloyd's Register of Shipping)

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(ii) Approaches to consolidating the international competitiveness of the shipbuilding industry

With the goal of consistently overcoming fierce competition in the domestic shipbuilding industry, efforts will focus on further enhancing technologies for improving production efficiency and saving energy, which are a strength of the industry. A focus will therefore need to be placed on radically improving productivity through the use of information and other technologies that are seeing rapid development in recent years.

To this end, since 2016, the MLIT has been using IoT, big data, and other technologies through all phases of seagoing vessel preparation, including development, construction, and sending into service. The result is an initiative known as i-Shipping, which seeks to improve production site productivity, cut down on the wasteful use of fuel, and completely eliminate losses of time due to malfunctions.

Specifically, efforts are under way to improve new vessel development, improve production site productivity, and realize high value-added ships. Through efforts such as subsidizing technology development and offering tax breaks for capital investment, efforts have begun to support businesses looking to proactively improve productivity. The MLIT is also promoting the deployment of high-tech vessels that use advanced technologies, and submitted a bill for the Act for the Partial Revision of the Marine Transportation Act and Mariners Act to the Diet in February 2017, with the goal of stimulating Japan's maritime industry and strengthening the country's international competitiveness.

Coordinated efforts by government, industry, and academia are under way with the goal of acquiring and training more personnel for the shipbuilding industry, one of the core principles of i-Shipping. These efforts include promotion of internships for high school teachers and students to deepen their understanding on appeals of shipbuilding, and improving the quality of shipbuilding education provided at technical high schools. Having established that expending the maximum possible effort to acquire domestic personnel through the aforementioned efforts will be a basic goal, the MILT is recruiting overseas workers with the potential to hit the ground running as an urgent and time-limited measure (to be achieved by FY2020).

Through these measures, efforts are focused on bolstering international competitiveness in order to increase the global market share of Japan's shipbuilding industry from the current 20% to 30% by 2025.

(4) Offshore Industries

Offshore development, represented by offshore oil and natural gas production, is an area in which medium- to longterm growth is expected. In addition, there are many types of vessels used in this field and the revenue per construction is considerable. As such, offshore development is an important field for Japan's maritime industries (e.g. marine transportation and shipbuilding). However, as there is no domestic field for offshore resource development, the offshore industries in Japan are still immature. j-Ocean, one element of the MLIT's Productivity Revolutionization Project, is therefore aiming to improve such areas as the technical capabilities of Japan's maritime industries in a wide range of fields, from the design to the construction to the operation of facilities used in the area of offshore development, and gain business in offshore development market. A central focus will be on continuing to develop educational bases for training offshore development engineers—a pressing need—and making steady progress in supporting technological development.

4 Trends in Air Transport Business and Measures

In regards to circumstances surrounding the aviation industry, demand was robust overall due to a rise in the number of inbound foreign visitors during a moderate recovery in domestic and overseas economies. According to Japan's air transport results, the number of domestic air passengers, which had move downward after peaking in FY2006, turned for an increase from FY2012 on, with impetus from demand for restoration from the Great East Japan Earthquake, increased demand encouraged by the entry of LCCs and so on, reaching 96.06 million in FY2015 (up 0.9% from a year earlier level). The num-



ber of international passengers also turned for the increase from FY2012, reaching 18.85 million (up 12.4% from a year earlier level), same as the domestic passengers.

5 Trends in the Consigned Freight Forwarding Business and Measures

The consigned freight forwarding business^{Note} is combined with multiple means of transport to provide services specific to varied user needs. Recent years have witnessed growing entry into the aircraft- and ship-based segments of international shipment to reflect the cargo owners' needs for globalization.

Further, while international trade becomes increasingly important and its speediness is globally required, safety assurance during transportation is also essential. The MLIT works to ensure the availability of safe and secure logistics services, as by conducting audits, etc. to consolidate thorough operator code compliance.

6 Trends in the Warehousing Business and Measures

Commercial warehouses play a significant role as nodal points of physical distribution. There are 6,031 warehouse operators (4,884 ordinary warehouse operators, 1,147 refrigerated warehouse operators) as of the end of FY2014.

In recent years, the construction of large, intelligent physical distribution facilities by foreign or domestic real estate entities or funds has been activated, giving birth to warehouse operators who rent such facilities to develop their businesses.

7 Trends in the Truck Terminal Business and Measures

The truck terminal business plays a significant role in streamlining the flow of transport, mitigating congestion and so on as a nodal point of trucking between a trunk line and a terminal. In recent years, the construction of facilities that provide the functionality of a distribution center (sorting, processing for distribution and so on), as well as loading and unloading, is in progress to meet the sophisticated and diversified needs for logistics.

Note A business that transports cargoes by the means of transport (motor trucks, railways, aircrafts, ships) owned by real carriers (who undertake transportation by themselves) in a fully integrated, complex flow of door-to-door transportation, from picking up cargoes to delivering them.

8 Trends in the Real Estate Business and Measures

(1) Real Estate Business Trends

The real estate business is one of the key industries that command 2.8% of the total sales of all industries and 11.4% of the total number of corporations (FY2015).

According to 2017 official land prices (as of January 1, 2017), the national average for residential land prices halted its decline and leveled out, while commercial land prices increased for the second year in a row. The average for the three major metropolitan areas continued the rising trend for both residential properties and commercial properties. On the other hand, land prices in rural areas continued the downward trend for both residential and commercial land, though the rate of decline was smaller. The number of housing starts was 980,000 in FY2013. This dropped to 880,000 in FY2014 due to a reactionary drop prompted by a last-minute surge in demand in response to a consumption tax hike. The number then increased to 920,000 in FY2015.

In the existing housing distribution market, the number of successful deals was 179,000 in FY2016 (up 3.4% from the previous fiscal year) according to the Real Estate Information Network System (REINS)^{Note 1}.

(2) Status of the Real Estate Industry

The Ministry endeavors to ensure precise administration of the Real Estate Brokerage Act to protect consumer interest involved in housing land and building deals and to expedite distribution. The number of real estate dealers was 123,307 at the end of FY2015.

The MLIT, along with prefectural and municipal governments, endeavor to prevent complaints and disputes by working in conjunction with the bodies concerned while imposing severe supervisory dispositions on those entities that have breached the law. In FY2015, 227 supervisory dispositions were imposed (including 137 revocations of licenses, 63 suspensions of business and 27 orders).

To ensure the proper management of condominiums, the MLIT is taking measures aimed at registering condominium managers and ensuring proper business operations in accordance with the Act on Advancement of Proper Condominium Management. As of the end of FY2015, the number of condominium management service entities was 2,185.

Moreover, on-site inspections are being conducted and the necessary guidance and oversight is being provided to condominium management service entities in the interest of, among other things, preventing wrongdoing.

Since December 2011, a "system of rental housing management entity registration" that places a certain set of rules on the fulfillment of rental housing management services has been put into effect to foster and develop a good-quality rental housing business. As of the end of FY2015, the number of registered rental housing management entities was 3,815. Before five years passed after its establishment, the system was reviewed in August 2016 based on discussions at a third-party council. The purpose was to respond to current issues including conducting more proper management and taking measures against increasing sub-leasing.

(3) Conditioning the Environment for Market Reactivation

(i) Status quo of the real estate market

Japan's real estate had a total asset value of about 2,519 trillion yen as of the end of FY2015 Note 2.

The book value of the real estate or the trust beneficiary interest in real estate that were acquired by J-REITs (real estate investment corporation), real estate specified joint enterprises, special-purpose companies and so on as objects of securitization during FY2016 stood at about 4.8 trillion yen.

Note 1 Real estate brokers have property information loaded on REINS for them to exchange. As property deals are concluded successfully, the relevant information, including the transaction prices, is stacked on REINS.

Note 2 A sum total of the values of the buildings, structures and land calculated on the basis of National Accounts.

J-REITs play a central role in the real-estate investment market. As many as five brands were newly listed in just one year in FY2016. As of the end of March 2017, 58 brands were listed on the Tokyo Stock Exchange. Total book value of assets under management of J-REITs amounts to 17.2 trillion yen and the market value of the real-estate investment securities adds up to about 11.9 trillion yen.

The Tokyo Stock Exchange REIT Index, which indicates price movements across the entire J-REIT market, put the market in a good position in 1H 2016 as a result of factors including the negative interest rate policy implemented by the Bank of Japan. The index rose from around 1,700 points in early January to between 1,850 and 1,900 between February and July. Although numbers sagged from August on due to long-term interest rates and other factors, the index had returned to around 1,850 points by the end of December. This rebound owed to, among other things, heightened optimism for U.S. economic growth following the results of the American presidential election and an interest rate hike by the Federal Reserve Board, as well as a weaker yen resulting from stabilization of long-term interest rates in Japan.

The amount of yearly property acquisition in J-REITs stood at about 1.7 trillion yen for 2016.

(ii) Conditioning the environment for real-estate information

The MLIT surveys real estate transaction prices, etc. nationwide in a bid to make the real estate market more transparent, streamline, and reactivate deals. Information thus collected from such surveys, including locations, areas and prices of real properties traded, is uploaded at a Website on the Internet (Land General Information System^{Note}) with due care taken to prevent identification of the individual properties (as of March 2017, the number of transactions published was 2,971,491 and the number of visits to the website was about 710 million).

In the interest of tracking real estate price trends in a more accurate and timely fashion based on lessons learned from financial crises and other events in recent years, the MLIT has announced that it will publish a property price index (residential) on a monthly basis in accordance with guidelines prepared by the IMF and other international organizations, and has published a property price index (commercial) every quarter since a pilot project for the index was launched in March 2016.



Land General Information System

Since April 2006, transaction price information based on questionnaires conducted among parties to real-estate deals has been posted every quarter on an MLIT website, with care to protect the properties in question from being identified easily.
 As of March 2017, information on 2,971,491 properties was posted, attracting a total of about 710 million Web accesses.



(iii) Conditioning the existing home circulation market

The MLIT is working to condition the existing home trading environment to promote the circulation of existing homes, which have a low share of the total volume of housing in circulation when compared with the U.S. and Europe. Revisions were made to the Real Estate Brokerage Act in FY2016 with the goal of promoting, among other things, usage of the building conditions survey (inspections) based on discussions concerning issues such as program design related to collaborative operations between housing land and building dealers and service providers in the business of inspections and renovations. Information required for real estate transactions, including transaction histories, transactions made in nearby areas, natural disaster risk, and legal restrictions, has been gathered efficiently, and a pilot project for a comprehensive real estate database that allows housing land and building dealers to provide critical information to consumers in a suitable and timely fashion has been carried out in Yokohama, Shizuoka, Osaka, and Fukuoka. In addition, efforts were made to put into more widespread practical use the Price Appraisal Manual, which is used in the underwriting process by housing land and building dealers and suitable in the underwriting process by housing land and building dealers and struct to Existing Homes formulated in FY2015.

(iv) Effective use of the tax system

A number of changes were made as a result of the 2017 tax system reforms. These include an extension of the deadline for application of special provisions on business asset replacement concerning land, etc., held for the long term; an exten-

sion of the deadline for the application of special measures for registration of transfer of land ownership pertaining to the registration of transfer of land ownership; an extension of the deadline for application of, and an expansion (the addition of healthcare facilities to real estate subject to real estate acquisition tax exemption) of special measures pertaining to real estate acquired by J-REITs and other trusts; an extension and loosening of requirements for the application of special measures in connection with the establishment of new business categories under the Act on Specified Joint Real Estate Ventures.

(4) Building a Real-estate Market Tailored to New Ages

Based on the new direction for land policy laid out in the 2016 New Plan for Land Policy (at an August 2016 meeting of the Planning Task Force of the National Land Development Council's Land Policy Subcommittee), a meeting of the Real Estate Appraisal System Conference was held in order to hold wide-ranging discussions on issues pertaining to the Real Estate Appraisal System Conference going forward.

On-site inspections by real-estate appraisers and appraisal monitoring surveys concerned mainly with facts about securitized real-estate appraisals have been conducted to further enhance real-estate appraisal reliability.

Previously, properties acquired by REITs were mainly offices and residences. In recent years, however, types of properties acquired are expanding to hotels, logistics facilities, healthcare facilities and the like. As a step toward making it easier for REITs to acquire healthcare facilities, a seminar was held in collaboration with concerned ministries, agencies, and other organizations that targeted healthcare business operators based on REIT-related guidelines for healthcare facilities drafted in 2014 and 2015.

A number of efforts have been made to bring real estate securitization techniques into wider use in local regions. These include holding seminars and mobilizing experts to participate in real estate securitization projects in small cities. To promote the reuse of vacant homes and shops through the use of crowdfunding and other means, a bill for the Act for Partial Revision of the Act on Specified Joint Real Estate Ventures, which provides for the creation of a registration system for small specified joint real estate businesses and the development of crowdfunding rules, was ratified by the Cabinet and submitted to the Diet in March 2017.

Under the project to promote formation of earthquake-resistant/green buildings, the decision was made to invest in a public-private fund for the financing of two environmental development and environmental improvement projects in fiscal 2016.

In addition, with the aim of promoting the usage of public real estate (PRE) owned by local public entities and further expanding the real estate investment market, handbooks on utilizing securitization and other techniques were distributed to employees at local public entities. A related model project was also conducted. Along with these efforts, the MLIT launched the Public Real Estate (PRE) Portal Site^{Note}, which serves as a central repository for information provided by private organizations and information on sales of and loans for underutilized real estate published by local public entities and other organizations actively engaged in working with private enterprises.

9 Building a Sustainable Construction Industry

(1) Conditions Surrounding the Construction Business

An essential player in developing social infrastructure, the construction industry plays a major role in helping to achieve a bright future for Japan through efforts that include urban revitalization and rural area development. It is also a very important defender of Japan's communities, helping with recovery from earthquakes, taking measures to prevent and mitigate disasters, carrying out strategies to address aging facilities, and performing maintenance.

However, the rising proportion of elderly citizens in Japan is leading to systemic problems that include a declining number of young workers in the construction industry and a greater proportion of older workers. Addressing these problems, and building a sustainable construction industry, will be critical.

Amid these circumstances, the MLIT drafted rules for ensuring proper procedures for foundation pillar construction in March 2016. These rules, which seek to address a problem concerning foundation pillar construction that was brought to light in 2015, were created in response to interim guidelines released by a task force in December 2015. With respect to systemic problems facing the construction industry, in July 2016, the MLIT created a guideline to ensuring the quality of private construction work following the release of interim guidelines by the Fundamental Issues Subcommittee of the Central Council on Construction Contracting Business in June. The MLIT also took measures in October to set forth decision-making criteria concerning the prohibition of blanket contracting.

Furthermore, at a Construction Industry Policies Research Group meeting conducted in October, discussions were held concerning a basic framework for construction industry-related programs aimed at improving construction industry productivity while also maintaining workplace capabilities 10 years from now.

Figure II-6-3-16 shows the trends in construction investment and the number of licensed contractors and employees.



(2) Securing and Fostering Human Resources to Work for the Construction Industry

The construction industry builds on a large number of human resources. While the number of employees in the construction industry shows signs of pickup in recent years, it would be important for the MLIT to direct its continued efforts at securing and fostering industry leaders, including young workers, as well as challenging reforms of work methods, in order to enable the construction industry to continue playing its role as a community supporter in the background of falling birthrates with aging populations.

To this end, the MLIT is working to refurbish the environment that makes construction builder confident about their future prospects, including a continued, stable supply of public works funding, in addition to improving the labor conditions drastically, such as maintaining appropriate wage levels and encouraging their subscription to social insurance and other security programs. The MLIT revised the system for technical certification to facilitate early use of young workers, and is keen to enhance education and training in the industry to facilitate the smooth transfer of skills from generation to generation. Moreover, the MLIT is making efforts to further increase women's engagement in the construction industry, based on an action plan formulated through a joint effort between the private and public sectors.

Moreover, the MLIT will be working to help boost productivity in the construction industry, such as by introducing

i-Construction at construction sites and improving the heavily tiered subcontracting structure, in light of declines in working population in the future.

United public-private approaches will be driven to encourage more people to join in the construction industry and let them concentrate on their jobs with pride.

In addition, the project of receiving foreign construction workers is in place since April 1, 2015 as a time limited measure to handle increased construction demand due to one-off factors such as hosting of the 2020 Tokyo Olympic and Paralympic Games. Under this framework, 1,480 foreign construction workers entered Japan (as of March 31, 2017).

(3) Establishing a Framework of Fair Competition

The construction industry must establish a framework of fair competition among contractors, including thorough legal compliance, to enable those of them who are superior in their technical strength, construction capability and management power to keep up with their growth. Accordingly, MLIT has conducted subcontracting transaction status surveys, on-the-spot surveys, etc., opening a desk for consultation services on troubles and other problems encountered in concluding construction work contracts as "Construction Business Transaction Normalization Center" and the Construction Business Normalization Promotion Month. The Ministry has been working to normalize the practice of deals between prime contractors and subcontractors in the construction business through means that include making revisions to the Guideline to Legal Compliance in the Construction Industry in March 2017.

(4) Measures Aimed at Supporting Construction Companies

(i) Regional construction business management-incentive finance program

The regional construction business management-incentive finance program allows prime contractors to acquire loans from money lending business operators (e.g., cooperative association) on security of the public works contract price credit obligations, according to the completed amount of works. Its purpose is to smooth their cash flow. This program aims to secure loan funding and reduce the borrowing rate and other costs by providing debt guarantee to sublease loans, which the money-lending operator borrows from financial institutions when extending loans.

Effective since November 2008, this program will be carried forward through FY2017 and onwards.

(ii) Subcontracting receivables preservation support program

The subcontracting receivables preservation project aims to prevent chain-reaction bankruptcies of subcontractors in association with failure of their primary contractor by reducing the burden of guarantee charge when the payment of such receivables is guaranteed by a factoring company^{Note} and





Note A financial enterprise that collects receivables owned by others by guaranteeing or purchasing them. At present, 10 factoring companies, including bank subsidiaries, prepayment guarantee companies and leasing companies, run this service.

by indemnifying the factoring company for part of losses, it may suffer upon fulfillment of the guaranteed obligations. This program has been implemented since March 2010 and will be carried on through FY2017.

(iii) Regional construction industry revitalization support project

In the regional construction industry revitalization support project, regional revitalization support advisers, including human resources development experts and small and medium enterprise management consultants, provide wide-ranging advice that help resolve management tasks or technical tasks, such as execution management tasks, to smaller or middle-ranking construction companies and construction-related businesses (such as surveying, construction consulting and geological surveying) as they work to develop, and maintain and manage social infrastructures and to get prepared for, and reduce the impact of, disasters in support of communities. In addition, for exemplary initiatives where multiple companies or other organizations collaborate and contribute to securing and fostering of industry bearers and higher productivity, we provided continued support by a team of experts until set goals such as plan development are achieved (consulting support) and subsidizing part of expenses in the phase of implementing the plan (step up support) as priority support projects. In FY2016, we provided consulting support in 20 cases and step up support in 15 cases.

This program has been implemented since 2015.

(5) Promoting Construction-related Businesses

Information about the total number of operators registered in the construction-related businesses (such as surveying, construction consulting and geological surveying) is published each month and analyses of the financial conditions by sector based on that information are released at the end of the next fiscal year. In addition, the MLIT works to encourage sound growth of the construction-related industries and make effective use of the registration system, as by holding explanatory sessions for students before attending school in collaboration with the associated bodies.

(6) Present Status of Construction Machinery and Growth of Construction Production Technologies

The number of units of major construction machinery owned by organizations and people in Japan totaled approximately 870,000 in FY2013. Market share by industry for units of construction machinery purchased was about 54% for the builder's equipment leasing industry and around 25% for construction businesses.

Pursuant to the second phase "Computer-Aided Construction Promotion Strategies" (formulated in March 2013), to encourage and diffuse the practice of computer-aided construction, the MLIT seeks to promote proactive use of machine control/machine guidance technologies realizing high-precision and efficient construction under automated control. As current deployment of computer-aided construction equipment is inadequate to encourage and diffuse the practice of computer-aided construction industry, as well as to support a healthy builder's equipment leasing industry, since this industry accounts for a major share of construction machinery purchases.

(7) Settling Disputes Arising from the Execution of Construction Works

To promptly resolve disputes arising from the execution of construction work contracts, the Construction Works Dispute Review Panel implements dispute settlement procedures. In FY2015, the Panel received 39 applications (three of arbitration, 34 for conciliation and two for mediation) at the central level and 94 applications (24 for arbitration, 55 for conciliation and 15 for mediation) at the prefectural level.

Chapter 7 Building a Safe and Comfortable Society

Section 1 Realizing a Universal Society

1 Realizing Accessibility through a Universal Design Concept

The "Act on Promotion of Smooth Transportation, etc. of Elderly Persons, Disabled Persons, etc." embodies the universal design concept of "freedom and convenience for anywhere and anyone", making it mandatory to comply with "Accessibility Standards" when newly establishing various facilities (passenger facilities, various vehicles, roads, offstreet parking facilities, city parks, buildings, etc.), mandatory best effort for existing facilities as well as defining a development target for the end of FY2020 under the "Basic Policy on Accessibility" to promote accessibility.

Also, in accordance with the local accessibility plan created by municipalities, focused and integrated promotion of accessibility is carried out in priority development district; to increase "caring for accessibility", by deepening the national public's understanding and seek cooperation for the promotion of accessibility, "accessibility workshops" are hosted in which you learn to assist as well as virtually experience being elderly, disabled, etc.; these efforts serve to accelerate accessibility measures (sustained development in stages).

(1) Accessibility of Public Transportation

In accordance with the "Act on Promotion of Smooth Transportation, etc. of Elderly Persons, Disabled Persons, etc.", public transportation administrators are required to comply with "Accessibility Standards for Public Transportation" when carrying out new development of passenger facilities or large-scale improvements as well as introducing new vehicles and for existing facilities. Efforts must be made to comply with these standards and staff must be educated and trained as

needed to strive for accessibility as part of the stipulated requirements for mandatory efforts. In addition, assistance measures are available to support the accessibility of passenger ships as well as train stations and other passenger terminals along with the implementation of non-step (low-floor) busses, lift-equipped busses, welfare taxis, and other initiatives.

(2) Accessibility of Living and Housing Environments

(i) Accessibility of housing and architecture

In order for those such as the elderly and disabled to have secure, safe, and comfortable housing within the region, the conversion of housing to barrier-free housing is supported by measures such as reducing the interest on Japan Housing Finance Agency's (Independent Administrative Institution) Flat 35 S Loans for obtaining

Figure II-7-1-1	Current Accessibility of Public Transportation
	(as of March 31, 2017)

Passenger Facilities	s (over 3.000	persons/day using (on average)	

Percentage of facilities with "elimination of steps"	Total Facilities	"Elimination of steps" complete	Percentage of total number of facilities (as of the end of 2015)	Target value (per- centage) as of the end of 2020
Railway stations	3,542	3,045	86.0%	100%
Bus terminals	48	43	89.6%	100%
Passenger ship terminals	14	14	100.0%	100%
Airport passenger terminals	35	30	85.7% (100%)	100%

(Notes) 1 Regarding the "elimination of steps", it is calculated in accordance with conformity to Article 4 (which covers width of the travel path, ramps, elevators, escalators, etc.) of the "Standard for Smooth Transport, Etc., with Public Transportation" based on the Barrier-Free Law.

2 The installation of elevators, escalators, and slopes that can be used by the disabled in airport passenger terminals had already reached the 100 percent level by March 2001.

OVehicles

O Ver libies					
Percentage of "Vehicles compliant with smoothness of transport"	Total Number of Vehicles, etc.	Vehicles Compliant with Accessibility Standards for Public Transportation	Target value (percent age) as of the end		
	As of the end of 2015	As of the end of 2015	As of the end of 2015	of 2020	
Railway carriages	52,346	34,140	65.2%	About 70%	
Low-floor buses (excluding ex- emption-certified vehicles)	45,228	45,228 22,665 50.		About 70%	
Lift-equipped buses (excluding exemption-certified vehicles)	15,124	895	5.9%	About 25%	
Welfare taxis	-	15,026	-	About 28,000 cars	
Passenger ships	650	238	36.6%	About 50%	
Airplanes	593	571	96.3%	About 90%	

(Notes) 1 "Compliance with smoothness of transport vehicles" is calculated based on each vehicle's compliance with the Accessibility Standards for Public Transportation. Source) MLIT housing that fulfills a certain barrier-free level; providing subsidies for barrier-free renovations; making new public housing and Urban Renaissance Agency rental housing constructed as part of the housing rehabilitation project barrier-free as a standard specification; and providing assistance and other options for the development of serviced housing for the elderly by private sector businesses and others.

In addition, for architectural structures used by the general public, including those such as the elderly and disabled, architecture that is greater than a certain scale is required to be accessible in accordance with the "Barrier-free Law." Specific approved buildings that meet certain requirements are eligible for support measures such as subsidy programs. For government facilities that are used by many unspecified users, development is promoted in accordance with the standards for encouraging smooth travel for buildings based on the "Barrier-free Law," thereby ensuring that all people including the elderly and disabled can use the facilities safely, comfortably and smoothly. For this, initiatives are being carried out to reflect the opinions of facility users such as the elderly and disabled in facility development.

Figure II-7-1-2	2	Арр	Approval of Architecture for Specified Designated Buildings in Accordance with the "Barrier-free Law"																			
Fiscal year	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of certified plans (Fiscal year)	11	120	229	320	382	366	332	232	280	367	386	348	331	289	255	184	208	130	196	174	208	187
Number of certified plans (Total)	11	131	360	680	1,062	1,428	1,760	1,992	2,272	2,639	3,025	3,373	3,704	3,993	4,348	4,432	4,640	4,770	4,966	5,140	5,348	5,535
Source) MLIT																						

(ii) Accessibility of walking spaces

In accordance with the Barrier-free Law, areas such as roads and station squares that are connected to facilities, such as stations, government facilities, and hospitals, must allow everyone, including the elderly and disabled, to pass through comfortably. This is achieved by promoting the barrier-free design of pedestrian spaces through measures that include the following: creating wide sidewalks, reducing unevenness, slopes, and grades, eliminating utility poles, and laying down guiding blocks for the visually impaired.

(iii) Accessibility of urban parks and other areas

For the development of urban parks, there are standards and subsidies under the "Barrier-free Law" for safe and comfortable usage, such as eliminating grade disparities at entrances, exits, and passages, as well as ensuring that facilities such as restrooms are usable by the elderly and disabled, among others. In addition, to ensure that anyone can enjoy natural spaces such as rivers and ports, development of waterfronts and renovation of passenger ship terminals for better accessibility are being promoted as an integral part of town planning.

(3) Promoting Universal Design for the 2020 Tokyo Olympic and Paralympic Games

Taking the upcoming 2020 Tokyo Olympic and Paralympic Games as an opportunity to promote the precepts of universal design and Mental barrier-free and Universal design town building and implement measures to leave behind a concrete legacy after the Games come to an end, a liaison council of ministries and agencies with ties to Universal Design 2020 was set up in February 2016 under the purview of the Headquarters for the Promotion of the Tokyo Olympic Games and Tokyo Paralympic Games. In August 2016, an interim summary was compiled for discussions in the "Mental barrier-free and Universal design town building" and "Town-building Subcommittees of the network of ministries," which were set up under the liaison council. Then, in February 2017, the liaison council was upgraded to a council of relevant ministers, which decided on a Universal Design 2020 Action Plan that sets out an agenda of concrete measures.

2 Creating an Environment that Supports Child-rearing Under an Low Birthrate Society

(1) Supporting the Balance of Work and Child-rearing

(i) Supporting the supply of housing suitable for child-rearing households

In order to secure housing and living environments suitable for child-rearing households, a relocation system that allows comparatively spacious housing owned by those such as the elderly to be provided as rental housing to those such as child-rearing households and for this the Japan Trans-housing Institute's (General Incorporated Association) owned home leasing program is being promoted. Also, support is provided through local government for the development and reduced rent of rental housing (high-quality regional rental housing) for child-rearing households as well as integrated development of public rental housing with child care support and other facilities.

(ii) Promotion of teleworking

Teleworking is a flexible work style that uses information and communication technology (ICT) to make effective use of time and place. It must be promoted, as it helps ensure employment continuity for workers engaged in raising children or caregiving, contributes to the realization of the dynamic engagement of all citizens through the participation in society of such people as women, seniors, and people with disabilities, and leads to the revitalization of regional cities through the creation of new places to work as well as to improvements in productivity of corporate activities and work-life-balance.

The "Declaration to Become the World's Most Advanced IT Nation," decided by the Cabinet on May 20, 2016, as well as the "Plan for Dynamic Engagement of All Citizens," the "Japan Revitalization Strategy 2016," and the "Basic Policy on Economic and Fiscal Management and Reform 2016," decided by the Cabinet on June 2, 2016, all promote teleworking. In ways such as this, the momentum to promote teleworking has increased greatly.

Relevant ministries and agencies set up a liaison council of government ministries and agencies concerned with teleworking. The council, whose members include vice ministers from each ministry, works cooperatively to promote the further adoption of teleworking, including by sharing each ministry and agency's initiatives to promote teleworking and considering collaborative measures.

The MLIT has quantitatively ascertained the actual conditions associated with the teleworking style of work and the population of teleworkers and conducted a study of policies for promoting the development of locations at which teleworking can be deployed.

(2) Creating a Relaxed and Safe Environment for Children to Grow

To ensure the safety and comfort of children and other park users, various facility administrators are made aware of "Guidelines for Safety of Playground Equipment at Urban Parks (Edition 2)" and "Pool Safety Standards Guidelines" and programs such as the Social Capital Development Integrated Grant provide focused support to local governments for safety and comfort measures of park facilities.

3 Ageing Society Measures

(1) Creating a Living Environment for the Elderly to Live Comfortably

The Silver Housing Project provides a package including the supply of public housing and other accessible facilities, life support advisors to counsel daily living needs, and emergency response services and as of 2015 is implemented at 952 housing projects (24,836 housing units).

Also, in order to promote development of the "Housing and City for smart wellness" where various families with the elderly and small children can live and act actively, the promotion projects for the housing for smart wellness supports the development of housing with service for the elderly, welfare facilities etc. in housing developments etc. and pioneering living and town planning measures for the elderly.

(2) Providing Transport Services That Meet the Needs of an Aging Society

In order to respond to the demand for the transportation of disadvantaged such as the elderly and disabled to hospitals and other care facilities, the implementation of welfare taxis^{Note} is being promoted, and as of the end of FY2015, 17,062 vehicles were in operation. In addition, the Investment Subsidy to Ensure the Procurement, Maintenance and Improvement Regional Public Transportation is being utilized to support the implementation of welfare taxis needed in regional areas and since FY2012, universal design taxis that are easy for the elderly and various people have been granted preferential measures regarding motor vehicle tonnage tax and vehicle excise tax if the vehicle meets standard specifications and is certified by the government. As of the end of FY2015, 3,107 organizations were providing fee-based passenger transport services to allow municipal governments and NPOs to provide fee-based transport services using private vehicles in cases in which the parties representing regional residents agree that services by bus or taxi companies are deemed difficult to provide and the private fee-based passenger transport services are required to ensure passenger transport that is necessary for local residents.

4 Promotion of the Dissemination of Pedestrian Mobility Support

We are promoting the dissemination of pedestrian mobility support services that utilize ICT to establish a society in which anyone, including foreign visitors, elderly and physically-challenged people, can participate in social activity freely and without stress both inside and outside buildings.

In light of the recommendations of the Study Committee for Promoting ICT-assisted Pedestrian Mobility Support (led by Ken Sakamura, Dean of the Faculty of Information Networking for Innovation and Design at Toyo University), we are carrying out environmental improvements such as the promotion of "open data" aimed at the creation of services by diverse entities, and in March 2017, we revised the specification for data needed to build the services. In addition, using the area around Tokyo Station, the area around Shinjuku Station, Narita Airport, and International Stadium Yokohama (Nissan Stadium) as model cases, we have developed indoor digital maps and a positioning environment and have conducted demonstration tests of mobility support services for people such as wheelchair users.



Note Taxi vehicles with lifts and other facilities so that those using wheelchairs or gurneys (stretchers) can board and disembark as is or taxi vehicles serviced by those with various qualifications, such as home care workers.

Column Toward the Realization of the Barrier-free, Stress-free Society

Information such as where you are, and which route would be best to reach your destination, is expected to become even more accurate than it is at present, both indoors and outdoors, owing to the dissemination and technical innovation of the smartphone and other information communication tools, as well as to the four quasi-zenith Japanese satellites set to be operational in fiscal 2018, which will complement the GPS satellite of the United States.

By using these technologies and installing indoor electronic maps and transmission devices called beacons to accurately identify where you are, even in underground malls and inside buildings where satellite signals are hard to reach, a variety of private-sector services are emerging to provide even greater convenience. These services are also expected to help realize the Barriet-free, Stress-free society in which everyone, including elderly people, people with disabilities, and foreign visitors, can travel smoothly and take part in society.

With this image of future society in mind, the MLIT launched the Indoor high-precise positioning project as a new initiative pursued in concert with transport operators, facility managers, and various other private-sector companies, with an eye to the 2020 Tokyo Olympic and Paralympic Games. In fiscal 2016, a demonstration test was implemented using a navigation app to guide wheelchair users to avoid bumps and obstacles by installing indoor electronic maps and beacons on a trial basis with the cooperation of interested parties. The test was implemented in four locations: around Tokyo Station, which has the largest underground space in Japan; around Shinjuku Station, which is used by the largest number of passengers in Japan; in Narita Airport, which serves the largest number of international flight passengers; and in Nissan Stadium, which boasts the largest capacity of all stadiums in Japan.



Source) MLIT

Section 2 Natural Disaster Measures

Japan's national land is subject to severe conditions in such terms as climate, geography, and geology. Such natural disasters as earthquakes, tsunamis, floods, and sediment-related disasters occur almost yearly. The year 2016 saw meteorological phenomena and earthquakes which have not occurred recent years, including Kumamoto Earthquake in 2016, which recorded a maximum seismic intensity of 7 twice within a short period, three tropical cyclones making landfall in Hokkaido for the first time in recorded history, and a tropical cyclone making landfall on the Pacific coast of the Tohoku region for the first time in recorded history. Additionally, there were many other disasters, including torrential rain, with

the seasonal rain front falling on the areas afflicted by Kumamoto Earthquake in 2016 and an earthquake with an epicenter in central Tottori. The importance of natural disaster measures is more urgent than ever before because there is concern over water- and sediment-related disasters that are occurring more frequently and seriously due to climate change as well as over the occurrence of giant earthquakes that are expected to strike, including Nankai Trough Mega Earthquake and Tokyo Inland Earthquake. To this end, disaster prevention, disaster mitigation, and dilapidation measures must be fundamentally bolstered, and structural and non-structural measures are being taken to protect lives and living standards.

Shifting to a Society with Higher Disaster Prevention Awareness

In light of the lessons of the many disasters that occurred in 2016, we are undertaking a general mobilization of structural measures with major impacts and non-structural measures from the perspective of residents, in a shift to society to raise disaster prevention awareness that all actors, including government, residents, and companies, are sharing knowledge and perspectives of disaster risks prepare for all kinds of disasters, including — flooding, earthquakes, and sediment-related disasters.

Given the notion that major flooding exceeding the capacity of facilities engineering will inevitably occur, we set out a "Vision for the Restructuring of Society to Raise Flood Prevention Awareness," so that society as a whole prepares for flooding, in response to water disasters that are becoming more frequent and more serious. We are carrying out initiatives based on that vision, starting with rivers under the ministerial jurisdiction. Further, in August 2016, we decided to expand the initiatives under the "Vision for the Restructuring of Society to Raise Flood Prevention Awareness" to rivers managed by prefectural governments and are trying to accelerate initiatives in rivers managed by prefectural governments, in light of the damage caused by the series of tropical cyclones that struck Hokkaido and Tohoku regions.

Given the concerns about the growing frequency and intensity of water disasters, sediment-related disasters, and droughts caused by global warming-induced climate change, we are making steady progress with facilities improvement and also working on measures against external forces that significantly exceed the capacity of facilities. In particular, with regard to measures to prevent catastrophic damage to society and the economy, the Kanto, Chubu, and Kinki Regional Development Bureaus are studying projected damage and countermeasure plans, including for areas outside flood zones.

In response to the projected Nankai Trough Mega Earthquake and Tokyo Inland Earthquake, which are thought to be steadily approaching, we are promoting effective measures, including the development of evacuation routes and evacuation shelters, and the strengthening of dyke in zero meter areas against earthquakes, according to the specific damage features anticipated.

Now, when there are less than four years until the 2020 Tokyo Olympic and Paralympic Games, is the time to ensure disaster-prevention measures in the capital region, for which we established the Roadmap of Measures Against the Tokyo Inland Earthquake Ahead of the Tokyo Olympic and Paralympic Games, which sets out a concrete action plan based on the Ministry of Land, Infrastructure, Transport and Tourism Tokyo Inland Earthquake Response Plan.

(1) Rolling Out the Vision for the Restructuring of Society to Raise Flood Prevention Awareness

(i) Vision for the restructuring of society to raise flood prevention awareness

We established the Vision for the Restructuring of Society to Raise Flood Prevention Awareness in response to the heavy rains that fell in the Kanto and Tohoku regions in September 2015. We have set up councils composed of river administrators, local governments, and others to share goals for natural disaster reduction, and are carrying out structural and non-structural measures in an integrated, systematic manner for all rivers under ministerial jurisdiction and municipalities along the rivers.

In 2016, MLIT discussed concrete initiatives to take at rivers under ministerial jurisdiction and 129 areas alongside such rivers in light of regional features, with a view toward such things as smooth and rapid evacuation, appropriate flood fighting activities, and drainage of floodwater. We compiled initiatives for the next five years into Regional Action Policies and various initiatives are already underway.

In August 2016, we decided to expand these initiatives to rivers managed by prefectural governments. By the flood season of 2017, councils composed of prefectural and municipal governments, who are the river administrators, will be set up and, with the support of the national government, local governments will compile Regional Action Policies by March

2018 to reduce disasters in rivers managed by prefectural governments.

(ii) Responses based on disasters in Hokkaido and Tohoku regions in August 2016

The torrential rain brought by tropical cyclones that struck successively in August 2016 caused flood damage, including the dyke breach on small- and medium-sized rivers in Hokkaido and Tohoku regions. The Omoto River, which is administered by Iwate Prefecture, especially was a scene of tragic harm, when residents of a facility for people requiring assistance became victims because they were unable to escape.

In light of these incidents, we are accelerating the expansion of initiatives under the Vision for the Restructuring of Society to Raise Flood Prevention Awareness to rivers managed by prefectural governments, which is an action that had already been decided. As one of the initiatives, we drew up the Guidelines for the Use of Hotlines for Small and Medium-sized Rivers, in order to widely entrench in the prefectural governments the use of "hotline" to support the decision to issue evacuation orders by river administrators communicating information during a flood through means such as direct telephone calls to the mayor.

In January 2017, the Infrastructure Development Council reported on its recommendations for restructuring society to raise flood prevention awareness regarding small and medium-sized rivers. The report recommended that relevant parties such as river administrators, local governments, and local communities cooperate and support each other, responding with all-out, unified efforts toward the goals of "eliminating human suffering resulting from the inability to escape" and "ensuring the continuity of local community functions" according to the current situation facing small and medium-sized rivers, such as climate change and a declining population.

In light of this report, in February 2017, we submitted to the Diet a bill to partially amend the Flood Control Act with the aim of achieving "zero failures to escape" and "minimization of social and economic damage" from floods by creating evacuation plans at nursing-care facilities located in areas with a high water-disaster risk, mandating evacuation drills, and disseminating water-disaster risk information, including for small and medium-sized rivers, to community residents.



Column Promoting Emergency Flood Control Measures in Response to the Series of Tropical Cyclones That Occurred in August 2016

Damage from the series of tropical cyclones in August 2016

The series of tropical cyclones that struck Hokkaido in August 2016 brought record-breaking heavy rain, which breached dykes and caused flooding along the banks of the Tokachi River water system. As a result, homes and farmland were swamped, roads were flooded, bridges were damaged, and other such serious damage was sustained throughout the area.

Another impact from Typhoon Lionrock was the record-breaking downpour on the coastal regions of lwate prefecture, causing serious flood damage along the Omoto River (Iwaizumi Town).

(1) Damage from Typhoon Mindulle and Tropical Storm Kompasu

The overflow of Ishikari River, a river under the ministerial jurisdiction, inundated homes in Fukagawa City and Asahikawa City, flooding approximately 120 ha of farmland. Similarly, the overflow of the Tokoro River wrought its own severe flood damage, inundating some 470 ha of farmland in Kitami City. Flood damage was also seen along the Bebetsu River, a river of the Ishikari River water system that is managed by Hokkaido, and where dykes were breached.

(2) Damage from Typhoon Lionrock

Along the Sorachi River, belonging to the Ishikari River water system and under the ministerial jurisdiction, the dyke breached and inundated approximately 130 ha of Minami-Furano Town.

Along the Omoto River, a part of the Omoto River water system that is managed by Iwate Prefecture, inundating much of the narrow, low-lying area and hitting a record-breaking rise in water level that resulted in injuries at a facility vulnerable for people.

Emergency flood control measures(1) Hokkaido emergency flood control project

In fiscal 2016, the Hokkaido Emergency Flood Control Project was launched in cooperation among relevant institutions, to implement both structural



Two tropical cyclones made landfall on Hokkaido in a single year (three, when including re-landfall), for the first time since statistics began to be compiled by the Japan Meteorological Agency (1951). More damages due to approach of Typhoon Lionrock.

Damage along the Tokoro River



Source) MLIT





Source) MLIT

and non-structural emergency initiatives in regions along rivers that suffered severe damage in the August 2016 series of tropical cyclones that struck Hokkaido.

In addition to disaster recovery efforts, urgent and concentrated structural measures are being taken to develop dykes and river channels by fiscal 2019, with the aim of preventing a recurrence of this disaster, or anything similar. The soil that was excavated to create a river channel is being used to restore the farmland, promoting a quick restoration and reconstruction of the affected region.

Non-structural measures are also being taken in cooperation among relevant institutions, to ensure quick evacuation by residents as necessary, such as by promoting push-type systems for transmissions of flood information along rivers under the ministerial jurisdiction. At present, the initiatives are restricted to segments of Class A rivers that are managed by Hokkaido, but in the future, a council composed of prefectures and municipalities will be established for Class B rivers as well, to examine and implement disaster mitigation measures that also include small and medium rivers.

(2) Emergency flood control measures along rivers managed by lwate prefecture

In lwate prefecture, emergency measures against extensive flood damage will be implemented roughly over the next five years through a special emergency project against catastrophic river disasters, a project against river disasters, and an emergency project related to restoration following river disasters.

Structural measures will focus on preventing a recurrence of identical or similar disasters by constructing circle dykes and continuous dykes, and building river channels. In addition to the construction of a circle dykes, a restriction will be placed on land use along the Omoto River in consideration of the current land use situation, and to ensure effective flood control.

Non-structural measures will include the designation of water level alert rivers and the dissemination of information about flood risks in cooperation with relevant institutions, to ensure residents evacuate as necessary.



(2) Preventing and Mitigating Water Disasters

Large-scale water disasters caused by tropical cyclones or the like (for example, disasters caused by Typhoon Wipha visited Izu Oshima Island and other regions in Japan in 2013 and storm surge disasters caused by Hurricane Sandy in US in 2012) are occurring more frequently and seriously. With this situation in mind, the "Underground Mall, Subway, Etc. Working Group," "Disaster Action Plan Working Group" and "Catastrophic Damage Prevention Working Group" have been set up under the "Water Disaster Prevention and Mitigation Headquarters, MLIT" chaired by the Minister of Land, Infrastructure, Transport and Tourism in January, 2014, to study the measures to be taken when water disasters occur.

The Underground Malls, Subways, Etc., Working Group has summarized responses to issues concerning underground settings and disseminated this summary to the relevant organizations. Accordingly, flood measures have been applied on a coordinated basis to underground malls, subways, and connected buildings in the three major metropolitan areas.

The Disaster Action Plan Working Group provides support to enable the heads of municipalities to issue evacuation instructions at appropriate times and has formulated timelines focused on the issuance of evacuation instructions for rivers under the direct jurisdiction of the national government, as well as timelines for bringing together twenty organizations and thirty-seven departments and agencies, including local governments, railways, electricity power operators, telecommunications operators, and welfare facilities, in the downstream basin of the Arakawa River. Modeled on this approach, councils have been established for Ishikari River (Hokkaido), Kuma River (Kumamoto), and other blocks throughout the country to commence studies on timelines for bringing together many concerned parties. In August 2016, we established and announced the first version of a Policy on Formulating and Using Timelines (Disaster Action Plan) and disseminated

it to municipalities and organizations concerned with disaster prevention.

In the Catastrophic Damage Prevention Working Group, the objective is to protect lives and preventing catastrophic damage being caused to society and the economy in the context of an ideal way of engaging in disaster prevention and mitigation for the new stage, as declared in January 2015. The group studies measures to prevent catastrophic damage caused to society and the economy in accordance with the necessity of a collective societal response informed by a shared sense of crisis. The Kanto, Chubu, and Kinki Regional Development Bureaus have set up councils in different areas and have been conducting hearings attended by companies and studies of the projected impact of disasters in terms of damage.

In August 2016, we convened the Fourth MLIT Water Disaster Prevention and Mitigation Headquarters and expanded initiatives based on the Vision for the Restructuring of Society to Raise Flood Prevention Awareness to small and medium-sized rivers. At the same time, we promoted the establishment of systems of close coordination and cooperation among diverse stakeholders according to actual conditions in the communities, with the clear objective of supporting regional economies in addition to safeguarding lives, and decided on priority measures for FY2017. As specific examples of priority measures for FY2017, it was decided to: (i) promote urban flood countermeasures using real-time rainfall information, and (ii) improve disaster response capabilities that bring together Japan's disaster prevention technologies (ICT and robots).

(3) Responding to Climate Change

There are growing concerns about the intensified frequent occurrence of water disasters (river water flooding, inland water flooding, storm surges) and sediment-related disasters, droughts caused by natural hazards that exceed the capacity of facilities. In August 2015, a report was issued by the Infrastructure Development Council entitled "Approach to Climate Change Adaptations in the Field of Water-related Disasters."

Regarding natural hazards that could occur relatively frequently, continue to steadily promote improvements that have been ongoing to date for the construction of dykes, flood control structures, and sewer systems. Regarding natural hazards that exceed the capacity of facilities, endeavor to reduce risk by making improvements in facilities' operations, design and implementation procedures. For natural hazards that significantly exceed the capacity of facilities, aim for the protection of human life to the greatest extent possible and avoid catastrophic damage to the society and the economy, considering worst-case scenarios, and by developing measures with an emphasis on nonstructural measures.

In the future, we will work on measures to adapt to the effects of climate change based on the Plan for Adaptation to the Impact of Climate Change, adopted by a Cabinet decision in November 2015, and on the MLIT Climate Change Adaptation Plan of November 2015.

(4) Responding to Nankai Trough Mega Earthquake and Tokyo Inland Earthquake

If Nankai Trough Mega Earthquake occurs, it is predicted that a wide Pacific-side area from the Kanto region to Kyushu will experience strong shaking with a seismic intensity of weak 6-7 and a huge tsunami will attack the wide Pacific-side coastal area within a short period of time. Deaths will reach a maximum of about 320,000 people, a critical situation including the interruption of transport infrastructure and paralysis of urban functions along the coast will be created, and the lives and economic activities of Japanese citizens are expected to suffer extremely serious effects all over Japan.

If the Tokyo Inland Earthquake occurs, it is expected to cause strong shaking with a seismic intensity of weak 6-7 along the entirety of the Tokyo Metropolitan area. In the Tokyo Metropolitan area, population, buildings, economic activities and others are concentrated extremely compared with other areas, and so it is expected that human, property, and economic damages become tremendous. In addition, in the Tokyo Metropolitan area, political, administrative, and economic functions of the capital are concentrated, and so it is expected that the Tokyo Inland Earthquake exerts impacts upon national economic activities and others as well as overseas countries.

In order to cope with such a national crisis, the Ministry of Land, Infrastructure, Transport and Tourism—which is in charge of the development and management of a lot of infrastructures and the protection of human lives and properties at sea and which has many field agencies all over Japan—established the Ministry of Land, Infrastructure, Transport and Tourism Nankai Trough Mega Earthquake and Tokyo Inland Earthquake Response Headquarters and a Response Plan Making Working Group in 2013, and formulated the Ministry of Land, Infrastructure, Transport and Tourism Nankai Trough Mega Earthquake Response Plan and Ministry of Land, Infrastructure, Transport and Tourism Nankai Trough Mega Earthquake Response Plan and Ministry of Land, Infrastructure, Transport and Tourism Tokyo Inland

Earthquake Response Plan on April 1, 2014, in order to determine the reality-based responses to be taken by collective effort. Regarding Nankai Trough Mega Earthquake, more specific and practical Regional Response Plans were developed for each regional block along with the abovementioned plans. In August 2016, under the purview of Nankai Trough Mega Earthquake and Tokyo Inland Earthquake Response Headquarters, we formulated the Roadmap for Tokyo Inland Earthquake Responses in Preparation for Hosting the Tokyo Olympic and Paralympic Games. The roadmap lays out a concrete action plan for shifting to a society with higher disaster prevention awareness, which extends the concept of a society with higher flood prevention awareness to other disasters such as earthquakes and sediment-related disasters. The roadmap especially reflects the Ministry of Land, Infrastructure, Transport and Tourism Tokyo Inland Earthquake Response Plan. Priority measures were determined after taking into account the status of implementation to date of both response plans.

As specific examples of priority measures for FY2017, it was determined (i) enhancement of the road re-opening plan in preparation for a large-scale earthquake, (ii) promotion of earthquake resistance improvement of houses and other buildings in preparation for the Tokyo Inland Earthquake, and (iii) establishment of a cooperative system, including public-private partnership for a wide-area disaster waste disposal system utilizing the mass transportation characteristic of ships.

We also decided the TEC-FORCE Action Plan for Nankai Trough Mega Earthquake, which plans for the prompt dispatch of TEC-FORCE and other response teams after an earthquake.



Column

National Government Agency Projects for Restoration of National Auxiliary Roads, Prefectural Roads, and Village Roads

The national government has been implementing disaster recovery efforts from Kumamoto Earthquake, which inflicted damage that requires advanced technologies to restore, and other such severe damages, through projects under its direct control or by taking over the local recovery efforts.

Despite the fact that National Route 325 in the Aso-Ohashi Bridge area is categorized as a national highway controlled by Kumamoto Prefecture, its restoration was decided to be undertaken as an agency project of the national government, based on the Road Act as it lies adjacent to an active fault and bridges a deep valley, requiring advanced restoration technologies on May 9, 2016.

On May 10, 2016, a government ordinance was approved by the Cabinet to designate the Kumamoto Earthquake as an Extraordinary Disaster under the Act on Large-scale Disaster Restoration. The designation of Extraordinary Disaster ranks second to Specified Large-scale Disaster, and warrants the establishment of a reconstruction headquarters by the national government. Thus, the designation enables the national government to act as an agent in implementing disaster restoration projects in Kumamoto, such as for the restoration of roads, at the request of the prefectural and municipal governments. On May 13, upon requests from Kumamoto prefecture and Minami-Aso Village, it was decided that the national government would act as an agent in the restoration of Kumamoto-Takamori Prefectural Road, including the Tawarayama Tunnel, and the Tochinoki-Tateno Village Road in Minami-Aso Village, including the Aso-Choyo Ohashi Bridge. The Act on Large-scale Disaster Restoration was established in the aftermath of the Great East Japan Earthquake, and was applied for the first time since coming into force in June 2013.

In the government agency project for disaster recovery of the Aso-Ohashi Bridge area, the design of the new National Route 325 Aso-Ohashi Bridge has been decided and a construction contract has been signed (as of March 31, 2017). In regard to the Kumamoto-Takamori Prefectural Road project, the restoration of the Tawarayama Tunnel was completed on December 24, 2016, which successfully secured an east-west passage. The Tochinoki-Tateno Village road is planned to be opened to traffic in the summer of 2017 after emergency repairs.

Damage to roads being restored as a national government agency project





Source) MLIT

2 Shaping National Land that is Safe and Resilient to Disasters and Enhancing and Strengthening the Framework of Preparedness for Crisis Management

(1) Flood Measures

Aso Ohashi Bridge (National Route 325)

Many of Japan's major cities are positioned on low-lying districts that are lower than the river level during flooding, making the latent danger of flood inundation quite high. Water control measures, such as those involving the expansion of the river channel to safely flush away floods, embankments, the development of discharge channels, dams to temporarily hold back floods, and retarding basin, have steadily improved the degree of water control safety. However, flooding occurred in various locations throughout the country in 2016, which is caused by tropical cyclones that hit Hokkaido and Tohoku regions and other factors. In order to mitigate and reduce damage caused by flood disasters which occur frequently and seriously, structural measures such as preventative flood control measures and measures to prevent re-occurrence as well as non-structural measures such as strengthening of the flood defense system and provision of river information

are being promoted in a comprehensive manner taking into account the influence of climate change.

In incidents involving inundation and other forms of flooding that occurred in 2016, the value of flood control projects implemented previously was demonstrated. For example, during Typhoon Mindulle, the average rainfall over the Ishikari River basin was nearly the same (about 0.9 times) as that during the August 1962 floods that brought large-scale flood damage to the area. However, damage from Typhoon Mindulle was greatly reduced (flooded area 1/190, flooded houses 1/10,000) by the effect of flood control projects, such as constructing dykes, excavating river channels, and building retarding basins and dams.



(i) Preventative water control measures implemented systematically

Dam Upgrading

In light of the increasing frequency and intensity of flood damage associated with climate change, it is important to systematically carry out water control measures against floods that have a comparatively high frequency of occurrence. For this reason, we are systematically promoting such measures as developing water control facilities, such as dykes and excavating river channels, dams, and discharge channels. In addition, in order to use the existing facilities effectively, we are working on dam improvement, including dam redevelopment, through such measures as raising the height to increase a dam's storage capacity and the flexible operation of dams to make use of service water capacity for flood control and making use of flood control capacity for other purposes.

Additionally, for areas with a high likelihood of grave human casualties due to dyke breaches in densely populated areas, in coordination with town planning projects, a safe and pleasant living environment that protects the human lives of local residents will be created, and to increase the safety of areas away from rivers, the development of super levees that do not collapse in the face of flooding that exceeds the planned capacity of facilities is being carried out.

Column

- Early Upgrading of Water Utilization and Flood Control Capacities to Support Local Economies -

In recent years, frequent droughts and floods are posing increasing risks on corporate production activities. To mitigate this risk at an early stage, it is effective to maximize the capacity of existing dams by heightening the dams using new construction technologies, and reviewing operational rules. From this perspective, dam upgrading was selected as one of the Productivity Innovation Projects of the MLIT by the MLIT Productivity Innovation Headquarters in November 2016. Hereafter, a dam upgrading vision will be formulated, and water utilization and flood control effects will be drawn out as early as possible, by strategically and systematically implementing structural and non-structural measures that maximize the capacities of existing dams (wise and flexible operations \times wise development).



(ii) Preventing the reoccurrence of flood disasters

In regions where the frequent occurrence of flood damage and inundation above floor level have caused loss of life and serious problems in people's daily lives, river channel excavation and dyke construction, among other measures, are being implemented intensively over a short time span in order to improve the flow capacity of rivers, in an effort to prevent the recurrence of disasters.

(iii) Flood control measures tailored to river basin characteristics

For rivers that experience a significant decline in flood control safety due to river basin development or existing urban areas regularly subject to flood damage, it is important to ensure the water retention and flood dissipation functions of the river basin. Rivers such as these require the promotion of river basin measures and a variety of methods that taken into consideration regional characteristics to ensure safety and comfort.

a. Comprehensive flood control measures

With factors, such as an increase in the impermeable land area following the development of urban areas and peripheral areas, as well as an increased discharge from flooding rivers, for urban rivers where flood control safety is significantly compromised, it is important to carry out comprehensive flood control measures, in addition to river development, such as securing the water retention and flood dissipation functions of the river basin, directing land use in regions at high risk of disasters occurring, and establishing a precautionary evacuation framework. As part of these efforts, we are cooperating with the relevant local authorities to promote the suppression of rainwater drainage through the development of rainwater storage infiltration facilities, as well as measures to reduce civilian damage.

In addition, to prevent the disruption of urban functions due to flooding as well as the flooding of underground malls

in accordance with the Act on Countermeasures against Flood Damage of Specified Rivers Running Across Cities, river administrators, sewage system administrators, and local government are working together to promote river basin flood damage countermeasures such as developing rainwater harvesting and infiltration facilities as well as regulations to suppress the drainage of rainwater.

b. Localized downpours measures

In recent years, due to inundation damage caused by phenomenon such as concentrated heavy rains in localized areas, to ensure that residents can live safely even during localized heavy rains exceeding planned levels, a plan created with the support of residents (groups), private sector companies, and others that stipulates a comprehensive approach implemented to reduce flood damages known as the "100 mm/h security plan" is registered and initiatives to promote mitigation measures against flood damages are being implemented in addition to the development of rivers and sewerage.



c. Integrating flood control measures with land use

Land use combined with a circle dyke^{Note} and the regulation of land use, such as designation of disaster risk areas, is promoted with local governments when the measure is more efficient and effective than constructing dykes from the viewpoint of recent damage from flooding and situation of land use.

d. Inland water measures

To prevent flooding through inner water inundation and strive for the steady development of cities, the improvement of facilities such as sewer pipes and drainage pump stations are being promoted. However, in recent years, the frequency of concentrated downpours that far exceed planned scales, the increased rainwater drainage due to the advancement of urbanization, and the increased complexity of the urban landscape including the concentration of population and wealth as

well as the increased use of underground spaces make the risk of damage due to inner water inundation even greater. For this reason, measures such as integrated projects for the reduction of sewer flooding damages and integrated projects for inland water emergency measures are being utilized with the cooperation of relevant parties including regional authorities and affected residents to carry out structural measures such as proactively implement rainwater drainage reduction facilities; non-structural measures such as providing rainfall information, land use regulations, and creation of inland water hazard maps; and self-help initiatives such as the placement of water stops and sandbags as well as evacuation activities in combination for the promotion of integrated inundation measures.

Column Launch of Anti-inundation Measures Through Public-private Partnership

Given the frequent occurrence of localized heavy rains, a system for designating inundation damage control zones was established under the revised Sewerage Act that came into force in July 2015, to enable prompt and efficient anti-inundation measures through the cooperation of public sewerage system administrators and private businesses, in conjunction with urban redevelopment efforts and other city planning initiatives. **<Overview of the inundation damage control zone system>**

O Designation of inundation damage control zones

In areas where urban functions are concentrated and inundation damage cannot be prevented by simply developing the public sewerage system, it is necessary to promote anti-inundation measures through public-private partnership. These areas may be designated as inundation damage control zones by public sewerage system administrators.

O Enforcement by ordinance

To prevent inundation damage in designated zones, an ordinance may be established that sets forth technical criteria for temporary retention or underground seepage of rainwater, and requires private businesses to install rainwater storage facilities, in place of the criteria for drainage facilities in Article 10 of the Sewage Act.

\bigcirc Agreement for management of rainwater storage facilities

Public sewerage system administrators may manage rainwater storage facilities with a storage capacity of 100 m³ or more located within inundation damage control zones based on a management agreement. Even if there is a change in facility owner, the agreement remains effective against the next owner (a continuing effect), so the public sewerage system administrator may manage the rainwater storage facility on a continuous basis.



<Support measures for private businesses in inundation damage control zones>

Ourban inundation damage prevention projects in designated regions (subsidy for sewerage disaster prevention works) In inundation damage control zones, the government will directly subsidize the cost of developing sewerage facilities incurred by sewerage system administrators and the cost of developing rainwater storage facilities incurred by private businesses, also supporting anti-inundation measures through public-private partnership.

OSystem of additional depreciation deductions for rainwater storage and utilization facilities (income tax, corporate tax)

In cases where a private business builds a rainwater storage and utilization facility with a capacity of 300 m³ or more in an inundation damage control zone, a tax measure is applied that provides a 10% additional depreciation deduction on the allowed depreciation limit for five years (expiration date: March 31, 2019), provided that sterilization equipment and filtering facilities installed along with the structure for storing rainwater are not included in the scope of rainwater utilization facilities.

<First-ever designation of an inundation damage control zone in Japan>

In Yokohama City, the area around Yokohama Station (Excite Yokohama 22 Center Zone), which is one of the largest commercial centers within the Tokyo metropolitan region and serves as a gateway to Yokohama, was designated an inundation damage control zone on January 25, 2017, to increase the area's safety level against inundation, and became the first area to receive the designation in Japan. Hereafter, discussions are planned to be held with relevant businesses, to promote anti-inundation measures through public-private partnership.



Source) Developed from materials on Yokohama city



Source) City of Yokohama Environmental Planning Bureau

(iv) Strengthening the flood prevention framework

In collaboration with prefectural governments, flood prevention administrative bodies, neighborhood associations, and other stakeholders, we have been implementing joint inspections of sections at high risk of flooding prior to the arrival of flood season, carrying out information-transmission drills, holding flood-prevention technical workshops and flood-prevention drills, endeavoring to disseminate flood-prevention technologies, and otherwise providing support for the strengthening of the flood prevention framework in order to minimize damage caused by flooding.

In order to reinforce the ability of local areas to prevent floods with the participation of various key players, we are also supporting initiatives tied to plans for the securing of evacuations and the prevention of inundation in underground malls (including those slated to be constructed and those that are under construction) situated in areas expected to become inundated, facilities for people with special needs, and large-scale factories. In addition, in light of the damage to a facility for the elderly caused by Typhoon Lionrock in 2016, we have been holding briefings to raise awareness of the danger of flood damage and sediment-related disasters at facilities around the country for people requiring assistance.

(v) Publicizing forecasts and warnings of flooding and providing river information

The Minister of Land, Infrastructure, Transport and Tourism or the Prefectural Governor designate rivers with large

river basins that are at risk of causing great damage to the nation's economy or other great losses as flood forecast rivers and issue flood forecasts indicating the water level or flood volume jointly with the Director-General of the Japan Meteorological Agency. Also, aside from flood forecast rivers, important small and medium-sized rivers are designated as water level alert rivers, and during floods, when the water level reaches flood-warning levels (special caution water levels of flood), this information is also released. As of the end of March 2016, there are 419 flood forecast rivers and 1,572 water level alert rivers.

The water level, rainfall information, flood forecasts, flood prevention warnings and other river information is collected, processed, and edited in real-time and made available to river administrators, municipalities, residents, and others on the website "MLIT Disaster Management Information of River" Note 1 to be utilized in issuing warnings and evacuation during floods.

The personal delivery of flood information, which began in September 2016 in Joso City, Ibaraki and Ozu City, Ehime, which are local governments in the Kinu River and Hiji River basins, was expanded in May 2017 to 373 municipalities in 63 river systems that are flood forecast rivers managed by the national government.

In addition, the data broadcast function of digital terrestrial television is being used in cooperation with broadcasters for efforts to provide river water levels and rainfall information.

XRAIN (eXtended RAdar Information Network), which can accurately monitor concentrated heavy rainfall and localized heavy rainfall with high-resolution and high-frequency in order to help facilitate appropriate river management and disaster prevention activities, is used in rainfall observation. Rainfall information is also made available on the Internet.

(vi) Designation of probable inundation zones

To reduce the flood damage by means of smooth and rapid evacuation and prevention from inundation when a flood occurs, districts that are likely to be inundated when the river floods (probable inundation zones) are designated and information such as the depth of inundation is publicized in accordance with the Flood Control Act. With the 2015 amendments to the Flood Prevention Act, probable inundation zones because of conceivable maximum-scale rainfall will be sequentially designated and publicly disclosed.

In order produce hazard maps that are directly tied to more effective evacuation actions in municipalities located in probable inundation zones, for the benefit of users, we have revised and published guidelines for the production of flood damage hazard maps and are providing support tools that make it easy to produce hazard maps containing the minimum information required as well as technical support for their dissemination and utilization.

Probable inundation zones have been designated and publicly disclosed for approximately ninety-seven percent Note ² of flood-forecasted rivers and rivers for which water levels are publicly disclosed. Flood hazard maps have been produced for approximately ninety-nine percent Note ² of municipalities included in areas that are expected to become inundated.

The MLIT not only allows for tax subsidies for inundation prevention facilities obtained by the underground malls, etc. in probable inundation zones in accordance with inundation prevention plans and supports voluntary flood defense initiatives carried out by underground malls, facilities for people with special needs, and large-scale factories via the disaster information dissemination office established within the river-related office of Regional Development Bureaus and others across the nation as a contact point for businesses and others.

(vii) Strategic maintenance and management of rivers

The condition of river channels and facilities are assessed and appropriate maintenance and management is carried out in accordance with any changes to ensure that the river administration facilities function as intended during floods and other situations.

In the course of river development carried out, the number of facilities, such as dykes, weirs, floodgates, and drainage pump stations, under management greatly increased, and the age degradation of these facilities is advancing. Also, for river infrastructure, migration to condition-based maintenance is being implemented where degradation conditions are monitored through inspections so that measures are taken at appropriate moments to as move to extending facility life cycles and renewal in a planned manner. In addition, the Priority Plan for Social Infrastructure Development states that

Note 1http://www.river.go.jp [PC version], http://www.river.go.jp/s [smartphone], http://i.river.go.jp [mobile]Note 2As of the end of March 2016.

major river infrastructure administered by the nation will have lifetime extension plans by FY2016. In addition, necessary technological development for extending lifetime will be furthered and technical standards for middle to small rivers will be studies in cooperation with prefectures for appropriate maintenance and management. In addition, technical support is provided through permanent consultation services made available by regional development bureaus.

The River Law, which was partially revised in 2013, clarifies the need for the administrator of river management facilities or authorized structures to maintain river management facilities or permitted structures in good condition through maintenance and repair. Based on this, we have revised the Technical Criteria for River Works: Maintenance (River) and have developed various procedures such as for the inspection of dykes and other river management facilities and river channels for the promotion of appropriate maintenance.

(viii) Measures against illegally moored vessels in rivers

Since illegally moored vessels in rivers can impede flood control measures (such as by impeding river construction work, blocking the downstream flow during flooding, and damaging river management facilities) and otherwise impede the management of rivers (such as by causing water pollution through the leakage of fuel and impeding river usage), river administrators are providing guidance on the lawful mooring of unlawfully moored vessels and on the relocation of unlawfully moored vessels to proper storage facilities and otherwise working to remove unlawfully moored vessels.

In May 2013, the Plan for Promoting Comprehensive Measures for the Proper Management of Pleasure Boats and Improvements to Their Usage Environment was formulated. In June 2015, the results of a nationwide survey on the conditions surrounding pleasure boats that was conducted on a consolidated basis for three areas of water (ports and harbors, rivers, and fishing harbors) in order to verify the effects of measures implemented under this plan were publicly disclosed. In accordance with the 2013 amendments to the Order for the Enforcement of the River Act, river administrators are strengthening prosecution of those who abandon vessels inside river areas.

(ix) Road submergence measures

Road underpasses in Tochigi and Hiroshima Prefectures were submerged in water due to the concentrated heavy rainfall that occurred in August and September of 2008, causing vehicles to sink. To prevent such accidents, information concerning submergence risk locations is shared with road administrators, police agencies, fire departments, and other relevant authorities. The framework for information exchange and passage prohibition is established, and the development and installation of submergence alert systems and monitoring facilities, as well as the publication of submergence risk locations that are publicized on the website^{Note}, are promoted.

(x) Developing hills using construction-generated soil

The Koto Delta, an expansive low-lying zone with a maximum subsidence of 4.5 meters that was created by pumping out the subterranean water that had previously existed here, is presently home to approximately 2.5 million people. As this zone sits below sea level, there is considerable concern that a stretch of this zone will become submerged in a large-scale flood, thereby forcing large numbers of residents to travel long distances for evacuation purposes. At the same time, there is a lack of locations for processing construction-generated soil in urban centers, such that the effective utilization of this soil is also a pressing matter. For this reason, a project to get businesses that produce construction-generated soil to create hills for parks and other land features at their own costs as one approach to processing this soil has been launched.

(2) Countermeasures Against Sediment-related Disasters

Japan has a steep geography and vulnerable geology over a wide area. In addition, Japan has a low number of plains and development of residential land has extended to hills and piedmont slopes along with the development of economy as well as the increase in population. As a result, there are about 520,000 areas vulnerable sediment-related disasters such as debris flows, landslides, and slope failures where a lot of people are forced to live cheek by jowl with a risk of sediment-related disasters. There have been 1,000 cases of sediment-related disaster caused by heavy rain and earthquake annually on average in the past 10 years (from 2007 to 2016). In 2016, there were 1,492 cases, causing great damage and leaving 18 people dead or missing.
In order to prevent and mitigate the damages by sediment-related disasters, combination of non-structural and structural measures, such as construction of sediment-related disaster prevention facilities and improvement and enhancement of early warning and evacuation systems are being promoted.

The Kumamoto Earthquake and subsequent torrential rain with the seasonal rain front of 2016 caused sediment-related disasters in Kumamoto and elsewhere that resulted in significant damage, including 15 deaths. In Minamiaso Village, Kumamoto Prefecture, sediment that was produced on slopes by the earthquakes flowed downstream, but existing sediment control dams blocked the sediment flow, demonstrating their effectiveness in mitigating damage. Additionally, sediment-related disaster prevention facilities already constructed in each area also demonstrated their effectiveness.



Houses, hospitals, a national road, and other structures in the sediment disaster hazard area were protected from a sediment disaster by the sediment control dam.

Source) MLIT

Column

Measures Against Large-scale Slope Failures in the Aso-Ohashi Bridge Area

The 2016 Kumamoto Earthquake caused large-scale slope failures in the Aso-Ohashi Bridge area, closed off National Routes 57 and 325, in addition to suspending operations on the JR Hohi Line.

To prevent any secondary disasters due to the large volume of unstable sediment on the upper regions of the slope falls, new slope measures have been launched as part of a sediment control project directly managed by the national government. The Aso-Ohashi Recovery Technology Committee was organized to implement measures toward the stabilization of the collapsed slope and early recovery of transportation facilities that have been damaged, based on discussions and advice from a professional, academic perspective.

The slope control work was performed by simultaneously operating fourteen unmanned machines, the largest number ever used. After conducting earth retaining and embankment works eliminating unstable sediment, the removal of sediment that posed a high risk of collapse was completed by December. From January, manned operations were accelerated for the recovery initiative.



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Source) MLIT
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(i) Fundamental countermeasures against sediment-related disasters

Large-scale sediment discharge from devastated mountainous areas can cause serious damages to important community facilities such as downstream towns, roads, and railways. Construction of sediment-related disaster prevention facilities is being promoted to prevent large-scale sediment discharge from devastated mountain areas and riverbed rise in the down-stream area, and to protect lives, property, and important community facilities from the damages by sediment discharge.

(ii) Emergency countermeasures against sediment-related disasters in sediment disaster-affected areas

In order to ensure safety and security, and to maintain and promote socio-economic vitality in the areas where sediment-related disasters caused loss of life and great damages to people's living, concentrated construction of sediment-related disaster prevention facilities for preventing recurrence of disasters is being promoted.

(iii) Countermeasures against sediment-related disasters to protect those requiring assistance during disasters

People requiring assistance during disaster such as the elderly and children who cannot evacuate by themselves are liable to suffer the damages by sediment-related disasters. Among the dead and missing of sediment-related disasters, the percentage of people requiring assistance is high. So, in order to protect social welfare facilities, medical facilities, etc., for people with special needs, construction of sediment-related disaster prevention facilities such as sediment control dams is promoted in a focused manner.

In accordance with the Act for Promotion of Measures to Prevent Sediment Disasters in Sediment Disaster Alert Areas, etc., (Sediment Disaster Prevention Act), measures combining structural and non-structural elements are being promoted, such as by restricting development pertaining to facilities used by persons with special needs and stipulating the names and addresses of facilities used by persons with



special needs in sediment-related disaster hazard areas and matters relating to the transmission of information on sediment-related disasters in municipal plans for the prevention of local disasters.

(iv) Countermeasures against sediment-related disasters for urban areas near mountain base slopes

For urban areas near mountain base slopes, forestry bands are fostered as green belts on the mountain base slopes adjacent to urban areas to enhance sediment-related disaster safety and maintain and create urban environments and land-scapes with abundant greenery.

(v) Countermeasures against sediment-related disasters for slopes near roads

Slope disaster prevention measures are taken for the slopes which have a risk of landslide near roads.

(vi) Countermeasures against sediment-related disasters to promote regional disaster prevention

In hilly and mountainous areas at high risk of sediment-related disasters which has a large impact on community people, construction of sediment-related disaster prevention facilities for protecting people's lives, as well as maintaining the important facilities, such as evacuation shelters, evacuation routes, and town offices, that play an important role in regional disaster prevention is promoted for sustention and development of regional society. Also, we are providing support for initiatives to enhance and reinforce evacuation systems in sediment-related disaster alert areas.

(vii) Promoting countermeasures against sediment-related disasters based on the Sediment Disaster Prevention Act

a. Promoting sediment disaster prevention measures through designation of sediment-related disaster hazard areas

In accordance with the Sediment Disasters Prevention Act, areas vulnerable to sediment-related disasters that cause harm to residents are designated as sediment-related disaster hazard areas, warning and evacuation systems will be developed. Also, areas vulnerable to sediment-related disasters that cause damage to architectural structures and serious harm to residents are designated as special sediment-related disaster hazard areas, and non-structure measures are taken to restrict certain development activities and restrict on building structures. Also, guidelines and case studies are released for the development of warning and evacuation systems as well as the creation of hazard maps, further the development of warning and evacuation



systems as well as the creation of hazard maps against sediment-related disasters are being promoted in the municipalities.

The Sediment Disaster Prevention Act, which was amended in response to sediment-related disasters that occurred in the city of Hiroshima from torrential rains in August 2014, was enacted in January 2015 and mandated the public disclosure by prefectural governments of the results of basic surveys, imposed an obligation on prefectural governors to provide notifications of sediment-related disaster warning information to municipal mayors and disseminate such information to the general public, and called for matters stated in municipal local disaster prevention plans for areas designated as sediment disaster alert areas to be put into effect and for other such measures to be taken.

b. Promoting the relocation of housing at risk

Houses near cliffs vulnerable to slope failures are prompted to relocate using the program for relocating at-risk housing located near cliffs. In FY2015, this program decreased risky houses by 40 and 18 new houses were built to replace risky houses.

(viii) Countermeasures for large scale sediment-related disasters

In order to reduce the damages caused by deep-seated catastrophic landslide, combination of structural and nonstructural measures are taken by, for example, development of sediment-related disaster prevention facilities as well as strengthening of the warning and evacuation system by use of deep-seated catastrophic landslide risk evaluation maps.

If there is a risk of a natural damming of a river (landslide dams) or debris flows following volcanic eruptions, urgent survey are conducted in accordance with the "Sediment Disaster Prevention Act" to provide municipalities with information on the land areas vulnerable to sediment-related disasters as well as the timing of occurrence. In recent years, sediment-related disasters have occurred frequently due to localized rainfalls more concentrated and intensified and volcano getting more active. So, training for enhancing the ability to respond for implementation of urgent survey and strengthening cooperation with relative organizations are promoted.

(ix) Issuing a Landslide Alert Information

In case that the risk of sediment-related disasters (or landslides*) increases due to heavy rainfall, Landslide Alert Information is jointly issued by prefectures and the Japan Meteorological Agency over the respective-municipalities. Issuance of the Landslide Alert Information is expected to lead issuance of evacuation orders announced by the municipalities and/ or self-evacuation of residents. In order to support such operation, the Agency also



provides Real-time Landslide Risk Map indicating the risk of landslides as well as detailed rainfall data.

* "Landslides" refer to debris flows and concentrated slope failures.

(3) Volcanic Disaster Countermeasures

(i) Countermeasures for sediment-related disasters following volcanic activity

In preparation for the volcanic mudflow caused by volcanic eruptions and the debris flow caused by rainfall, sediment control dams, training dikes, and so on for preventing or reducing damage are being constructed. In addition, for facilities that are unable to properly maintain their functions due to continued and massive debris flow, removing sediment deposition and other measures are being carried out to keep effectiveness.

Sediment-related disasters following volcanic eruptions could lead to large-scale disasters. In addition, it is very difficult to





predict the position or scale of an eruption, that causes serious damage, with good accuracy beforehand. For this reason, a sediment-control plan for the emergency mitigation of the effects of a volcanic eruption is being formulated in order to mitigate damage through agile responses to volcanic conditions in combination with the development of facilities in advance; this plan targets forty-nine volcanoes that exhibit active volcanic activity and that are at risk of causing sediment-related disasters in the wake of an eruption. The amended Active Volcanoes Act came into force in December 2015 and prefectural governments, Regional Development Bureaus, and other sediment-control departments, as members of the Volcanic Disaster-Prevention Council, decided that they would study volcanic hazard maps from the standpoint of sediment-related disasters caused by eruptions. Thus, by developing volcanic sediment-control hazard maps (volcanic hazard maps that relate to sediment-related disasters), support was provided for a series of studies on alerts and evacuation systems by the Volcanic Disaster-Prevention Council.

In response to the eruption of Mt. Aso in October 2016, a survey of ash fall was conducted by helicopter and on land, and information was provided to the relevant local authorities.

(ii) Measures against ash falling due to active volcanoes

Since the ash falling on roads due to volcanic eruption has a great social impact, such as traffic obstruction, a framework is being developed in order to remove ash quickly and appropriately from roads using street sweepers.

(iii) Japan Meteorological Agency initiatives

To prevent and mitigate volcanic eruption disasters, domestic volcanic activity is monitored and volcanic warnings are issued in a timely manner. Especially for the fifty volcanoes in need of more intensive monitoring/observation for volcanic disaster mitigation selected by the Coordinating Committee for Prediction of Volcanic Eruption observation facilities have been deployed and volcanic activity is being monitored around the clock (volcanoes subject to continuous observations).

Also, Volcanic Alert Levels are being applied and improved through coordination of evacuation planning at local Volcanic Disaster Mitigation Councils (applied to thirty-eight volcanoes as of the end of March 2017).

In accordance with recommendations (March 2015) issued at an investigative meeting of the Coordinating Committee for Prediction of Volcanic Eruptions held in response to the disaster caused by the eruption of Ontakesan (Mt. Ontake) in September 2014, the Japan Meteorological Agency (JMA) has been strengthening volcanic activity observation, evaluation systems, and information provision. For instance, JMA has reinforced observation facilities around the crater as well as started volcanic gas observation. The agency has upgraded systems to monitor and evaluate volcanic activity and release disaster prevention information. From the perspective, it has established the Volcanic Observation and Warning Centers accompanying the increase of the number of personnel working on volcanoes, and also commissioned spatial advisors to JMA. In addition, it has instituted "Eruption Notice" designed to promptly report an eruption in progress. A close study and publication of volcanic alert level criteria are ongoing.

(iv) Japan Coast Guard initiatives

Airborne observations are routinely conducted on submarine volcanoes and volcanic islands, and the information on eruptions or discolored water as a precursor phenomenon of eruptions is immediately provided to mariners. In addition, to serve as basic data to predict the eruption of submarine volcanoes and volcanic islands, comprehensive surveys are conducted to gather basic information such as seafloor topography, geological structure and so on. Continuous GNSS observations in the Izu Islands area are also conducted to monitor crustal movements.

With respect to the Nishinoshima Volcano, three years after it began erupting in November 2013, the JMA reduced the precaution scope for the volcanic warning on August 17, 2016, and navigational warning was canceled in response to the canceling of a marine warning. The Japan Coast Guard also conducted a survey to produce a nautical chart, including land, from October to November 2016. The area of the island had increased to approximately 2.7 km² as of September 2016 (inclusive of the former Nishinoshima). Monitoring of volcanic activity and status of the island using aircraft will be continued in the future.

Column Field Surveys for Creating Maps and Charts of Nishinoshima Island

The eruption on Nishinoshima Island that began in November 2013 spewed lava and formed new land, almost fully covering the old island that existed prior to the eruption and expanding it further. After the eruption, the Japan Coast Guard conducted the aerial observation monthly, and confirmed that a state of quietude has continued since the last eruption in November 2015, two years after the first eruption. In August 2016, the coverage of the eruption warning was reduced to the area around the crater, so the Japan Coast Guard and the Geospatial Information Authority of Japan conducted a joint survey from October to November 2016, to create new maps and charts.

Members of the survey team landed on Nishinoshima Island with a rubber boat deployed from the Japan Coast Guard's survey vessel (Shoyo), and installed triangulation points and hydrographic survey markers for referencing positions and heights. The position information (latitudes, longitudes, altitudes) for creating maps and charts was thereafter acquired by performing satellite surveys, tidal observations, and leveling for determining heights.

After the field survey, the Geospatial Information Authority of Japan took aerial photographs around the island using its survey aircraft (Kunikaze III), planning to publish and provide a new map based on the results of the field survey.

Furthermore, the Japan Coast Guard deployed a boat from (Shoyo) and an aircraft (Mizunagi) to survey the land and shallow waters around the island and collect data on water depths and coastlines. A new chart of Nishinoshima Island is being planned to be published based on the collected data.

As press members were also aboard the survey vessel (Shoyo), the details and significance of the survey of Nishinoshima Island were widely reported with coverage of the island's flora, fauna, and nature, which suggests the high interest levels among the people in Japan.





Landing on the island via a rubber boat

Transporting survey equipment







Source) MLIT

(v) Geospatial Information Authority of Japan initiatives

a. Improved observation and monitoring of volcanic activities

At active domestic volcanoes, continuous three dimensional crustal deformations are monitored by GNSS-based control stations (continuous GNSS Note 1 observation network called GEONET), automatic distance and angle measurement devices, and Remote GNSS Monitoring System (REGMOS). In addition, the GNSS observation data conducted by other institutions are integrated into the analysis to monitor the crustal deformation around of volcanoes in more detail. Ground surface deformation of volcanoes are being monitored with SAR interferometry Note 2, by using the data of Advanced Land Observing Satellite "DAICHI-2".

b. Development of geospatial information about volcanoes

Volcanic Base Maps that show details, such as a volcano's distinctive geographical features, are being developed and updated.

c. Research on natural disasters following volcanic eruptions



Research and development is being conducted to improve precision of observation by use of GNSS and SAR interferometry as well as to reveal the mechanism of volcanic activities by analysis of the abovementioned observation data.

(4) Storm Surge and Coastal Erosion Measures

(i) Promoting storm surge and high wave measures

To protect human lives and assets from storm surges and high waves caused by frequently occurring storm surges, a combination of structural and non-structural measures are being promoted, such as the development of coastal levees and the issuing of flood prevention warnings. In May 2015, the Flood Prevention Act was partially amended. In order to further reinforce measures in terms of both structural and non-structural elements, a system for the designation of coastal areas for which water levels pertaining to storm surges are publicly disclosed and areas vulnerable to inundation was established.

(ii) Promoting coastal erosion measures

Since a variety of factors contribute to coastal erosion across the nation, the administrators of rivers, coasts, shipping ports, and fishing ports are coordinating to implement measures such as sand bypasses Note ³ and sand recycling Note ⁴.

Note 1 Global Navigation Satellite System

Note 3 When the transport of sand is cut off by coastal structures, this construction method takes the sediment accumulated on the upper hand side to move and supply it to the lower hand side coast to restore sands.

Note 4 This construction method takes the sand accumulated on the coast along lower hand side of the flow and restores it to the upper hand side of the coast subject to erosion to restore sands.

Note 2 Technology that monitors ground surface deformation from artificial satellites in space.

(iii) Providing disaster prevention information regarding storm surges

To enhance disaster prevention activities at municipalities, the Japan Meteorological Agency provides each municipality with storm surge warnings and advisories for individual municipalities.

Also, to assist victims and aid restoration efforts in regions that ground subsidence occurred following the Great East Japan Earthquake, an "Hourly Tide Level Calendar" consolidating astronomical tide level (forecast values for tide level) is published along with other information regarding storm surges.

(5) Tsunami Measures

(i) Promoting tsunami measures

In preparation for the large scale tsunami disasters created by earthquakes, such as Nankai Trough Mega Earthquake, region building for tsunami disaster prevention through multiple defenses that combine structural and non-structural measures against the biggest tsunami is being promoted through support extended to local governments for matters such as establishing tsunami inundation projections, designating warning areas, and drafting evacuation plans.

For the tsunami measures for coasts, structural measures are taken to develop coastal levees and so on necessary for resisting tsunami with relatively high frequency of occurrence, take earthquake and liquefaction measures, enable automatic/remote operation of floodgates, and develop coastal levees and seawalls with a tenacious structure that includes various structures, such as green coastal levees, in addition to non-structural measures taken to assist creation of tsunami and storm surges hazard maps and manage and operate floodgates and others effectively. In light of the fact that many operators of floodgates lost their lives during the Great East Japan Earthquake, the formulation of operating rules related to floodgates has been mandated. Additionally, a study was conducted for instilling operation and retreat rules into onsite operators, and the Management System Guidelines for Floodgates and Land Locks in Tsunami and Storm Surge Measures were revised and broadened in April 2016.

For tsunami measures for ports and harbors, in order to maintain the harbor functions when a large-scale tsunami occurs, development of breakwater with a tenacious structure, creation of plans for elimination of obstacles in sea routes (reservation of sea routes in case of emergency), and other disaster prevention and mitigation measures are promoted. In July 2016, sea routes to be secured in case of emergency were designated in the Seto Inland Sea in addition to the three major bays in Japan. Also, we created the Hamaguchi Award, for individuals and/or organization that, have made significant scientific or pragmatic contributions to the enhancement of coastal resilience against tsunami, storm surge and other coastal disasters, and have conducted activities to raise awareness related to tsunami disaster prevention.

Also, specified ports (86 ports) under the Act on Port Regulations have established Councils on Tsunami Measures for Ships to further improve tsunami measures for ships at each of the ports with the cooperation of relevant organizations.

With respect to tsunami measures applicable to rivers, the bulking up of river embankments, quakeproofing, and liquefaction measures are being advanced in areas at significant risk of flooding from a tsunami in order to prepare for the imminent arrival of a massive earthquake or tsunami.

With respect to tsunami measures applicable to roads, agreements have been concluded with local governments in tsunami-prone areas. To provide embankment as temporal evaluation locations, stairs and open spaces are developed for the evacuation purpose. Efforts to reinforce disaster prevention functions have also been made by developing a system of signs providing evacuation guidance and by providing user training to local residents.

Regarding tsunami measures for airports, at airports likely to experience tsunami disasters, tsunami evacuation plans that determine evacuation methods and other matters for airport users and others to protect human life has been drafted, and tsunami evacuation training and other matters will be carried out in accordance with these plans. In addition, a plan was formulated for rapid recovery of airport functions following a tsunami disaster and initiatives to establish a cooperative framework with relevant organizations based on the plan is being promoted.

For the tsunami measures of railways, the conditions of evacuation guidance when tsunamis occurred after the Great East Japan Earthquake are being inspected and fundamental thinking for evacuation (speedy evacuation is the most effective and important measure, etc.) for the largest scale tsunamis following something like Nankai Trough Mega Earthquake is being reflected in the response guidelines and case studies compiled for passenger railways to secure safety when tsunamis occur to promote initiatives by railway companies.

(ii) Providing disaster prevention information regarding tsunamis

To prevent and mitigate disasters caused by tsunamis, the Japan Meteorological Agency (JMA) monitors seismic activities across the nation around the clock in order to make prompt and appropriate issuance for tsunami warnings/advisories and information. Based on the lessons learned from the tsunami disaster caused by the 2011 Great East Japan Earthquake, JMA started new tsunami warning system operation in March 2013, in which, for example, the word of "huge" for Major Tsunami Warnings was introduced as an expression of estimated tsunami height in the case of large earthquakes with magnitude 8 or more to emphasize that it is an emergency situation.

As of the end of March 2017, JMA monitors tsunamis with 191 Ocean-bottom tsunami meters, 18 GPS wave gauges, and 174 coastal tsunami gauges for issuance of tsunami information and update of tsunami warnings/advisories.

To facilitate tsunami measures for vessels, the Japan Coast Guard creates and publishes 78 tsunami information maps, as of the end of March 2017, depicting the behavior of a maximum level tsunami caused by the Nankai Trough Megathrust Earthquake and the tsunami caused by a Tokyo Inland Earthquake.

(iii) Tsunami evacuation measures

Given concerns over tsunami damage occurring in the wake of Nankai Trough Mega Earthquake or any other massive earthquake that is expected to arrive sometime in the future, technical guidelines summarizing ways of properly allocating evacuation facilities based on the use of basic urban planning data were formulated and publicly disclosed in June 2013.

In ports, we are promoting to establish a tsunami evacuation plan and construct tsunami evacuation facilities by local governments or manager of port. Also, the Private Urban Organization is assisting private enterprises develop distribution facilities that can be used for evacuation from tsunamis and other disasters. On August 30, 2016, our support was used to improve a distribution facility with an evacuation function in Yokkaichi Port—the first such instance in the country—creating expectations for a higher evacuation function of the port.

(iv) Development of parks and greenery that effectively function to reduce tsunami damage

Taking the lessons learned from the Great East Japan Earthquake, "The Technical Guidelines for Development of Urban Parks Towards Reconstruction from the Great East Japan Earthquake" was put together in March 2012 for utilization by local government in evaluating town building for reconstruction in which parks and greenery is considered to have four functions, that of multi-layered defense; evacuation path and evacuation space; assisting restoration and reconstruction; and disaster prevention education, so the concept of planning and designing parks and greenery to realize disaster mitigation effects is presented.

(v) Tsunami measures for government facilities

Government facilities act as the central facility for disaster emergency measure activities as well as temporary evacuation space and is something that contributes to the rescue of human lives, therefore securing necessary functions when tsunamis and other disasters occur is important.

In February 2013, the combination of structural and non-structural measures for tsunami measures indicated by the "Basics of Ensuring the Function of Government Facilities in Preparation for Tsunamis, etc." prepared by the Council for Social Infrastructure will be used in coordination with the organizations that operate and maintain government facilities to promote integrated and effective tsunami measures.

(6) Earthquake Measures

(i) Improving the earthquake resistance and safety of housing and architecture

Based on the Act on Promotion of Seismic Retrofitting of Buildings to achieve goals of making at least 95 percent of housing and architecture used by many people earthquake-resistant by 2020 and to generally resolve housing with inadequate earthquake resistance by 2025, the reporting of earthquake-resistance diagnosis results for large-scale architectural structures and others used by an unspecified number of people has been mandatory, and the creation of display requirements for the earthquake-resistance has been implemented among other measures in its aim to promote earthquake-resistance.

Regarding the earthquake proofing of housing and buildings, Social Capital Development Integrated Grant and other

measures are implemented for support but from FY2013, for architectural structures requiring mandatory seismic diagnosis, intensive and emergency assistance is being implemented in addition to usual subsidies.

(ii) Promoting the earthquake resistance of housing land

In order to prevent damage caused to existing residential areas by landslides and ground liquefaction in the wake of a large earthquake, we are providing support for the conducting of change-prediction surveys and prevention measures carried out by local governments.

(iii) Implementing danger assessments for housing land in disaster-stricken areas

To prevent secondary disasters and ensure the safety of residents, frameworks are being developed in cooperation with the Disaster Stricken Housing Land Danger Assessment Liaison Council consisting of prefectures and designated cities to evaluate the degree of danger of housing land swiftly and accurately after disaster strikes.

(iv) Development to improve densely built-up areas

Development activity to rapidly improve densely built-up areas that are problematic in terms of disaster prevention and the residential environment is a pressing matter to be generally resolved by ensuring a minimum level of safety for densely builtup areas that are highly vulnerable in the event of an earthquake (4,450 hectares) by FY2020 (densely built-up areas that are highly vulnerable in the event of an earthquake as of the end of FY2016: 4,039 hectares).

To realize this, fireproofing architectural structures along trunk roads to cut off fire paths and serve as evacuation paths in



combination to form a skeletal disaster prevention axis (disaster prevention axis) and the development of disaster prevention parks to serve as evacuation areas, disaster prevention block improvement projects, and integrated housing and urban development projects will be used to eliminate decrepit architecture and joint rebuilding of fireproof architecture, expansion of narrow roads to improve evacuation and firefighting efforts.

(v) Securing open space

To improve disaster prevention functions and strive for safer and more comfortable town buildings, the development of disaster prevention parks is being promoted to serve as the center of restoration and reconstruction when earthquake disasters occur, center of disaster prevention as a relay hub for supplies, and as an evacuation area to protect the lives of evacuees form urban fires. A project for developing disaster-prevention parks and urban areas is being carried out to develop and upgrade disaster-prevention parks and urban areas in an integrated manner.

(vi) Promoting construction and improvement of government buildings as disaster prevention centers, etc.

It must be possible to secure the functions of government buildings as centers for disaster emergency response activities and to ensure the safety of people's lives. Accordingly, government buildings that do not meet the required seismic performance are being renovated for earthquake resistance, with the goal of making at least 95% of government buildings satisfy quake-resistance standards by 2020. (vii) Improving the earthquake resistance of public works facilities

For river works, earthquake resistance inspections are carried out and necessary measures are implemented so that levees, floodgates, and other river structures remain functional even under what is referred to as level 2 seismic movement.

For coastal works, earthquake resistance measures are promoted taking into account facility functions, degrees of importance of areas behind levees and other factors to prevent large-scale submergence of zero-meter areas due to damage to levees caused by earthquakes and to prevent the functions of levees and other protective facilities from being impaired before arrival of tsunamis when earthquakes such as Nankai Trough Mega Earthquake occurs.

For road works, to ensure smooth emergency and rescue activities, transport emergency supplies, and deploy emergency transport essential to recovery efforts when earthquake disasters occur, seismic strengthening of bridges and undergrounding of cables are implemented to important roads, such as emergency transport roads.

For port and harbor works, we are endeavoring to enhance the quake and tsunami resistance of port facilities and fortify industrial ports and harbors to encourage the formation of coastal disaster prevention bases that can serve as base for the transport of emergency supplies and deployment of support teams during a disaster, as we prepare for Nankai Trough Mega Earthquake, a Tokyo Inland Earthquake, or any other large-scale earthquake.

For airport works, in addition to serving as the base of emergency transport when earthquakes and other disasters occur, seismic strengthening of government facilities to ensure necessary control functions and basic facilities that are absolutely essential is being implemented for airports considered important for maintaining air transport as well as the aviation network and ensuring the continuity of hinterland economic activity.

For railway works, in preparation for Nankai Trough Mega Earthquake and Tokyo Inland Earthquake, earthquake measures for major stations, elevated bridges, and other railway facilities are being promoted. Also, the fortification of the Honshu-Shikoku Bridge's (Hon-Shi Bisan Line) earthquake resistance will be steadily implemented to avoid and reduce damage due to Nankai Trough Mega Earthquake and other events and secure the railway network that connects Honshu and Shikoku.

For sewage works, to ensure the functions required of sewers during earthquakes, disaster prevention, such as strengthening the earthquake and tsunami resistance of water pipeline infrastructure and water treatment facilities that connect disaster prevention bases with treatment plants and disaster mitigation that aims to minimize damage in anticipation of disasters striking are being combined for the promotion of integrated earthquake measures.

(viii) Countermeasures against sediment-related disasters to large-scale earthquakes

In preparation for large-scale earthquakes such as Nankai Trough Mega Earthquake, implementation of effective sediment-related disaster countermeasures with combination of structural and non-structural measures are being promoted for the areas at risk of sediment-related disasters where important facilities and important transportation networks will be damaged and communities will be isolated by the landslides.

In the wake of a major earthquake, it will be important for us to collaborate with relevant organizations and entities, promptly ascertain disaster conditions, and properly carry out emergency measures. For this purpose, we are reinforcing ties to relevant organizations, carrying out practical training, and otherwise promoting the development of a crisis-management system.

(ix) Japan Meteorological Agency initiatives

To prevent and mitigate disasters caused by earthquakes, the Japan Meteorological Agency (JMA) monitors seismic activities in and around Japan, as well as crustal deformation in the Areas under Intensified Measures against Earthquake Disaster (Tokai Region), around the clock to provide Earthquake Early Warnings and other earthquake information as promptly and accurately as possible.

With respect to Earthquake Early Warnings, in December 2016, JMA put into place new technique to estimate the epicenters of earthquakes more precisely, when multiple earthquakes occur at the same time. JMA also prepares for introducing techniques to estimate seismic intensity correctly, even for a large earthquake in which strong tremors covers an extremely wide area.

With regard to long-period ground motion, information on observation of long-period ground motion is being issued on a trial basis from March 2013 to provide useful information that will contribute to the initial response immediately after

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the earthquake, such as the early detection of human and fixture damage. In addition, a report summarizing issues such as how to provide information on forecasts of long-period ground motion was released in March 2017. Going forward, preparations will be made to provide new earthquake early warnings based on this report.

(x) Japan Coast Guard initiatives

To elucidate the physical mechanism of huge earthquakes, observations of seafloor crustal movements are conducted on the landward slope of the major trenches along the Pacific side of Japan such as the Japan Trench and Nankai Trough where the large earthquakes have repeatedly occurred. To monitor crustal movements GNSS observations are also conducted in coastal areas and the Izu Islands.

In May 2016, the distribution of the strength and weakness of interplate coupling in the presumed source region of the Nankai Trough Megathrust Earthquake was clarified for the first time, based on survey data of seafloor crustal movements over the past 10 years in the area of the Nankai Trough, and published as a research paper.

(xi) Geospatial Information Authority of Japan initiatives

a. Observing crustal movements and strengthening monitoring frameworks

Across the nation and earthquake disaster prevention measure regions, the monitoring of crustal movements is boosted by continuous GNSS observations at about 1,300 GNSS-based control stations (GEONET), GNSS surveying, and leveling.

Also, monitoring of ground surface deformation crustal movements started using the interferometric SAR of the Advanced Land Observing Satellite "DAICHI-2."

b. Development of basic disaster prevention information

We are developing and updating location information of active faults as well as basic disaster prevention information related to the natural conditions of the land. This work is being conducted in the regions with the main active faults and in the regions where population and social infrastructure are concentrated.

c. Research on natural disasters resulting from earthquakes

From the results of geodetic observations, such as GNSS, SAR interferometry and geodetic leveling, the mechanism of earthquake occurrence is being elucidated and research is being conducted to improve observations and analysis. We are engaging in research and development work and trial operations as concerns the rapid provision of information during disasters through analytical processes that combine basic geospatial information corresponding to Japanese territory and earthquake intensity. Additionally, for exchanging information on surveys, observations and research outcomes regarding earthquake prediction between relevant government organizations and universities, as well as to conduct academic deliberations based on this, the Coordinating Committee for Earthquake Prediction is operated. Moreover and for research on crustal movements, the Coastal Movements Data Center is being operated in order to gather, archive, and provide tidal records observed by relevant government organizations.

(xii) Measures for stranded commuters

If a major earthquake were to strike a major metropolitan area, it is expected that urban functions would become paralyzed and that there would be more stranded commuters than there were in the wake of the Great East Japan Earthquake. Thus, in order to ensure the safety of people in areas where there is a concentration of people and urban functions, a system based on plans for promoting urban regeneration and ensuring safety was established in 2012. In areas subject to urban regeneration and emergency development measures (fifty-nine areas nationwide as of the end of March 2017), efforts are being undertaken to improve urban disaster preparedness through public-private partnerships by way of the production of plans for promoting urban regeneration and ensuring safety, the conclusion of agreements concerning facilities for promoting urban regeneration and ensuring safety, and the easing of various regulatory constraints. Comprehensive support for the production of plans for promoting urban regeneration and ensuring safety and for both structural and non-structural elements based on such plans is being provided through projects for ensuring and promoting urban safety for which areas around key stations are also regarded as areas subject to aid. In addition, in order to secure beforehand the capacity to handle stranded commuters as an urban function, we are supporting the development of disaster prevention bases through a program for urgent promotion of reinforcement of disaster bases, with areas around major stations as those subject to a subsidy.

(xiii) Ensuring operational-continuity functions in the event of a disaster

If the supply of energy during a disaster is suspended in areas where urban functions are concentrated, there is a risk that economic activities will become paralyzed and disaster measures will be impeded, thereby causing a huge socioeconomic impact on this country.

In order to address these vulnerabilities in our cities, we are using a project for the urgent promotion of the development of operational-continuity zones in case of disaster, and are accordingly promoting the development of area-wide energy networks to ensure operational continuity during disasters.

(xiv) Safety and security measures for the underground malls

Underground malls serve as important public spaces within the city, but there are concerns that evacuees will be disordered when a large-scale earthquake occurs along with the fact that facilities are aging, therefore, a guideline was created on safe evacuation measures for underground malls to promote disaster prevention measures for the safe evacuation of users and others.

(7) Snow Damage Measures

(i) Securing winter road transportation (snow and cold weather works)

In accordance with the Act on Special Measures concerning Maintenance of Road Traffic in Specified Snow Coverage and Cold Districts, to support safe and comfortable living, strengthen exchanges and cooperation between regions, the Five Year Plan to Secure Road Transport in Special Snow and Low Temperature Regions was established in November 2013. The Cabinet made this decision, along with promoting projects for removing snow, preventing snow, snow and frost damage on roads (snow and winter works). In addition, the Hokuriku Snow Damage Measures Technology Center was established in July 2012 and is promoting research and development, human resources development, assistance to local governments, as well as providing information and raising public awareness related to snow damage measures across the country. We are reinforcing clearing snow systems, such as by establishing clearing snow priority zones, removing snow rapidly by imposing road closures, and promoting collaborations among road administrators and with relevant organizations. In the event that vehicles become stuck in traffic, the Basic Act on Disaster Control Measures (amended on November 2014) will be applied and measures to move the vehicles that block the road will be promptly taken to quickly restore the flow of traffic.

(ii) Avalanche disaster measures in heavy snowfall regions

In Japan, 21,000 areas are prone to snow avalanche and the development of avalanche prevention facilities is being promoted to protect human lives from avalanche disasters in settlements.

(8) Sophistication of Disaster Prevention Information

(i) Aggregation of disaster prevention information

The "MLIT Disaster Prevent Information Center^{Note}" enables citizens to easily obtain and utilize disaster prevention information by aggregating and providing information available such as rainfall as well as provide a comprehensive array of information on disaster responses and disaster prevention from a single source.

(ii) Development of hazard maps

In order to enable residents to take appropriate evacuation actions when a disaster strikes, we are promoting the production of hazard maps by municipalities and their dissemination and use by residents, as well as opening an Internet portal site that allows users to browse hazard maps developed by municipalities across the country^{Note}.



(iii) Improvement of disaster prevention weather information

In order to take precautionary measures against many kinds of weather disasters, the Japan Meteorological Agency issues information such as Emergency Warnings, Warnings, Advisories, and Bulletins related to weather conditions. The Agency also provides detailed real-time risk maps indicating the risk of landslides. With the help of these data, Landslide Alert Information and flood forecasts for designated rivers are jointly issued by the MLIT, prefectural governments and the Agency.

In July 2015, the Meteorological Subcommittee of the Council of Transport Policy received recommendations to proactively announce the possibility that a large-impact weather event, however unlikely, may occur and to convey the level of risk and the level of imminence involved in an easy-to-understand manner. Initiatives are accordingly being advanced with a view to the implementation of these recommendations.

(9) Strengthening the Crisis Management System

Initial response systems have been established to respond to natural disasters, including forecasting natural phenomena that could lead to a disaster, rapid collecting of information, conducting inspections and emergency rehabilitation of facilities during disasters, rescue operations at sea, and supporting affected local governments. In order to increase disaster response capabilities, further expedite and enhance disaster responses, such as strengthening the system for collecting and sharing information during the initial response to a disaster by Integrated Disaster Information Mapping System (DiMAPS).

(i) Disaster response by TEC-FORCE (Technical Emergency Control Force)

In order to respond to the occurrence or likelihood of large-scale natural disasters, the TEC-FORCE was established in 2008 and is available for deployment to smoothly and rapidly implement technical support for the local government of the affected area to carry out various emergency disaster measures such as rapidly assessing the extent of the disaster, prevent expansion of damage, and rapid recovery of affected areas. In 2016, TEC-FORCE dispatched approximately 3,500 members, who rendered around 15,300 man-days of service to 96 municipalities and 11 prefectures that sustained damage as a result of numerous natural disasters, including the Kumamoto Earthquake in April, torrential rain with the seasonal rain front that fell on Western Japan from June to July (including the areas affected by the Kumamoto Earthquake), a series of tropical cyclones that hit Hokkaido and the Tohoku region, and earthquake with an epicenter in central Tottori prefecture that occurred in October. Furthermore, TEC-FORCE gave technical advice to police, fire department, and the SDF to ensure the safety of life-saving and rescue activities in place where the risk of secondary disaster exists. TEC-FORCE responded with total efforts to minimize the damage caused by disasters

(ii) Initial response in the Kumamoto Earthquake

In response to the earthquake (M6.5, maximum seismic intensity 7) that struck in Kumamoto at 21:26 on April 14, 2016, MLIT immediately established an emergency system and held the first meeting of the headquarters for major disaster countermeasures. In the affected area, immediately after the earthquake struck, we inspected rivers, dams, erosion and sediment control facilities, roads, and other facilities. At the same time, we dispatched liaisons from the Kyushu Regional Development Bureau to the affected local governments to coordinate the dispatch of TEC-FORCE and other personnel and ascertain the status of damage at the site and assistance needs. Furthermore, the following morning, we surveyed of the general damage situation from the air using helicopters, and TEC-FORCE members started surveying the status of damage caused to facilities under the jurisdiction of local governments. Also, efforts were made to prevent secondary disasters, including emergency inspections of sites at risk of suffering sediment-related disasters, and obstacles were eliminated from roads. Regional Development Bureaus, from Hokkaido to Okinawa, dispatched TEC-FORCE, for the first time since it was created in 2008. On April 22, 2016, a maximum of 440 members and 83 pieces of machinery were dispatched in a single day and contributed to the subsequent quick disaster recovery.

(iii) Strengthening business continuity systems

In order to implement disaster prevention services immediately in the case of Tokyo Inland Earthquake, the Ministry of Land, Infrastructure, Transport and Tourism Operational Continuity Plan (Third Edition) was compiled on April 1, 2014. Furthermore, the operational continuity framework is being strengthened through such measures as annual emergency staff assembly drills based on the scenario of a Tokyo Inland Earthquake. Also, in August 2016, we established a TEC-FORCE Action Plan for Nankai Trough Mega Earthquake, and took other steps to strengthen the support system for local governments, in order to quickly and smoothly dispatch TEC-FORCE members and machinery.

(iv) Deploying information and telecommunication systems and machinery in preparation for disasters

To secure information communication systems in the case of a disaster, the MLIT headquarters, Regional Development Bureau, and related organizations are connected with a highly reliable information communication network consisting of microwave networks and optical fibers, in addition to satellite communication channels to strengthen the system for gathering information from the disaster site, are used to create a high mobility system. Also, in order to respond disasters rapidly, the development of helicopters, satellite communication vehicles, pump vehicles, lighting vehicles, and other disaster response machinery are being developed at Regional Development Bureaus across the nation, so that in the event of a large-scale disaster, the framework will be able to execute rapid development.

(v) Implementing practical and wide-area disaster prevention drills

In comprehensive flood fighting practices at Regional Development Bureaus, we conducted information-transmission drills, life-saving and rescue drills, and flood-fighting drills by flood fighting teams with the participation of fire departments, the Self Defense Forces, and other relevant organizations in an effort to strengthen the ability to respond to a flood disaster. We also conducted operational drills of the emergency disaster measures headquarters based on the scenario of Nankai Trough Mega earthquake and conducted road obstacle elimination drills at Regional Development Bureaus based on the scenarios of a Tokyo Inland Earthquake and Nankai Trough Mega Earthquake, in an effort to strengthen the ability to respond to a large-scale earthquake. Furthermore, in comprehensive drill for large-scale tsunami disaster, we conducted evacuation drills and emergency drainage drills by TEC-FORCE based on the scenario of a tsunami caused by Nankai Trough Mega Earthquake in an effort to strengthen the ability to respond to a tsunami caused by Nankai Trough Mega Earthquake in an effort to strengthen the ability to respond to a tsunami caused by Nankai Trough Mega Earthquake in an effort to strengthen the ability to respond to a tsunami. Based on spirit of the fact that a plenary session of the United Nations General Assembly designated Japan's Tsunami Preparedness Day (November 5) as World Tsunami Awareness Day in December 2015, we obtained the participation of international students and other foreigners in these drills, as well as visits by embassy, in order to disseminate Japan's disaster prevention knowledge and techniques to the world.

(vi) Disaster responses by the Japan Coast Guard

The Japan Coast Guard maintains patrol vessels and aircraft around the clock to allow for rapid responses and rescue operations in the event of a disaster. In FY2016, during the Kumamoto Earthquake in April, the Coast Guard conducted

coastal damage assessment surveys using patrol vessels and aircraft immediately after the earthquake struck. It also conducted emergency transport for injured people and hospitalized patients, among others, and provided resident assistance such as supplying water and food.

(10) Management of Existing Stock with ICT (Information and Communications Technology)

An optical fiber network is being used to enable the management of public facilities and the sophistication of crisis management by taking advantage of ICT (Information and Communications Technology). Specifically, measures are being promoted for safe road use, such as sophisticated management of optical fibers for continuous monitoring of the road slope and providing disaster information through the Internet. Also, in addition to remote control of floodgates and the remote monitoring of river flow conditions and volcanic regions, sewage treatment plants and pump stations are connected with optical fibers for remote monitoring and control as well to make management more sophisticated.



In addition, to speed up and consolidate the control of

floodgates and other facilities, the development of tsunami and storm surge disaster prevention stations to prevent tsunami and storm surge damages is being supported through disaster prevention and safety grants and other means.

(11) Disaster Recovery of Public Works Facilities

Damage caused to public civil-engineering facilities under the jurisdiction of the MLIT (including rivers, sediment control structures, roads, coastal areas, sewage systems, parks, and ports) in 2016 is reported to have totaled approximately 587.8 billion yen (at 15,400 sites) due to the frequent occurrence of disasters nationwide, including the Kumamoto Earthquake in April, torrential rain with the seasonal rain front in June, record rainfall in Hokkaido and Iwate due to the effect of Typhoon Mindulle and Lionrock in August, Typhoon Malakas in September, and the Central Tottori Earthquake in October.

In response to the damage caused by these natural disasters, technical advice, including recovery policies and construction methods, as well as other forms of support for affected local governments were provided, such as dispatching TEC-FORCE (Technical Emergency Control Force) to local areas immediately after each area was hit by a disaster and dispatching Senior Deputy Directors for Disaster Assessment from MLIT, in order to support the formulation of disaster recovery and rehabilitation plans.

Previously, in order to help local governments dealing with especially heavy damage recover quickly, we would consult with the relevant organizations for each disaster individually about improving the efficiency of various disaster assessments (such as raising the maximum amount for paper-based assessments, raising the limit on money immediately available for disaster recovery, and simplification of design documentation) and about implementing those measures in order to accelerate disaster recovery.

However, we have now established the Assessment Policy for Public Works Facilities Recovery Construction Projects in Large-scale Disasters, and put it into operation in 2017, to prepare regions to achieve quicker recovery and reconstruction following the large-scale disasters that are anticipated to occur. Specifically, the policy, which is the first institution of such a system in 60 years since the establishment of the Assessment Policy for Public Works Facilities Recovery Construction Projects in 1957, predetermines how to improve the efficiency of disaster assessments, which are to be started immediately after the government states that a serious disaster is anticipated, and significantly shortens the time until completion of disaster assessments. The administrative procedures up to the point at which a project is adopted have been significantly reduced through the optimization (simplification) of the assessment process. For example, the maximum amount of money a project that can perform a paper-based assessment, carried out in a conference room just with documents, can be allotted has been increased from less than JPY three million in ordinary cases to less than JPY hun-

dred million, depending on the status of damage of the local government, and design documents have been simplified to shorten the time for surveying and designing by making use of aerial photographs and standard cross-sectional drawings.

Furthermore, emergency funds for disaster countermeasures were allocated to 24 areas that were damaged by natural disasters, including torrential rains and strong winds associated with Severe Tropical Storm Chanthu, Typhoon Lionrock, and Tropical Storm Kompasu, and other such weather events in 2016, in order to carry out disaster prevention measures to ensure the safety and security of residents.

(12) Promoting non-structural Measures Including Information and Public Relations for Safety and Comfort

To ensure safety and comfort, non-structural measures were promoted in addition to structural measures for natural disasters and the status of progress was subject to annual inspections in accordance with the "MLIT General Framework of Non-structural Measures Promotion for Safety and Comfort", however, the Great East Japan Earthquake brought to light the need for congruent and integrated evaluations of structural and non-structural aspects and currently deliberations are in progress following the re-evaluation of the Social Capital Improvement Priority Plan/MLIT Disaster Prevention Operation Plan.

3 Secure Transportation Systems Resistant to Disasters

(1) Ensuring Redundancy and Substitutability

Rails, ports, airports, and other facilities are being made disaster resistant and an emergency transport framework for rescue, restoration activities, business continuity is being established to ensure redundancy and substitutability efforts are being made to secure the safety of users.

Considering that road networks are essential to overcome weakness of regions that are likely to be isolated once a disaster occurs, we will continually develop them in a systematical manner.

(2) Road Disaster Prevention Measures

To support the emergency lifesaving and restoration assistance activities in the event of large-scale disasters, development of missing links for securing substitutability, disaster measures (measures for slopes, embankments, etc.), earthquake disaster measures (seismic reinforcement, etc.), and snow/cold region measures (development of anti-snow facilities) are being promoted. Additionally, supplementing traffic facilities with disaster prevention functions (turning Michi-no-Eki, service and parking areas into disaster prevention bases, as well as developing emergency lines of communication and fire escapes) were promoted. Disaster alliances with private sector businesses to implement swift road openings are concluded, and a council for road administrators to create a framework that keeps roads open was established. In addition, based on the Disaster Countermeasure Basic Act amended in November 2014, development of the system and equipment that allow road administrators to smoothly move vehicles for swift removal of road obstacles is being promoted.

Also, big data such as ETC 2.0 probe information and private probe information are used effectively to grasp early damage situations, thus enhancing initial responses.

Meanwhile, for regions that sustained devastating damage from the tsunami caused by the Great East Japan Earthquake, road development is being carried out as part of urban area development prioritized in the recovery plan and the development of access roads to expressway interchanges is being promoted. Additionally, as one measure to reduce tsunami damage, sea level indicator sheets are being added to road signposts to promote the provision of sea level information to road users.

(3) Accelerating Removal of Utility Poles

We are committed to removing utility poles to prevent them from falling down and blocking the traffic of emergency vehicles in the event of earthquake. As of April 2016, we have implemented measures to prohibit the installment of new utility poles on emergency transport roads and special measures for the property tax. Furthermore, in December 2016, the Act on Promotion of Utility Pole Removal was enacted and came into force.

(4) Disaster Prevention Measures for Various Transportation Modes

For railways, subsidies are provided to partially cover the costs of improvement projects such as disaster prevention projects carried out by passenger rail companies including rockfall and avalanche measures as well as coastal protection and improvement projects carried out by Japan Railway Construction, Transport and Technology Agency (Incorporated Administrative Agency) to maintain the function of the Seikan Tunnel such as the improvement of substations and train control facilities.

For ports, in order to secure port functions and maintain regional economic activities during disasters as well as to achieve early restoration of facilities affected by disasters, a Port BCP has been created, and the Wide Area Port Disaster Councils and others have been working to promote the establishment of a cooperative framework for the national government, port authority, port users, and others.

For airports, initiatives have been taken based on the Evacuation and Rapid Recovery Plans in the Event of an Earthquake or Tsunami Striking the Given Airport (draft). This plan studies disaster countermeasures that take into account disaster prevention-related plans for the area in which an airport is located, as well as links to other airports.

(5) Building a Logistics System Resistant to Disaster

The Great East Japan Earthquake and Kumamoto Earthquake highlighted the importance of utilizing the expertise and facilities of private sector logistics companies from the perspective of ensuring the smooth transport of relief supplies. That is why we are promoting the establishment of cooperative frameworks for coordination between the public and private sectors across the nation. This includes initiatives aimed at the establishment of a logistics system that is resistant to disasters through the coordination of central government, local government, and logistics companies, including promoting the use of private logistics facilities as bases for the distribution of relief goods (1,400 locations listed as of March 31, 2017) and encouraging the signing of cooperation agreements between distributor associations and local governments.

Column Support for the Recovery of Railways That Sustained Damage in the Kumamoto Earthquake and Tropical Cyclones of 2016

(1) Minami-Aso Railway

Minami-Aso Railway sustained damage to many of its facilities from the Kumamoto Earthquake that occurred in April 2016, including Saikakuyama Tunnel and the Daiichi Shirakawa Bridge, designated a recommended civil engineering heritage by the Japan Society of Civil Engineers.

In July 2016, the MLIT conducted surveys with a view to examining recovery methods for railway facilities that were damaged, and concluded in its report compiled in April 2017 that recovery of the facilities would take some five years from the design stage, at the longest, and would cost roughly 6.5 to 7 billion yen.

Based on this result, Minami-Aso Railway and the local government are presently putting their heads together to examine what types of support could be offered for the early recovery of the facilities.

(2) JR Hokkaido

The tropical cyclones that struck Hokkaido in August 2016 brought severe damage to JR Hokkaido's Nemuro Line and Sekisho Line. Among the bridges that were washed away were the Shimoshintokugawa Bridge, which was constructed in 1907 and served for more than 100 years, and the Shimizugawa Bridge.

In November 2016, the MLIT announced its intention to provide support through a subsidy for disaster recovery works, in consideration of JR Hokkaido's financial condition and the aging of its facilities.

The Nemuro Line recommenced operations by the end of December 2016, with the exclusion of the segment between Higashishikagoe Station and Shintoku Station.



Source) MLIT, "Results of the survey on the disaster recovery of Minami-Aso Railway" (announced April 16)



Section 3 Ensuring the Safety of Architecture

(1) Securing Trust for the Production and Supply System for Housing and Buildings

After the amended Building Standards Law went into effect in 2007, the building confirmation process became backlogged, leading to a large decrease in the number of building confirmations; therefore, in light of this, the operation of building confirmation procedures was improved on two occasions in 2010 and 2011 to speed up the building confirmation review and simplify the application documentation among other improvements.

The Minister of Land, Infrastructure, Transport and Tourism inquired the Panel on Infrastructure Development about the ideal for future standards policies in August 2012, and review was proceeded on the items that were requested most for review by priority at the Building Standards Sub commission established at the Building Subcommittee of the same Panel in September of the same year. Of this, regarding the scheme for promoting the seismic resistance of housing and buildings, the first findings were compiled in February 2013 and based on this the revised Law for Partial Amendments to the Act for Promotion of Renovation for Earthquake-Resistant Structures of Buildings was enacted in November 2013.

Also, regarding the ideal standards regarding wood structures and ideal efficient and practically implementable confirmation inspection regulations the second report was compiled in February 2013. Accordingly, the Act to Partially Amend the Building Standards Act came into force in June 2015.

As measures pertaining to architects, initiatives to optimize operations to design and construction administration in accordance with the Act to Partially Amend the Kenchikushi Law, which came into force in June of the same year, have been undertaken.

Additionally, when defects are discovered in new houses the defect warranty will be reliably fulfilled so that consumers can purchase housing with peace of mind and in accordance with the Act on Assurance of Performance of Specified Housing Defect Warranty (Housing Defect Warranty Performance Act), requiring construction companies and real estate transaction agents to secure funds (house defect warranty security deposit or a valid housing defect warranty liability insurance contract), the insurance underwriting system of housing defect warranty liability insurance entities will continue to be improved and initiatives to raise awareness among consumers and other measures to publicize the system are being carried out.

In FY2016, at the Research Committee for Newly Developing a Housing Defect Warranty Performance System, backed by key personnel (a fresh opportunity to engage in ongoing studies for future reviews of this system), issues to date have been subject to follow-up action and opinions have been exchanged for future reviews.

(2) Ensuring the Safety of Elevators and Play Facilities

While surveys to elucidate the causes of accidents involving elevators, escalators, and play facilities and the training of staff members at regional development bureaus in terms of safety and accident measures continue to be carried out, initiatives for ensuring safety have been advanced by partially revising the system of periodic inspections under the Building Standards Act and relevant ordinances, as well as making active use of guidelines for the appropriate maintenance and management of elevators and escalators and spreading awareness of the need to install open-door protection devices in existing elevators.

Section 4 Strengthening Safety Measures in the Transport Sector

Ensuring safety is a central and fundamental issue in the transport sector and once an accident occurs, not only can it cause significant damage, but also has an enormous impact on society so various measures are being undertaken to prevent accidents from occurring.

Building and Improving the Safety Management System in Public Transportation

In October 2006, Transport Safety Management System was introduced in the wake of frequently occurring troubles and accidents, which was seen to be caused by human error in each transportation mode. This is to build and strengthen the safety management system, which will be united with the organization, including the fields, which are under the proactive involvement of the top management, in the transportation business, coupled with election system of safety managers and creation of safety management regulations. The country has to check the system through advice and evaluation, which is intended to continuously improve the safety management system using the PDCA cycle.

In FY2016, 932 parties (59 railway par-



ties, 640 automobile parties, 223 shipping parties, and 10 airline parties) were subject to a transport safety management evaluation.

October 2016 was designated as the "10 Years of Strengthening Transport Safety Management Month" to mark the 10 years that had passed since the system was introduced. We carried out initiatives to further spread and instill the system, including holding discussions about how the system should be in the future, such as the "2016 Symposium on Safety in the Transport Business: Review of the 10 Years since the Introduction of the Transport Safety Management System and Directions for the Next 10 Years," and the "Transport Safety Management 10th Anniversary Seminar." Furthermore, the system's effects and issues were reviewed and discussions were started in the Transport Council's Task Force on Ensuring Transport Safety, in order to study the evolution of the system in the future.

In FY2016, a transportation safety management seminar hosted for transportation operators by the national government in order to deepen understanding of this system was attended by 3,789 persons. In FY2015, 7,043 persons attended seminars as part of an accredited seminar program established in July 2013 for the purpose of further disseminating and shedding light on this system for small to medium-sized business operators (a program through which transportation safety management seminars organized by private-sector organizations are accredited by the MLIT).



2 Railway Transportation Safety Measures

Driving accident numbers for railway traffic show a declining trend over the long term^{Note} due to factors such as the promotion of driving assistance facilities including automatic train stop systems (ATS) and rail crossing measures, but since many people may be killed or injured if a train collides or derails, the promotion of further safety measures must continue.

(1) Improving Railway Safety

In the light of past accidents, measures, like creation of necessary standards, will be implemented, and direction will be given to railway operators to ensure implementation, as well as, confirm the status of implementation for safety audits, and give feedback on audit results for further imple-



mentation of measures to improve the safety of railways.

Chapter 7 Building a Safe and Comfortable Society

Note In 2005, JR Fukuchiyama line derailment accident occurred, after which, for years the number of causalities and human losses have increased due to operation accident.

(i) Measures that were triggered by the JR West Fukuchiyama line derailing accident

In July 2006, the "Ministerial ordinance to define the technical standard related to the Railways" was revised to make the installation of Automatic Train Stop (ATS) devices, with functions to limit speed on the curves, driver anomaly detection, and train stopping devices; and driving condition recording devices mandatory. Improvements for which a time limit was stipulated by the ordinance were completed by the end of June 2016.

(ii) Measures taken in the wake of the derailment of a Japan Freight Railway on the Hakodate Line

JR Hokkaido has been instructed to implement the Measures to be taken by JR Hokkaido as business improvement order and supervision order, in January 2014, and carryout supervision and guidance through periodic reports, permanent audit systems (for five years) to reliably execute the same.

In accordance with the results of an investigation pertaining to reviews of the approach taken for security audits conducted in FY2014, railway operators are subject to modulated, more effective security audits, including planned security audits and provisional security audits conducted whenever similar types of problems occur.

(2) Promotion of Railway Crossing Measures

Unopened grade crossings^{Note} primarily in urban areas are a factor behind crossing accidents and chronic traffic congestion and measures to promptly address this problem are needed. For this reason, the road administrators and railway operators work together to prevent railroad crossing accidents, by developing crossing facilities, such as flyovers, structure improvement, and pedestrian bridges, and through the maintenance of railroad crossing safety equipment, such as railway crossing barriers, based on the Improving the Railway Crossings Act and the 10th traffic basic traffic safety plan.

In FY2016, 587 problematic crossings were designated, greatly exceeding the usual number of designations, as the amended Act on the Promotion of Railway Crossings allowed the Minister of Land, Infrastructure, Transport and Tourism to make such designations even in the absence of an agreement between railway operators and road administrators as to the methods by which improvements will be carried out.

Also, road administrators and railway operators collaborated to identify 1,479 crossings in need of urgent consideration of countermeasures, based on objective data including crossing elements, progress of countermeasures, the conditions behind the occurrence of accidents, and other examples of objective data. These findings were produced and published as safe grade crossing passage records.

Moving forward, we will continually promote further improvements in any possible ways in addition to conventional countermeasures after consideration at the Regional Railroad Crossing Improvement Council in collaboration with local interested groups. These include conventional grade separation, structural improvements, flyovers for pedestrians, construction of railroad crossing safety equipment, colored pavement and other infrastructure-based and non-infrastructure-based measures.

(3) Promoting the Development of Platform Doors

To improve the safety of the visually impaired and other rail station users, the installation of platform doors to prevent falling from the platform is being promoted (installed at 665 stations as of the end of FY2015). In accordance with the Basic Policy on Promoting the Facilitation of Mobility (March 2011), Basic Plan on Transport Policy (February 2015), and Priority Plan for Social Infrastructure Development (September 2015), we have been implementing structural measures, such as by promoting the development of platform doors and tactile paving with boundary lines and the development of technologies for new types of platform doors to address the problem that arises when train doors do not line up properly with the platform, as well as non-structural measures, such as encouraging users to reach out to and help guide visually-impaired riders to where they are supposed to go.

In response to the fatal accident caused by a visually impaired person falling at Aoyama-itchome Station on the Tokyo Metro Ginza Line on August 15, 2016, we set up an investigative commission for improving the safety of station platforms on August 26, and studied comprehensive safety measures related to the prevention of falls, in terms of structural and non-structural measures. In the interim summary released in December 2016, it was decided that, as a structural measure, platform doors are to be installed by 2020 as a general rule at stations serving 100,000 people or more, and where construction conditions are met, such as fixed locations for train doors and adequate space on the platform. Where the development conditions are not met, we have studied ways to meet them, such as installing new types of platform doors and making fixed door locations by updating train cars. Where new types of platform doors are to be installed, we have decided to construct them or start construction within about five years. Regarding stations that serve fewer than 100,000 people, we have decided to carry out priority development at the same level as stations serving 100,000 people or more, if such development is deemed necessary after taking the station's condition into consideration. Through such initiatives, we will work to achieve the development goals of approximately 800 stations by FY2020, set out in the Basic Plan on Transport Policy, as far in advance as possible.

Also, in the interim summary, it was decided to construct tactile paving with boundary lines by FY2018 at stations that serve 10,000 people or more. In addition, the main non-structural measures indicated in the summary include station employees offering to guide visually impaired riders at stations without platform doors, enhancing the service provided by station employees, including calling out clearly to visually impaired riders, encouraging other riders to reach out to and help guide visually impaired riders, promoting understanding of the "barrier-free heart" mindset, and cooperating with the training of guide dogs in stations, among other measures.



3 Safety Measures for Maritime Traffic

In the sea areas surrounding Japan, around 2,200 vessels are involved in marine accidents every year. Once a marine accident occurs, not only are precious lives and property lost, but Japan's economic activities and marine environment may be adversely affected in a major way, requiring the promotion of further safety measures.

(1) Improving Ship Safety and Ensuring Ship Navigation Safety

(i) Improving ship safety

In order to ensure ship safety globally, the international regulations and standards have been developed at the International Maritime Organization (IMO), and MLIT has been participating actively in discussions at IMO.

At an IMO meeting held in November 2016, IMO has started reviewing standards related to fire safety on passenger ferries in light of situations that many fire accidents have occurred on passenger ferries in recent years. Japan is willing to contribute discussions in this matter by introducing Japan's efforts based on fire accidents in Japan.

Also, in January 2017, we developed domestic legislation in association with the revision of international standards, such as a mandatory Polar Code that takes into account the unique dangers of polar seas, and IGF Code for ships that use low-flash-point fuels such as liquid natural gas (LNG).

Port State Control (PSC)Note 1 has been implemented to ensure that foreign ships entering ports in Japan comply with

such international regulations and standards, and to eliminate substandard shipsNote 2.

As an initiative focused on ship safety measures in Japan, a manual including effective firefighting procedures, the features of firefighting equipment, and training methods to enhance preparations for ferry operators to engage in firefighting was compiled and publicly released in response to a fire on board a ferry off the coast of Tomakomai, Hokkaido, in July 2015. In FY2016, briefings were held for ferry operators nationwide and the manual was used to provide guidance to them.

As a safety measure for small craft, we revised the Ordinance for Enforcement of the Act on Ships' Officers and Boats' Operators, making the wearing of lifejackets mandatory for all passengers as a general rule from February 1, 2018, and formulating a guideline about safety requirements for smartphone apps to prevent ship accidents.

(ii) Ensuring ship navigation safety

In accordance with the Seaman and Small Craft Operator Act, which complies with the STCW Convention^{Note 3}, the qualifications for seafarers are defined, as are the qualifications and compliance matters for small craft operators, to ensure ship navigation safety from human factors. Also, in July 2016, we partially amended ordinances, expanding the items subject to compliance penalty points, and publicized the amendments in order to reduce the number of small boat accidents. In accordance with the Pilotage Act, qualifications for people who can perform pilotage are defined for the safety of vessel traffic. Based on the report of the Basic Policy commission established at the Council of Traffic Policy Maritime Subcommittee, to secure a stable supply of pilots who will be needed in the future, initiatives to facilitate the acquisition of licenses required for the provision of mutual assistance among neighboring small to medium-sized pilotage districts are being carried out.

Investigation and inquiry, in accordance with the Act on Marine Accident Inquiry, are conducted for a marine technician, a small craft operator, or a pilot who causes a marine accident intentionally or negligently in the course of duties and in 2016 there were 372 cases of determinations and a total of 477 marine technicians, small craft operators, or pilots were performed disciplinary actions of suspension of business operation (one to two months) or admonition to prevent the occurrence of marine accidents.

Since human factors such as inadequate vigilance and inappropriate maneuvering account for approximately 80% of ship accidents, in order to prevent accidents caused by such carelessness, the Japan Coast Guard, in cooperation with relevant ministries, agencies, and organizations, is making efforts to raise the safety awareness of boat operators, including by directly visiting ships to provide guidance and by holding marine accident prevention workshops.

Also, we provide information, such as "Maritime Information and Communication System (MICS)^{Note 4}," to the broader public in order to prevent marine accidents due to insufficient understanding of available information. In August 2016, we enhanced the function of "Marine Safety Information" by adding information to encourage alertness toward waterspouts.

Note 1 Supervising of foreign vessels by port state

Note 2 Vessels not conforming to standards of international convention

Note 3 The International Convention on Standards of Training, Certification and Watchkeeping for Seafarers, 1978. This international convention stipulates the training and certification of mariners for the purpose of improving the safety of human lives and assets at sea, and also promotes the protection of the marine environment.

Note 4 A service that provides information such as local weather and hydrographic conditions, including wind direction, wind speed, and wave heights, as observed at lighthouses and other stations nationwide, as well as the status of offshore construction, and live images from cameras giving a picture of sea conditions via the Internet and through distribution via email of emergency information released by the Japan Coast Guard



The Japan Coast Guard works to quickly and smoothly escort vessels to safe sea areas when a tsunami or other emergency disaster occurs. During non-emergency periods, it coordinates the Vessel Traffic Service Center in Tokyo Bay with port traffic controls offices and is building a system to carry out these operations in an integrated fashion in order to ease congestion and ensure the safe and efficient operations of vessels. In May 2016, legislation was enacted to partially amend such laws as the Maritime Traffic Safety Act, which creates systems to maintain maritime traffic functions when an emergency occurs.

In addition, to improve efficiency of safety and navigation of the ship in the narrow waterways, at Kurushima Strait, tidal information is provided on the Internet through entire region simulation.

With respect to nautical charts, we are endeavoring to upgrade electronic navigational charts, which have gained in importance thanks to the dissemination of the Electronic Chart Display and Information System (ECDIS). Moreover, the nautical charts in just English was published for the foreign seafarers as part of provision for prevention of the marine accident. Nautical charts for regional ports and fishing harbors affected by the Great East Japan Earthquake were revised by February 2017, following those for major ports, which were revised by FY2015.

Regarding the navigational warnings and notices to mariners, visual information that constitutes valid information displayed on a map is provided over the Internet.

For Aids to Navigation, development is performed effectively and efficiently in accordance with the vessel traffic envi-

ronment as well as needs and in FY2016, improvements and renovation was carried out in 286 locations.

The Marine Accident Analysis Center established under the National Maritime Research Institute (National Research and Development Corporation) conducts highly specialized analysis of accidents as well as rapid analysis and transmission of information when major marine accidents occur, and contributes to consider measures to prevent its recurrence.

Ensuring the safety of ship navigation in the Straits of Malacca and Singapore, highly important maritime transportation routes through which eighty percent of crude oil imported to Japan passes, is important. Cooperation for the financing of the Aids to Navigation Fund^{Note 1} is being provided under the cooperative mechanism^{Note 2} with the involvement of littoral states and users. In addition, Japan is providing technical cooperation through the dispatch of experts, by maritime stakeholders, in order to conduct hydrographic surveys on the straits, a move that was approved in July 2016 as a Japan-ASEAN Integration Fund (JAIF) project, by Japan and three littoral states (Indonesia, Malaysia, and Singapore). Japan will continue this cooperation for the safety of navigation and the protection of the environment in the straits through public-private partnerships, together with our good relationships with the littoral states.

(2) Promotion of Safety Measures for the Passengers

About 44% of cases reported about the dead or missing passengers are due to fall accidents into sea. In order to survive after the fall, first thing to do is to float, and then promptly request a rescue. For this, the Japanese Coast Guard is working to disseminate and enlighten self-rescue measures based on the three principles: wear a life jacket at all times, ensure appropriate contact means such as a portable telephone packed in a waterproof package, and effectively use the emergency call number "Dial 118." In addition, the passenger mortality due to fall in the sea from small boats (fishing boats or pleasure boats), is five times higher in the passengers who do not wear a life jacket, than those who do, therefore, life jackets contributes greatly in saving the passengers from the fall. The Japan Coast Guard is therefore, through various occasions, endeavoring to raise awareness of the need to wear a life jacket.

(3) Strengthening the Rescue System

In order to engage in prompt and precise rescue activities, the Japan Coast Guard operates the 1-1-8 emergency telephone hotline and endeavors to rapidly ascertain information on the occurrence of accidents, such as by receiving information on marine accidents at any time, day or night, through the Global Maritime Distress and Safety System (GMDSS). Also, along with improving the rescue technology and capabilities of those such as special rescue team, mobile rescue technicians, and divers, enhancements and fortifications of the medical control framework to ensure, from a medical perspective, the quality of emergency life-saving treatment that emergency response personnel perform as well as advancing the functionality of patrol vessels and aircraft is being carried out as part of efforts to enhance and fortify the rescue and emergency system. Also, the enhancement and fortification of coordination between ministries, agencies, local governments, and private rescue organizations is also being carried out.

4 Air Traffic Safety Measures

(1) Strengthening Aviation Safety Measures

(i) State Safety Program (SSP)

Since April 2014, the Civil Aviation Bureau has been implementing the State Safety Program (SSP), which sets forth targets for civil aviation safety and measures to be taken for their attainment, in accordance with Annex 19 of the Convention on International Civil Aviation. In FY2015, the Civil Aviation Bureau, formulated a "Medium-term orientation for the administration of aviation safety," which outlines the orientation of safety targets for the next five years. In FY2016, a direction for further safety measures related to small aircraft was added in light of the frequent occurrence of accidents involving private small aircraft in recent years.

The Voluntary Information Contributory to Enhancement of the Safety (VOICES) program has been operated since

- Note 1 A fund established to cover costs incurred to replace or repair lighthouses and other facilities used for aiding navigation installed in the Straits of Malacca and Singapore.
- Note 2 A mechanism that substantiates, for the first time in international history, the cooperation of littoral states and states using these straits in accordance with Article 43 of the United Nations Convention on the Law of the Sea. This mechanism comprises three elements: the Cooperation Forum, the Project Coordination Committee, and the Navigation Aids Facilities Fund.

July 2014 in order to collect more information relating to aviation safety that is not subject to mandatory reporting and harness such information for the improvement of safety. Recommendations such as improving airport operations have been obtained through this program. While dissemination activities have been yielding results and more reports were issued in FY2016 than in the preceding year, attempts will be made to further use the system through continued work to highlight the importance of safety information. Efforts will also be made to improve safety by making use of obtained recommendations.



(ii) Air transport safety measures

While passenger deaths aboard specific Japanese air carriers^{Note} have not occurred since 1986, efforts are being made to reinforce the safety management system adopted by airlines and preventive safety measures are being promoted to appropriately deal with safety-related issues. As well, preliminary reviews upon the launch or expansion of a domestic airline and strict (including unannounced) and systematic on-site audits are properly conducted. Also, in accordance with the increased entrance of foreign airlines following the promotion of the open sky policy, monitoring of foreign airlines entering Japan were strengthened with site inspections and other measures.

(iii) Certification of domestic jetliners

With the development of Japan's first domestic jetliner, the MLIT, as the national government of design and manufacturing, established and expanded a certification organization to implement certification of compliance with safety and environmental standards more appropriately and smoothly and is carrying out reviews with close coordination with the aviation authorities of the United States and Europe. The MLIT carried out safety evaluation for the results of test flights conducted after the first flight by designers, as well as operation and maintenance system. Special flight permit required to conduct test flights in the United States was issued in August 2016. Since then, test flights based in North America have been taking place, and the MLIT has been monitoring and supervising the development activities, including test flights, by dispatching personnel to the United States. Going forward, we will continue conducting appropriate and smooth reviews in conjunction with the development progress.

Note Domestic air carriers that operate air transport businesses that use aircraft with 100 or more passenger seats or with a maximum takeoff weight of more than 50,000 kilograms.

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(iv) Safety measures applicable to unmanned aircraft

On December 10, 2015, an amendment to the Aeronautical Act was issued to enforce basic rules for unmanned aircraft, such as flying airspace and flying methods. During the year after it took effect (December 10, 2015 to December 9, 2016), 10,120 permits/approval were granted, including flights above densely inhabited districts and flights for the purpose of aerial photography. Also, in July 2018, the Public-Private Council for Improving the Environment Related to Small Unmanned Aircraft, which consists of relevant government ministries and agencies, manufacturers, and user organizations, put together the Direction for System Development to Ensure Further Safety of Small Unmanned Aircraft. Based on these recommendations, we will study and improve systems in light of trends such as technical development and will continue to ensure safety through the appropriate application of the amended Aeronautical Act and by publicizing guidelines.

(v) Safety measures for small aircraft

Human factors such as inappropriate flying control and judgment, inappropriate understanding and judgment of weather conditions, and insufficient checks before takeoff have been the common causes of aviation accidents involving small aircraft in recent years. In order to prevent these kinds of small aircraft accidents, we will provide thorough instruction on accident prevention, including compliance with laws, ordinances, and safety regulations, operation based on reasonable flight plans, accurate understanding of weather information, and enhancement of company education and training of pilots. We will also meticulously promote small aircraft measures from various perspectives in light of examples of accidents in recent years. Since FY2014, an examination system has been enforced for specified aircraft flying skills that requires an examination to determine whether, during the two years before the day of a flight, pilots have maintained aircraft flying skills and knowledge, such as maneuvers during takeoff and landing and handling during emergencies. We encourage appropriate application of that system. Also, we call on private pilots, who usually fly small aircraft, to attend safety workshops held by pilots' organizations. We actively support workshops for small aircraft pilots by dispatching instructors and through other methods. Furthermore, in December 2016, we launched the Small Aircraft Safety Improvement Committee, which is composed of experts, to continually study greater safety measures for small aircraft. For sky leisure enthusiasts who enjoy pursuits such as ultralights, paragliding, skydiving, gliders, and hot air balloons, we carry out sky leisure safety measures, such as enhancing safety training and providing information on aviation safety through such organizations as the Japan Aeronautic Association and relevant sports associations.

(2) Developing Air Traffic Systems for Aviation Safety

In order to ensure safe operation and on-time performance of aircraft, and to support the smooth implementation of traffic control functions, we are continuing to develop a new air traffic control data system that merges the existing systems.

In FY2016, we conducted system development and traffic control training with a view toward beginning to use the air traffic control data system at the Hakodate and Sendai Airports.

5 Finding the Causes of Aircraft, Railway, and Marine Accidents/Incidents, and Preventing Recurrence

During FY2016, accidents subject to investigations by the Japan Transport Safety Board consisted of 25 aircraft accidents and serious incidents, 32 railway accidents and serious incidents, and 763 marine accidents and incidents, and those investigations looked into finding causes and preventing recurrence.

Investigation reports for 30 aircraft accidents and serious incidents whose investigations were finished in FY2016 were released. These included the release in November 2016 of the results of an investigation into an accident in April 2015 in which an aircraft collided with an aeronautical safety facility during its landing approach at Hiroshima Airport, injuring 26 passengers and two crewmembers.

Likewise, investigation reports for 21 railway accidents and serious incidents were released. These included the release in July 2016 of the results of an investigation into a serious incident in April 2015 in which a utility pole fell onto the track of the JR Tohoku Line (Yamanote Line).

Investigation reports for 893 marine accidents and incidents were also released. These included the release in July 2016 of the results of an investigation into an accident in December 2014 in which the fishing vessel Daiichi Genpuku Maru capsized and sank off the west-northwest coast of Hamada Port, resulting in the deaths of four crewmembers, with another

crewmember missing.

Since 2013, the Japan Transport Safety Board has released the Japan-Marine Accident Risk and Safety Information System (J-MARISIS) that, by displaying digital maps on the Internet, can be used to search for marine waters where multiple marine accidents and incidents have occurred, and the results of those investigations. Also, in 2014, it started operating a global edition of J-MARISIS, to which information for 11 countries has been added to contribute to safe international ship navigation. Then, in 2015, it began operating a mobile version of J-MARISIS that can be used on a smartphone or a tablet.



6 Support for Victims and Families of Public Transport Accidents

In order to support the victims and their families in public transport accidents, the Public Transportation Disaster Victims Assistance Office was established in April 2012. The Assistance Office relays requests from accident victims to public transportation business operators concerned and introduces appropriate organizations to accident victims depending on the content of the requests.

In FY2016, when a public transport accident occurred, the Assistance Office made the consultation service well known to victims, as well as responded to consultation from victims. When no public transport accidents needed to be dealt with, the Assistance Office was involved in numerous other activities, such as by providing education and training to staff members who provide support, building networks with relevant outside organizations, holding support forums for the victims of public transport accidents, and urging public transport operators to formulate plans for the provision of support to victims.

In addition, in response to the ski bus accident in Karuizawa that occurred in January 2016, MLIT opened its Assistance Office around the clock and set up regional consultation services in the Kanto District Transport Bureau and the Hokuriku-Shinetsu District Transport Bureau to handle inquiries from victims and their families. We also held meetings to explain measures for preventing a recurrence and to listen to opinions and other responses.

7 Safety Measures for Road Traffic

In 1970, the number of traffic accident fatalities peaked at 16,000. This figure declined to a quarter of this level, or 3,904 fatalities (a decrease of 213 from the preceding year) in 2016, coming in under 4,000 for the first time in the 67 years since 1949. However, many traffic accidents were caused by elderly drivers, and approximately half of them, or 1,870 fatalities, were killed while walking or riding a bicycle. With half of these incidents taking place within 500 meters of each victim's home, the situation remains grim. For this reason, efforts will be made to further reduce traffic accidents and various measures will be implemented in coordination with the National Police Agency and others.



(1) Promoting Efficient and Effective Traffic Accident Measures

By promoting the functional differentiation of roads, we will divert automobile traffic to highly safe expressways. Through measures applicable to accident-prone "black spots" and "zero-traffic accident plans" (tactics for the priority elimination of accidents at black spots) carried out in collaboration with prefectural public safety commissions, we are effectively and efficiently promoting accident measures in order to further improve the safety of arterial roads, which account for approximately sixty percent of traffic accident fatalities.

With respect to residential streets, where the number of fatal accidents is not on a stable downward trend compared to arterial roads, big data such as ETC 2.0 will be used to identify in advance key locations prone to speeding and sudden braking, in order to secure safe walking spaces by restricting the flow of vehicular traffic and forcing a reduction in vehicular speeds. Comprehensive measures to inhibit traffic accidents are being advanced in collaboration with prefectural public safety commissions, through such measures as road narrowing and widening roadside strips in combination with zonal speed limits, engaging in sidewalk development projects, and carrying out effective measures such as the installation of speed bumps and curb extensions.

Given that the number of fatal traffic accidents involving bicycles and pedestrians has decreased only by 20% over the past 10 years, so we are promoting a configuration that separates pedestrians from bicyclists, who as a basic rule should travel on roadways.

With respect to temporary two-lane expressways, which have a high rate of fatal accidents caused by sudden crossing into oncoming traffic, in addition to expediting the change to four lanes and the establishment of additional lanes, we will verify the installation of wire rope as a measure to prevent head-on collisions, along 100 km of expressway nationwide.

(2) Promoting Safety Measures for School Commute Routes

For school-commuting roads, following a series of accidents in April, 2012 involving groups of children commuting to schools, a "school route emergency joint inspection program" was implemented and included coordination among schools, boards of education, police, and other stakeholders. Intensive support was directed toward the measures based on the results above.

In addition, Japan has instituted a "school-commuting roads safety program" in each municipality to ensure the sustained safety of school-commuting roads, and has implemented regular joint inspections and improved and enhanced other measures as well.

(3) Safety Driving Support on Expressways Using IT

Japan is the first country in the world that commenced the ETC2.0 service, which utilizes roadside units installed across the country and onboard units. Safe driving support is promoted by providing alerts on locations where accidents occur frequently and on objects that have fallen onto the road as well as information on snow accumulations, overtopping waves, and other such circumstances to the vehicle's car-navigation system. In response to the problem of cars driving in the wrong way on expressways, which is highly likely to lead to a major accident, we are implementing physical and visual measures at locations such as interchanges and junctions, and are carrying out initiatives aimed at practical use of technologies to automatically detect, warn, and guide vehicles driving in the wrong way, based on the Roadmap to Future Measures against Wrong-way Driving on Expressways, with the aim of achieving zero wrong-way accidents on expressways by 2020.

(4) Systematic Road Facilities Management to Provide Safe and Secure Road Services

Nationwide, there are approximately 730,000 road bridges and approximately 10,000 road tunnels. Old bridges and tunnels, which were intensively developed during Japan's period of high economic growth, will face rapid aging in the future.

To achieve appropriate management of roads in light of this situation, the amended Road Act, which includes clarification of the need for inspections, was promulgated in 2013. In government ordinances, technical standards were established for the maintenance and management of roads, and on March 31, 2014, a ministerial ordinance was enacted that clarified the obligations of road administrators, such as visual inspections in close proximity of bridges and tunnels once every five years.

Having received recommendations on the full-scale implementation of measures to deal with the aging of roads, as summarized by the Infrastructure Development Council's Road Subcommittee on April 14, 2014, we are working on building a framework for carrying out required actions as part of maintenance cycles. In particular, we are providing various kinds of support for local governments with many facilities to be managed. This support includes sharing technical information related to maintenance through the use of road maintenance councils that have been set up in all prefectures, the placement of lump sum ordering for inspection operations at the local level, the provision of training for the staff members of local governments, the implementation of direct assessments and repairs by national government personnel on behalf of local governments, and support through subsidy systems for large-scale repair and upgrading jobs.

Additionally, in order to deal with the aging of expressways, we are systematically carrying out large-scale upgrades and repair projects newly outlined in operational implementation plans according to amendments to the Road Act enacted in June 2014. Also, in October 2016, we issued a ministerial ordinance to set out the methods of maintenance and repair of bridges over railways in advance through discussions with railway operators, so as to encourage the systematic maintenance and repair of bridges over railways, and are working to prevent injury to third parties and ensure the safety of railways.

(5) Measures in Response to the Ski Bus Accident in Karuizawa

In light of the ski bus accident in Karuizawa that occurred in January 2016, we are promptly implementing all possible recurrence prevention measures contained in the "Thorough Measures to Achieve Safe and Secure Chartered Bus Operations," which were compiled on June 3, in order to prevent such a tragic accident from ever occurring again.

Column Measures Implemented in the Light of the Karuizawa Ski Bus Accident

The Karuizawa ski bus accident that occurred on January 15, 2016 suddenly took the lives of thirteen young people with promising futures. With a strong resolve to never allow such a tragic accident to happen again, "Comprehensive countermeasures for realizing safe and secure operations of chartered buses" were compiled in June.

Among the comprehensive countermeasures, those that require prompt legal attention, such as the introduction of a system for the renewal of business licenses for chartered buses, the establishment of an expense contribution system for having designated private institutions make rounds of visits to chartered bus operators to provide guidance, and the strengthening of penalties, were brought to an extraordinary Diet session in the form of a proposal to revise the Road Transportation Act. The revision was unanimously approved, implemented, and came into force, in part, on December 20, 2016.

OStatus of implementation of the comprehensive countermeasures

So far, eighty of the eighty-five items that were set forth as comprehensive countermeasures have been implemented. These include the tightening of standards for disciplinary action against auditors, and the establishment of a hotline for reporting on fares that fall below the lower limit.



National government (framework reinforcement)

. Onsite guidance, etc.

Payment of expense

Cooperation

Audit and sanctions

Chartered bus operators

Promptness Prioritization

Overview of the revised Road Transportation Act

- (1) Introduction of a business license renewal system
- Chartered bus operators shall be inspected every five years to determine whether they possess the ability to execute their business safely.

(2) Prevention of easy re-entry and evasion of disciplinary action by unqualified operators

With respect to passenger vehicle transportation businesses:

Business license

- Extension of the disqualification period (current stipulation: two years ⇒after revision: five years)
- · Restrictions on re-entry by subsidiaries of companies whose license has been revoked,
- and who exit the market after an audit as a measure to evade disciplinary action
- Issuance of a qualification certificate to operation managers*

Extension of the disqualification period (current stipulation: two years ⇒after revision: five years)
 *Personnel in charge of labor management of drivers or vehicle operation management, including daily inspection

- Thirty days prior notification of business closure (current stipulation: ex-post notification system)
- (3) Reinforcement of audits and promotion of voluntary improvement

A system shall be established in which designated private institutions provide onsite guidance to chartered bus operators by collecting the necessary fee from them.

(4) Strengthening penalties

- Statutory penalties will be strengthened, and a heavy corporate penalty will be established against business operators who fail to comply with transportation safety orders.
- (current stipulation: a fine of up to one million yen (violators, corporations) \Rightarrow after revision: one year in prison and a fine of up to one and a half million yen (violators), or a fine of up to one hundred million yen (corporations))

Comprehensive countermeasures		Major items for implementation	Overal: 80 / 85 items have been implemented
 Strengthening compliance requirements for chartered bus operators, operation managers, etc. 	26 / 27 items implemented	 Enhance instructions and supervision of new drivers, etc. Require images to be recorded and stored using a drive recorder Strengthen the qualification requirements for operation managers Increase the required number of operation managers Require a roll call during nighttime and long-distance services Require the use of the seatbelt in auxiliary seats 	
(2) Early correction of legal violations, elimination of disqualified operators, etc.	21 / 21 items implemented	Conduct a verification audit within thirty days of a correction order against a legal violation Shut down or revoke the license of operators who fail, multiple times, to correct a legal violation Impose stricter sanctions for violations of transportation safety Increase the ratio of suspended vehicles Introduce a system for revocation of business licenses (one-shot revocation) in consideration of the maliciousness or severity of the accident Strengthen the criteria for administrative sanctions against operation managers Require the introduction of a business license renewal system, the formulation of safety investment plans, and an estimate of business income and expenditure Strengthen penalties against those who violate transportation safety orders Expand the disqualification reasons for business licenses, operation manager qualification, and maintenance manager qualification	
(3) Increasing the effectiveness of audits, etc.	8 / 10 items implemented	Place greater weight on audits I	by using accredited institutions
(4) Strengthening relationships with travel agencies, customers, etc.	19 / 20 items implemented	Establish a hotline for reporting Establish a third-party committe the travel agency industry and c Require safety information to be	on fares that fall below the lower limit e on commissions by the joint effort of hartered bus industry reported to the national government
(5) Promotion of accident prevention through structural safety measures	14 / 15 items implemented	 Promote R&D of systems for responding to driver emergencies Display an ASV mark on vehicles equipped with an ASV system Strengthen vehicle body constructions Support the introduction of a digital driving recorder, etc. 	

The MLIT believes that the steady implementation of the items in the comprehensive countermeasures by the government, chartered business operators, and all other stakeholders is of utmost importance in ensuring safe and secure operations of chartered buses, and is committed to steadily following up on their status of implementation and thoroughly disseminating initiatives for preventing a recurrence of identical or similar accidents.

(6) Steady Implementation of the "Expressway and Chartered Bus Safety and Security Recovery Plan"

In response to the Kan-Etsu-Do Expressway tour bus accident that occurred in April 2012, the "Expressway and Chartered Bus Safety and Security Recovery Plan" was formulated in April 2013 to transition and unify expressway tour buses into the new share-ride expressway bus and already established standards for driver replacement shifts and for the remaining measures, these have been definitely implemented in the two years between FY2013 and 2014, and the status of implementation has been followed up and its effects have been reviewed. The MLIT continues to ensure the effectiveness of each measure of this plan such as implementation of street audit and understanding of bus operators that must be continuously monitored, and promotes measures to improve the safety and regain trust of bus operations.

(7) Promoting Safety Measures According to a Safety Plan for Commercial Vehicles

In November 2014, an interim review of a 2009 comprehensive safety plan for commercial vehicles that was formulated with the aim of halving the number of deceased persons and the number of accidents resulting in injury or death relating to the use of commercial vehicles in the decade between 2009 and 2018 was conducted. Various initiatives to further reduce accidents have been advanced to go along with new measures that have been implemented; these measures include the implementation of accident-prevention measures based on accident trends by industrial sector and key factors, the dissemination of measures to prevent accidents caused by physical changes affecting drivers, and the implementation of accident-prevention measures based on the use of survey data, accident data, and other types of pertinent information.

(i) Accident-prevention measures based on accident patterns by industrial sector and key factors

In order to promote transportation safety, we are evaluating accident-prevention initiatives based on characteristic accident patterns for each industrial sector—trucks, buses, and taxis—and are conducting follow-ups, including revisions of initiatives where necessary, so as to reduce accidents even further.

(ii) Establishing a framework for safety through the management of transportation safety

In accordance with a transportation safety management program introduced in October 2006, business operators have been establishing and improving safety management systems internally on a company-wide basis. In 2016, 537 operators were subject to evaluations of transportation safety management whereby the state verifies the status of the implementation of these systems.

(iii) Ensuring compliance on the part of motor carrier businesses

In order to thoroughly ensure that motor carrier businesses comply with relevant laws and ordinances and practice appropriate operations management, business operators who flagrantly violate the law and those who have caused a major accident will be subject to thorough audits, while business operators who are suspected of violations will be subject to high-priority audits.

Also, in response to the ski bus accident that occurred in Karuizawa in January 2016, thorough countermeasures were compiled in June and December, and we have implemented such measures as a system to correct legal violations promptly and to tighten administrative penalties to force business operators who are repeat violators to withdraw from the market.

In order to reinforce audit functions for the prevention of accidents through efforts to merge audit information with accident information, reinforce analytical functions, and identify business operators deemed to be at high risk of causing an accident, a comprehensive safety information system for commercial vehicles to construct.

(iv) Eliminating drunk driving

We promoted thorough checks for inebriation using alcohol analyzer during roll calls and made efforts to raise the effectiveness of the use of alcohol analyzer by expanding locations subject to IT roll calls to business offices, besides G Mark offices, that have met certain conditions as well as to remote locations. In addition, to eliminate driving by business drivers while under the influence of stimulants or dangerous drugs, guidance is being provided to business operators and operating managers whenever the opportunity arises through the use of workshops, nationwide transportation safety campaigns, general transportation safety checks conducted during the year-end and New Year's period, and other such initiatives in order to thoroughly ensure that drivers are guided and supervised on a daily basis.

(v) Promoting safety measures based on the use of IT and new technologies

We are providing support for the deployment of equipment that will contribute to the advancement of operation management such as digital operation recorder and for advanced initiatives such as preventing overwork driving, from the point of view to support the efforts made to prevent the traffic accidents caused by the automotive transportation operators. Also, to prevent accidents caused by health or driving while incapacitated by fatigue, we are accumulating such information as driving characteristics and physical condition management as big data, and have started using it to study accident prevention operation models, such as the possibility of establishing routes suited to the physical condition of the driver.

 (vi) Measures based on the recommendations of the Committee Investigating Accidents Involving Commercial Vehicles

The Committee Investigating Accidents Involving Commercial Vehicles conducts more advanced, complex investigative analyses of accident factors for major accidents involving commercial vehicles that have a large impact on society. It has publically released 19 reports on cases concerning incidents subject to special important investigations, such as an accident in which a passenger bus crashed into a traffic light pole in Ota City, Tokyo, on January 9, 2015.

(vii) Promoting measures to prevent accidents caused by rapid physical changes affecting drivers

The Council for Discussing Measures to Deal with Health-Attributable Accidents Involving Commercial Vehicles was established in September 2015 to promote screenings as a more effective tool contributing to the early detection of sleep-disorder breathing, brain diseases, heart disease, and other key diseases, as recommended in the Manual on Health Management for Drivers of Commercial Vehicles, which was revised in April 2014. The Council



Source) MLIT

conducted a survey of businesses in order to organize the issues for spreading the use of such screenings.

(viii) Safety measures for the land transportation of international maritime containers

In order to enhance the safety of the land transportation of international maritime containers, Guidelines for the Safe Land Transportation of International Maritime Containers were compiled on June 2013. We are working to disseminate these guidelines and ensure the effectiveness of them in collaboration with the stakeholders through stakeholders meetings and training sessions by related industries in rural areas.

(8) Comprehensive Safety Measures for Automobiles

(i) Considering vehicle safety measures for the future

In light of a report in June 2016 by the Automobile Task Force of the Road Transport Subcommittee under the Transport Policy Council, we are working to promote safety measures for children and seniors, safety measures for pedestrians and bicyclists, countermeasures against serious accidents involving large cars, and vehicle safety measures focused on handling new technologies such as automatic driving. Also, as a measure to prevent accidents involving elderly drivers, which are occurring more and more frequently, a Vice Ministers' Council was established in January 2017 among relevant ministries and agencies to take a wide look at ways to promote public awareness and encourage the adoption of automobiles equipped with advanced safety technology, such as advanced emergency breaking systems. An interim report was compiled in March.

(ii) Expanding, enhancing, and strengthening safety standards

Eleven international regulations have been adopted in Japan to improve the safety of automobiles. Due to this adoption, new safety standards were developed, including vehicle proximity warning systems installed in hybrid cars and automatic headlights.

(iii) Promoting the development, commercialization, and popularization of advanced safety vehicles (ASV)

We promoted the full-scale spread of commercially viable ASV technology, such as advanced emergency braking systems, through cooperation among government, industry and academia. Also, in FY2016, we began the sixth-term ASV promotion plan and began studying technical requirements for successor models of handling systems in cases of driver abnormality, such as pulling over on the shoulder of the road.

(iv) Providing safety information through automobile assessment

In order to promote the development of safer automobiles, and enable consumers to choose safe automobiles and child restraint systems, the results of the assessment of automobile safety were published. Assessment of braking systems to mitigate collisions with pedestrians began in FY2016.

(v) Efforts toward realization of automatic driving

Established under the purview of the UNECE World Forum for Harmonization of Vehicle Regulations (WP.29), the Automatically Commanded Steering Function



Informal Working Group, co-chaired by Japan, has spearheaded the formulation of international standards on automatic driving, such as by proposing standards for automatic steering that could allow for automatic driving on expressways. Among the different types of self-steering, international standards on self-parking systems and lane keeping assist systems were established in WP.29 in March 2017.

(vi) Swift and steady implementation of automobile recalls and informing users and others

In order to carry out vehicle recalls promptly and reliably, information is collected from vehicle manufacturers and users. In addition, checks are conducted and guidance is provided when audits are performed with respect to recall operations carried out by vehicle manufacturers. Technical verifications are conducted by the National Traffic Safety and Environment Laboratory of the National Agency for Automobile and Land Transport Technology on vehicles that are questionable in terms of conformity with safety or environmental regulations. To encourage recall repairs, we stepped up the dissemination of information to users through websites and social media. In order to reinforce the collection of information on defects, dissemination activities in connection with the hotline concerning information on automobile defects (www.mlit.go.jp/RJ/) are being proactively undertaken.

In addition, the information collected by the MLIT including malfunctions, accidents, and fires are made public and information is provided to users regarding matters that require the attention of users or details necessary for the appropriate usage or maintenance and management or to take appropriate measures when malfunctions occur.

Also, in FY2016 the number of recall notifications was 364 and the number of recalled vehicles was 15,850,000.

(vii) Sophistication of vehicle inspections

In order to prevent illegal secondary modifications^{Note} and the early detection of vehicular malfunctions, information technology is being utilized to make vehicle inspections more sophisticated.

(9) Victim Support

(i) Protecting victims with the automobile liability security system

The automobile liability security system, implements various victim relief measures such as insurance payments of Compulsory Automobile Liability Insurance, governmental indemnity services (relief for victims of hit-and-run and uninsured car accidents), and payments for nursing care fees and administration of nursing care centers for those with severe residual disabilities based on the principle of the mutual support of the car society and is fulfilling a big role in protecting victims of traffic accidents.



(ii) Promoting traffic accident consultation activities

In order to promote the activities of traffic accident consultation offices set up by local governments, we are supporting consultation activities in communities, such as by increasing the handling capabilities of counselors through training and the publication of practical manuals, and by holding meetings for liaison and coordination and the sharing of information, as well as by publicizing the availability of consultation activities through websites. In this way, we are helping to improve the welfare of traffic accident victims.

Note Conduct whereby, after a vehicle undergoes a new inspection with components removed, the given components are re-attached to the vehicle and used accordingly.
(10) Safety Measures for Mechanized Car Parking

In light of the occurrence of accidents involving deaths during mechanized car parking, we have developed guidelines on safety measures for mechanized car parking and have made requests to relevant organizations regarding safety measures and proper utilization. Also, we are proceeding with studies of JIS standardization of safety standards applicable to mechanical parking equipment in order to further improve the safety of mechanical parking equipment.

Section 5

Crisis Management and Security Measures

Promoting Crime and Terrorism Counter-measures

(1) Coordinating with Other Countries for Crisis Management and Security Measures

(i) International initiatives for security

In addition to participating in meetings and projects in the field of transport security at international conferences and organizations such as Group of Seven (G7), International Maritime Organization (IMO), International Civil Aviation Organization (ICAO), and Asia-Pacific Economic Cooperation (APEC), this knowledge is applied to domestic security measures while promoting initiatives for international cooperation and harmony. Japan, together with the United States and other countries, proposed draft guidelines on maritime cyber risk management at an IMO meeting held in June 2016. Interim guidelines were developed and approved based on that proposal. Japan is now considering specific security measures for maritime operators to implement based on the guidelines.

The "International Working Group on Land Transport Security (IWGLTS)" established in 2006 currently has a participation of over 16 nations and is expected to further evolve as a framework for bilateral dialogue with the United States of America and European Union on land transport security and it will be utilized to improve domestic security and international contributions.

(ii) Anti-piracy measures

According to the International Maritime Bureau (IMB), there were 191 instances of piracy and armed robbery in 2016. Broken down by region, the sea area around Somalia and the Gulf of Aden accounted for 2 instances, Africa (the Gulf of Guinea) accounted for 55 instances, and the sea area around Southeast Asia accounted for 68 instances.

While the number of heinous cases of piracy increased rapidly in the sea area around Somalia and the Gulf of Aden beginning in 2008, such cases have declined to low levels in recent years thanks to anti-piracy efforts by the navies of different countries, the implementation of self-de-



fense measures based on best-management practices (BMP)^{Note} on the part of merchant ships, and the initiatives of the international community, such as in terms of the presence of armed security on board merchant ships. Nevertheless, cases in which vessels are pursued by suspicious boats continue to emerge and circumstances in terms of the navigation of merchant ships remain unpredictable.

Note Stipulations of self-defense measures (such as measures to avoid piracy and the development of escape compartments onboard a ship) to prevent or minimize the harm caused by Somali piracy as produced by the International Chamber of Shipping and other international shipping organizations.

Under this situation, a Japan Maritime Self-Defense Force destroyer is conducting escorts of merchant ships in the Gulf of Aden as well as surveillance patrols by two P-3C patrol aircraft based on the Law on Punishment of and Measures Against Acts of Piracy. The MLIT provides a contact point for escort requests from shipping companies and others and selects vessels to be escorted. The MLIT also steadily applies the Act on Special Measures Concerning the Guarding of Japanese Ships in Pirate-infested Waters, which allows security guards employed by commercial security companies to guard Japanese-flagged vessels with which certain requirements are satisfied and ensures the complete navigational safety of Japanese-flagged vessels.

In order to deal with pirates off the coast of Somalia and in the Gulf of Aden, the Japan Coast Guard dispatches eight of its officers to Japan Maritime Self Defense Force destroyers to conduct judicial police activities in cases of piracy incidents. These Coast Guard officers are engaged in vigilance against piracy and the collection of information together with Maritime Self-Defense Force officials. The Japan Coast Guard also dispatches airplanes to littoral states in those areas to conduct pirate escort and extradition drills with the coast guard agencies of the relevant countries.

In the seas of Southeast Asia, the Japan Coast Guard dispatches patrol ships and airplanes to conduct cooperative anti-piracy drills and to exchange opinions and information with the coast guard agencies of countries where port calls are made. These are part of its efforts to promote links and cooperative relationships.

In addition, we are working actively to help increase law-enforcement capabilities, including conducting trainings for members of coast guard agencies of littoral states in these regions. We also contribute to international coordination and cooperation through international bodies, such as by dispatching personnel to the Information Sharing Center (ISC), which was established according to the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP).



(iii) Security measures for ports

Source) MLIT

Human resource development for port security measures is being implemented for ASEAN countries through training, expert conferences, and other measures. Also, information is being shared with other countries as a part of the initiative to further raise the level of security in international ports.

(2) Comprehensive and Strengthened Counter-Terrorism Measures for Public Transport

The threat of global terrorism continues to be a serious one, and so it is important to carry out anti-terrorism measures for public transportation and key infrastructure. During the Ise-Shima Summit held in May 2016, the MLIT conducted joint drills with public transportation operators, requested operators under its jurisdiction to perform voluntary inspections, and implemented other anti-terrorism measures in partnership with the private sector. Looking ahead to the Rugby World Cup in 2019 and the Tokyo Olympics and Paralympics in 2020, we will strengthen both structural and non-structural anti-terrorism measures within our fields of jurisdiction and continue to carry out initiatives in coordination with relevant ministries and agencies.

(i) Promoting counter-terrorism measures for railways

In addition to increasing security cameras within stations and strengthening patrols, "crisis management levels" are set and operated as well as "displaying security and user participation^{Note}" as the axis of promoting counter-terrorism measures. Also, the sharing of information regarding railway counter-terrorism measures with major nations is being actively pursued.



(ii) Promoting counter-terrorism measures for ships and ports

MLIT has been engaged in ensuring security, through approval of the Ship Security Plan of the Japanese ships engaged in international voyage and ship verification of them, approval of the Port Security Plan of the international port facilities in Japan, and control of all the ships entering into the ports, such control includes verification of them and Port State Control (PSC), in accordance with "Act on Assurance of Security of International Ships and Port Facilities." In addition, in the light of the results of inspections for the Japanese international port facilities and the security levels of foreign countries, MLIT has increasingly enhanced its port security measures, for example, the three-item check (checks on the ID, organization and purpose of entrance) at all the Japanese international port facilities after July 2014.



Note Displaying Security: Measures to proactively prevent terrorism by making security highly visible to people. User Participation: Measures to promote each individual railway user to be aware of preventing terrorism and take appropriate actions to strengthen the network for monitoring terrorist activities.

(iii) Promoting counter-terrorism measures for aviation

In order to do every possible thing to prevent terrorist attacks toward aircraft in our country, the aviation security framework is being strengthened in accordance with the international standards defined by the Convention on International Civil Aviation. In such situation, corresponding to the cases of terrorism and the unlawful intrusion inside and outside our country, in addition to strengthening the fences for intrusion preventive measures against vehicles and people, prompt measures are being taken such as installing sensors on every airport, which are able to cope with intrusion. Furthermore, as part of efforts to enhance security checks at airports, body scanners and other equipment will be installed at major airports in Japan by the 2020 Tokyo Olympic and Paralympic Games. In FY2016, body scanners were installed at eight airports, including Haneda, Narita, Kansai, Chubu, New Chitose, and Fukuoka as part of efforts to strengthen aviation security measures. Also, information exchanges with major countries are carried out through active participation in international conferences and other opportunities to share Japan's experience with the latest security measures.

(iv) Promoting counter-terrorism measures for automobiles

Relevant businesses are instructed to carry out inspections inside vehicles, strengthen patrol of the inside and perimeters of business offices and garages, and dispatching security officers to major bus stops during seasons with increased travelers.

(v) Promoting counter-terrorism measures for major facilities

For various river facilities special attention is paid for suspicious objects during river inspections and sight patrols; the lockout of entries and exits of dam management offices and dam body inspection corridors is also being strengthened. For various road facilities, special attention is paid to suspicious objects when patrolling expressways and directly managed roads and the trash boxes of rest facilities is also being aggregated. For national parks, security patrols are strengthened and caution is called for with various bulletins. At construction sites signboards are installed along with other measures calling for greater caution.

(3) Balancing Security and Efficiency of Logistics

For international logistics, initiatives to balance security and efficiency are spreading to each country, even in our country, the dissemination of AEO system^{Note 1} for logistics companies is being promoted. At present, the cargo for which the export declaration is done by AEO exporter, and AEO bonded transporter transports the cargo up to the bonded area, export declaration for the cargo is entrusted to AEO customs broker, also receiving the export permission before the cargo is stored in bonded area.

For the security system of air cargo with the purpose of protecting air cargo from the shipper to loading on aircraft, the KS/RA system^{Note 2} based on international standards established by the ICAO is adopted. Then, based on the request of the United States for further security strengthening, the system was revised while maintaining the smooth performance of the logistics, applied from October 2012 for the United States for international passenger flights equipped with cargo, the same system was also expanded for application of all international passenger flights equipped with cargo from April 2014.

Also, in the container terminals of major ports, an access control system is being implemented to accurately confirm the identity and association of truck drivers and full-scale system operation started from January 2015.

Note 1 A system for the customs to certify international trade related business operators with well developed system of security management of cargos and compliance with laws and to grant the benefit of simplifying customs clearance.

Note 2 A system that confirms the safety of all air cargo before loading the aircraft for designated shippers (Known Shipper), designated air cargo shipping businesses or designated air shipping agents (Regulated Agent), or air carriers.

(4) Information Security Measures

The sophistication of cyber attacks on government institutions and businesses has been growing in recent years. Amid the increasing importance of initiatives for information security measures, measures will need to be further fortified as we head toward the Tokyo Olympic and Paralympic Games in 2020.

For this reason, the MLIT is taking information security measures, including at incorporated administrative agencies and critical infrastructure operators under its jurisdiction (aviation, railway, and logistics), in accordance with a policy formulated by the government's Cybersecurity Strategy Headquarters. These measures include strengthening information security functions and carrying out initiatives to enhance and strengthen preparedness for dealing with cyber attacks, in collaboration with the National Center of Incident Readiness and Strategy for Cybersecurity.

2 Establishing a Response System for Accident Disasters

When accident disasters such as accidents involving multiple fatalities occur on rail, air, etc. or ships are involved in oil spill accidents, a disaster response headquarters is established within the MLIT to develop a system to collect and aggregate precise information quickly and be able to implement disaster emergency measures with relevant government agencies.

For accident disasters at sea, coordination with relevant organizations is being furthered such as ensuring a dispatch system for patrol vessels and aircraft and readying disaster mitigation equipment and rescue equipment, in addition to implementing joint training. Also, environmental protection information on coastal waters needed to contain oil, etc., is being compiled and provided.

3 Ensuring Public Safety at Sea

(1) Promoting Counter-Terrorism Measures

As measures to prevent terrorism, nuclear power plants, petroleum complexes, and other important facilities in coastal areas are subject to surveillance and detection functions carried out by patrol vessels and aircrafts. Passenger terminals, ferries, and other soft targets where large numbers of people can be found are also subject to surveillance and detection functions on a priority basis.

Counter-terrorism measures are also being carried out by public-private partnerships formed through close ties with relevant organizations and local governments. Such measures include the provision of thorough guidance to business operators on the matter of self-security, increased awareness of the risks of terrorism committed against passengers, calls for the early detection of suspicious incidents, and the implementation of joint drills on counter-terrorism measures.

In FY2016, we focused on the promotion of counter-terrorism measures in accordance with the hosting of the Ise-Shima Summit, and are striving to reinforce counter-terrorism measures in anticipation of the Tokyo Olympic and Paralympic Games in 2020.

(2) Promoting Measures Against Suspicious Vessels and Spy Ships

It is well known that suspicious vessels and spy ships are probably engaged in serious crime in our country's territorial waters and to shed light on their objectives and activities, suspicious boats needs to be stopped for boarding inspection and if crime is discovered, it needs to carry out a proper criminal investigation. For this reason, in response to suspicious vessels and spy ships, the Japan Coast Guard which is a police organization deals with them as the primary agency in cooperation with relevant government agencies.

The Japan Coast Guard conducts various training as well as closely works with relevant agencies, etc. to exchange information, and thereby strives to detect suspicious vessels and spy ships early as well as to maintain and improve capabilities to cope with them.

(3) Promoting Measures Against Maritime Crimes

Examples of recent trends that we are seeing in terms of maritime crimes include cases in which domestic poaching is carried out by poachers and buyers working in tandem and cases in which funding is provided by crime syndicates.

Environmental offences, such as cases in which waste products are illegally dumped into the ocean to avoid having to pay for treatment costs, continue to be perpetrated. These offenses are becoming more aggravated and increasingly sophisticated. Cases in which foreign fishing vessels are found to be illegally operating continue to arise. Some vessels operate unlawfully under cover of darkness to evade control. Such cases are also becoming more aggravated and increasingly sophisticated. International criminal organizations are also getting involved in the smuggling and the stowaway. Regarding various maritime crimes, there is still a need for vigilance and Japan Coast Guard is strengthening surveillance and law enforcement, gathering and analyzing crime information, and strengthening boarding inspections by effectively utilizing patrol vessels and aircraft as well as sharing information with relevant domestic and foreign organizations as part of the efforts to pursue effective measures and take strict yet appropriate measures against maritime crimes.

Column The Yearly Seizure of Stimulant Drugs Hits a Record at 1,314 kg

The Japan Coast Guard has been detecting a succession of crimes related to the smuggling of large amounts of stimulant drugs into Japan, and has seized a total of approximately 1,314 kg in 2016 (corresponding to an end trafficking price of approx. 91.9 billion yen and a usage of roughly 43.8 million times). This figure immensely surpasses the 785 kg that was seized in 1999 as the largest, yearly amount at the time.

In terms of amount seized per incident, approximately 597 kg of stimulant drugs were seized in a largescale smuggling incident by Taiwanese captain of a Malaysian yacht exposed in Naha City, Okinawa Prefecture in May 2016. This surpassed the record seizure of approximately 564 kg in Minami-Satsuma City (former Kasasa Town), Kagoshima Prefecture in October 1999.

The Japan Coast Guard, while keeping their eyes peeled for maritime smuggling of stimulant drugs, and has more attempts to smuggle in large amounts of drugs at once, such as in deliveries of drugs at sea using small boats, and drugs hidden in sea cargo containers. They have also detected foreign cruise passengers attempting to smuggle drugs into Japan.



Source) MLIT

4 National Security and Protecting Citizens' Lives and Assets

(1) Responding to North Korea Issues

In view of the international situation surrounding Japan, including North Korea's announcement in October 2006 that it had conducted a nuclear test, Japan prohibits certain ships connected with North Korea from entering its ports, in accordance with the Act on Special Measures Concerning the Prohibition of Entry of Specified Ships into Ports. In January 2016, North Korea conducted a nuclear test and in February it launched a ballistic missile referred to as a "satellite." In light of these developments, the government decided in a Cabinet meeting on February 19 to bar from entering Japanese ports any third-country ships verified through procedures set forth under Japanese law as having made a port call in North Korea, in addition to ships registered in North Korea, beginning on that day. Also, in a Cabinet meeting on April 1, it was decided to include those ships among the ships subject to sanctions based on a decision of the United Nations Security Council. Furthermore, in light of such facts as North Korea's nuclear test conducted in Japan that were verified through procedures set forth under Japanese law as having registered in Japan that were verified through procedures set forth under Japanese law as having made a port call in North Korea. To ensure the implementation of these measures, the Japan Coast Guard is conducting the confirmation of information regarding the arrivals of North Korea-flagged ships. Also, to ensure the effectiveness of the measures banning exports to North Korea, such as United Nations Security Council Resolution 1874, in accordance with the Special Measures Law Regarding Cargo Inspections, etc., of Japan in Accordance with United Nations Security Council Resolution 1874, etc., close coordination with relevant administrative agencies is promoted to ensure the effectiveness of measures stipulated by the law.

Based on the repeated occurrences of North Korean transgressions, the MLIT has fortified immediate response systems in close coordination with relevant ministries and agencies, and a system for monitoring and keeping track of North Korea remains in effect. Even in cases of nuclear testing and ballistic missile launches, we collect information and provide necessary information to ensure the safety and security of the nation.

(2) Responding to Armed Attacks and Other Situations Under the Civil Protection Plan

In accordance with the Act concerning the Measures for Protection of the People in Armed Attack Situations and Basic Guidelines for Protection of the People that stipulates measures regarding the evacuation, rescue and minimization of losses due to armed attacks, etc., the MLIT, the Geospatial Information Authority of Japan, the Japan Meteorological Agency, and Japan Coast Guard stipulate Plan for the Protection of the People. The MLIT has stipulated that support for engaging in communications and coordinating with designated public institutions as public carriers in connection with the transporting of refugees in response to local government requests shall be provided. The Japan Coast Guard has stipulated that the implementation of measures for alarms and evacuations shall be communicated and that required measures, such as those to be taken to help guide refugees, shall be implemented.

5 Infectious Disease Measures

We are coping with the infectious diseases, by close cooperation with the relevant ministries and agencies, including the Ministry of Health, Labor and Welfare and the Cabinet Secretariat for the measures.

For countermeasures against pandemic influenza and new infectious diseases, "the Act on Special Measures for Pandemic Influenza and New Infectious Diseases Preparedness and Response (hereinafter Act on Special Measures)" was established in May 2012 and put into effect in April 2013. The Act on Special Measures is designed to limit the spread of infections as much as possible, protect the life and health of national citizens, and minimize impact on citizen's lives and the national economy by:1) businesses in general must work to cooperate with prevention and countermeasures and consider impacts due to epidemics and work to implement appropriate measures in conducting business, 2) Registered business operations eligible for prior vaccination must continue to carry out business activities that contribute to the stability of citizen's lives and economy even during outbreaks, and 3) designated public institutions are required by regulation to implement measures against breakouts of new type influenzas, etc., and designated public institutions that serve as transport operations must establish individual business plans in the event of new type influenzas, etc., emergency situations and carry out necessary measures to appropriately implement the transport of passengers or cargo.

In June 2013, the National Action Plan for Pandemic Influenza and New Infectious Diseases of JAPAN based on the Act on Special Measures was approved by the Cabinet and it includes countermeasures against pandemic influenza and new infectious diseases such as the basic policy, the implementation system, surveillance and intelligence gathering, prevention and stopping of outbreaks, medical treatment, and ensuring the stability of citizen's lives and the national economy for the various outbreak stages of pandemic influenza and new infectious diseases.

In accordance with this, MLIT amended the MLIT Action Plan or Pandemic Influenza and New Infectious Diseases in

June 2013 and for the implementation of the newly incorporated various measures in the Act on Special Measures: 1) the role of designated (local) public institutions which are transport business operators, and 2) responses when a declaration of an emergency situation regarding Pandemic Influenza were defined. Additionally, during overseas outbreak phase, cooperate with preventative measures to delay domestic epidemics as much as possible and when quarantine airports and harbor are aggregated, call for cooperation between airport and port administrators, and after the early phase of domestic outbreak, make transport requests for emergency supplies such as medical and food supplies in case of urgent need.

Since 2013, we have conducted an annual information transmission drill based on the scenario of an outbreak of a new strain of pandemic influenza. Additionally, in 2016, we conducted an operations drill at the MLIT Headquarters for Promoting Measures Against New Strains of Pandemic Influenza and Other New Infectious Diseases to verify the responses that would be necessary during the spread of a new strain of pandemic influenza within Japan.

Chapter 8

Creating and Preserving a Beautiful and Healthy Environment

Section 1 Promoting Global Warming Countermeasures

1 Implementing Global Warming Countermeasures

At the 21st session of the Conference of the Parties to the Framework Convention on Climate Change (COP21) held in 2015, the Paris Agreement was adopted as a new international framework for reducing greenhouse gas emissions beginning in 2020, with participation by all countries. The agreement went into effect in November 2016, and Japan is a signatory nation.

Based on the Paris Agreement, Japan adopted the Plan for Global Warming Countermeasures by a Cabinet decision in May 2016, and has committed to efforts toward the achievement of the mid-term objective to achieve a 26.0% decrease in the FY2013 level of greenhouse gases by FY2030, and as a long-term objective aims to reduce emissions 80% by 2050.

The MLIT has committed to a wide array of policy development initiatives for achieving the mid-term objective based on this plan, including making housing and buildings more energy efficient, measures for individual vehicles, and the promotion of low-carbon urban development. In addition, we partially amended our Environmental Action Plan in March 2017, and set out long-term roles for the MLIT in mitigation policies and other environmental policies.

In addition, we are working toward the promotion of adaptation measures based on the Climate Change Adaptation Plan devised in 2015 to counter the effects of climate change.



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2 Promoting Global Warming Countermeasures (Mitigation Measures)

(1) Promoting Low-carbon City Development

In urban areas with a considerable concentration of human residents and buildings, low-carbon urban development plans produced by municipalities according to "The Low- Carbon City Act," which came into force from the standpoint of the desire to advance "low-carbon urban development" in accordance with the consolidation of urban functions, the promotion of the use of public transit in connection with this consolidation, and the promotion of green conservation and greening initiatives, came to be formulated by twenty-three cities by the end of fiscal year 2016. "Low-carbon urban development" will continue to be promoted for initiatives under these plans through statutory special measures, taxation systems, fiscal measures, and other means.

(2) Promoting the Development, Distribution and Optimal Utilization of Environment-friendly Vehicles

(i) Improving mileage of vehicles

Based on the Law Concerning the Rational Use of Energy (Energy Saving Act), we are formulating fuel efficiency standards and the like, and are striving to improve the fuel efficiency performance of automobiles. In October 2016, we introduced the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), a globally harmonized standard for testing the emissions and fuel efficiency of passenger vehicles and others. In addition, in December 2016, the Automobile Fuel Efficiency Standards Subcommittee (a subordinate committee operating under the Council of Transport Policy) and others began discussions regarding the formulation of next-generation fuel efficiency standards for heavy vehicles.

In April 2016, we established a task force to investigate Mitsubishi Motors' and others' manipulation of fuel efficiency and emissions gas testing for the review process for designating vehicle types, and based on the task force's findings, we have improved and tightened up methods of review, including appearing unannounced to verify data measurements by manufacturers, and have amended the Road Transport Vehicle Act in order to intensify administrative discipline (revoking type designations, etc.) and penalties for violations.

(ii) Framework for promoting improvements in fuel efficiency

To make it easier for consumers to identify and select vehicles that offer exceptional performance in terms of fuel efficiency, we have obligated automobile manufacturers and others to publish fuel efficiency information in their catalogs, and a program for evaluating and publicizing performance in terms of the fuel efficiency of automobiles is being run.

To ensure that fuel efficiency information published in catalogs more closely applies to actual driving conditions, the Automobile Fuel Efficiency Standards Subcommittee and others have begun discussions regarding methods of publishing fuel efficiency information based on different driving situations, including driving in cities, in suburbs and on expressways.

Stickers are affixed to vehicles to enable fuel performance in terms of fuel efficiency to be outwardly discerned by consumers.

(iii) Promoting the dissemination of environment-friendly vehicles

We are implementing tax breaks to promote the spread of automobiles that offer superior environmental performance. Additionally, in the taxation system revision of FY2016, the greening exemption tied to the motor vehicle tax was extended for one year, with revisions made to its requirements, and the greening exemption tied to the light motor vehicle tax was extended for one year with the current system intact.

We are promoting urban development based on the use of environmental vehicles by providing subsidies for the acquisition of fuel-cell vehicles, electric vehicles, and micro-mobility vehicles from the standpoint of promoting global warming countermeasures. In addition, subsidies are being granted to truck and bus business operators for the acquisition of CNG automobiles^{Note}, hybrid vehicles, and advanced environmental diesel trucks.

Chapter 8 Creating and Preserving a Beautiful and Healthy Environment

(iv) Development, application, and creating a usage environment for next generation heavy vehicles

Since FY2015, we have been pursuing scientific research to promote the development and commercialization of technologies related to high-efficiency next-generation diesel engines and next-generation large-sized vehicles known as large-sized liquefied natural gas automobiles, from the standpoint of reducing carbon footprints and emissions.

(v) Promoting and disseminating ecological driving

MLIT has promoted holding symposiums and events all over the country in cooperation with the relevant ministries and agencies of the government and the District Transport Bureaus. We also worked on promoting and spreading ecological driving based on the "10 Reasons for Driving Ecologically." Furthermore, in order to promote and disseminate ecological driving by the Automobile Carrier businesses, MLIT supports the introduction of the Ecological-driving Management System (EMS)^{Note}.

(3) Promotion of Traffic Flow Improvement

Various traffic flow measures are being tried, since improving the driving speed by smoothing the traffic flow will improve the actual as mileage rate and decrease the carbon dioxide emissions from automobiles. Specifically, we are developing ring roads and other arterial road networks that are effective in reducing through-traffic in the urban center by providing them with alternate routes, working on grade separation of intersections and promoting serial railroad grade-separation projects to eliminate unopened grade crossings. In order to realize smooth, safe transportation services, we are also promoting initiatives for the "smart use" of roads in which the functions of the entire road network are used optimally, such as improving the maintenance of and making small-scale improvements to existing roads. In addition, we are improving the road environment to encourage the use of bicycles, and introducing LED road lights in order to reduce carbon footprint of road facilities.

(4) Promoting the Use of Public Transportation

The shift from private vehicles to public transportation, which is more energy efficient and emits less CO₂, is a necessary facet of global warming countermeasures. Thus we have made efforts to make public transportation more convenient through the introduction of an LRT/BRT system, improvements to transfers, and the promotion of the introduction of public transit IC cards and other computerization initiatives. In addition, we have made efforts to promote the diffusion of ecological commuting at the individual business level through a program to certify the Eco-commuting Excellence Office. Furthermore, information analysis and validation results of past activities for the Environmentally Sustainable Transport (EST) Model Project are being provided.



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Note Plan for the implementation of planned and continuous ecological driving of motor vehicles with the integration of evaluation and guidance.

(5) Optimizing Logistics

Exceeding 50% of the total domestic transportation modes in Japan, trucks account for the majority of the share ratio (ton kilometer basis in transportation). The CO₂ emissions base unit^{Note 1} of trucks is greater than that of mass transportation such as railroads and domestic shipping, and trucks account for 90% of the CO₂ emissions in logistics. In order to reduce CO, emissions while sustaining domestic logistics, we must strive to utilize energy efficient transportation modes such as railroads and domestic shipping in addition to improving energy efficiency and transportation efficiency of trucks. With a view to establishing an efficient system of logistics with a lower environmental impact, we are providing support for initiatives concerning joint transportation, modal shifts including the use of railways, efforts to promote the dissemination of large CNG trucks and other environmental vehicles, a smaller carbon footprint generated by logistical sites, and a smaller carbon footprint generated by ports and harbors. We are also promoting the dissemination of equipment containing natural coolants for use in warehouses for frozen and refrigerated goods. In addition to developing low-floor freight cars to accommodate the shipping of 40-ft. tall containers by rail, and providing subsidies for the acquisition of 31ft. containers for railways that are equivalent in size to 10-ton trucks, we are promoting the construction of energy-saving vessels and otherwise invigorating the coastal shipping and ferry sector. We are also working to disseminate the Eco Rail Mark (172 products (201 items) and 88 cooperating enterprises certified as of the end of September 2016), and the Eco Ship Mark (105 consignors and 122 logistics businesses enterprises certified as of the end of August 2016). In ports and harbors that are a hub for maritime and overland transportation, we are endeavoring to reduce overland transportation distances for cargo by promoting the development of international maritime container terminals, international logistics terminals, and domestic logistics sites compatible with combined multimodal transportation. In ports and harbors, we are also engaged in efforts to support the introduction of energy-saving systems, promote modal shifts and transportation streamlining based on the use of marine transportation for reverse logistics, facilitate the introduction and promote the use of recyclable energy, develop green tracts to contribute to CO, absorption, and create seaweed beds and other such ecosystems. In addition, we will continue discussions regarding blue carbonNote 2 in conjunction with relevant ministries and agencies and others.

In addition, in cooperation with the relevant ministries and related organizations, we hold the Green Logistics Partnership Conference to give awards to the excellent operations through the collaboration of logistics operators and shipping companies and to raise public awareness.

Note 1 The amount of CO_2 emitted by shipping 1ton of cargo for a distance of 1km.

Note 2 Carbon absorbed and fixed by sea algae, etc., in the ocean



(6) Promoting Low Carbonization of Railways, Ships, and Aviation

(i) Initiatives contributing to further enhance environmental performance in the railway sector

While rail has a smaller environmental impact than other modes of transportation, we are promoting the adoption of railroad-related facilities tied to the Ministry of the Environment and systems that help railway carriages generate a smaller carbon footprint and save energy and promoting the development of technologies to help improve environmental performance in order to further reduce the impact that rail has on the environment.

(ii) Initiatives for energy conservation and low carbonization in shipping

We are promoting energy conservation for ships in the area of coastal shipping by advancing the construction of vessels that contribute to energy conservation and supporting the demonstration of innovative energy-saving technologies. From the standpoint of advancing the development of an international framework and disseminating and promoting the development of technologies on an integrated basis in the area of international shipping, we have been supporting the private-sector development of technologies for the purpose of further reducing CO_2 emissions from vessels since FY2013 and spearheading IMO discussions on progressively fortifying regulations governing CO_2 emissions (fuel-efficiency regulations) and on creating an international framework that includes a program for reporting fuel consumption results (by which fuel efficiency during actual operations can be visualized).

(iii) Initiatives to reduce CO₂ emissions in aviation

We are advancing the implementation of area navigation (RNAV), which enables shortening flight time and distance and the User Preferred Route (UPR)^{Note} method, which allows the flight to have the most efficient altitude desired by the pilot, as well as enhancing aerial traffic systems by implementing the Continuous Descent Operation (CDO) which sustains minimal engine output by continuously descending without leveling out at any point during descent. We also

Note User Preferred Route

promote the use of ground power units (GPU) for airplanes and ecological cars such as Ground Service Equipment (GSE)^{Note 1} vehicles as a part of Eco Airport (eco friendly airport) activities. In addition, we are leading discussions on the creation of global frameworks for reduction of CO_2 emissions in aviation, and are leading discussions in conjunction with key countries toward the finalization of the global market-based measure (GMBM), which is an emissions trading system, for the International aviation sector agreed upon at the ICAO Assembly held in October 2016. We are also participating in the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE)^{Note 2}, in which air traffic control authorities and airlines cooperate to attain efficiency in flying. Furthermore, efforts to promote the use of alternative aviation fuels are being conducted in collaboration with the various stakeholders.

(7) Enhancing Energy-saving Capabilities in Housing and Buildings

The rise in the amount of energy consumed by the civilian sector is more prominent than in other sectors, which makes improving energy-saving capabilities in housing and buildings an urgent task.

In response to the fact that the basic energy plan will progressively mandate that new dwellings and buildings comply with energy-saving standards by 2020, the Act on the Improvement of Energy Consumption Performance of Buildings (Building Energy Efficiency Act), which sets forth regulatory measures such as measures for mandating compliance with energy-saving standards on the part of buildings above a certain size other than dwellings, and guidance measures such as measures with respect to a program for certifying buildings demonstrating excellent energy-saving performance and a program for indicating energy-saving performance, was promulgated in July 2015. The guidance measures went into effect in April 2016.

In order to communicate energy-saving performance to consumers in an easy-to-understand manner, efforts are underway to upgrade and disseminate a housing-performance indication system, CASBEE, the Building Energy-efficiency Labeling System (BELS), and other such programs.

Aside from this, the MLIT is supporting various efforts, such as the introduction of cutting-edge CO_2 emissions decreasing technology and energy conserving renovation, as well as efforts by small and medium-sized contractors in building zero energy housing and certified low-carbon buildings, while also lowering the interest rate by using the Japan Housing Finance Agency's securitization support business framework. In addition, it is working for the development and dissemination of things like the design and construction technology of energy-saving houses and buildings through holding workshops for design and construction professionals and providing support for the technological development of the leading private firms.

Furthermore, in order to stimulate energy-saving measures in pre-existing establishments, we are formulating supportive taxation measures for renovation work towards energy conservation in already existing residences and buildings.

(8) Promotion of Energy-saving Methods in Sewage

The reduction of carbon monoxide is being advanced by the implementation of energy-saving measures such as high efficiency equipment for sewage treatment, and with new energy measures such as the processing of raw sewage into solid fuel, and the high temperature incineration of raw sewage.

(9) Promotion of Environmental Measures for Construction Machinery

MLIT is implementing a system that gives type approval for construction machinery, such as hydraulic shovels and bulldozers, that meet the fuel consumption standards for major construction machinery.

(10) Implementation of CO₂ Sink Measures through Urban Greening

Urban greening is considered re-vegetation activities, which is subject to the greenhouse gas sink reports according to the Kyoto Protocol. Based on the basic plans for greening as formulated by the municipalities, we are promoting maintenance of city parks and the greening of communal facilities, such as roads and ports and private land.

MLIT is also working on public awareness regarding the meaning and effect of CO_2 sink measures by making cities more low carbon and green by mitigating the heat island phenomenon through improvement in the thermal environment

Note 1 Ground Service Equipment

Note 2 Asia and Pacific Initiative to Reduce Emissions

by things like improving ground covering.

3 Promotion of the Use of Renewable Energy

According to the "Energy Master Plan" which was approved by the Cabinet in April 2014 and based on the fact that that the introduction of re-usable energy is being expedited as much as possible for three years starting in 2013, MLIT is promoting use of the re-usable energy potential in offshore wind-power generation facilities in ports, harbors, and other extensive infrastructure spaces like airport facilities, as well as rivers and streams, and the stable yet abundant sewage biomass.

(1) Promotion of the Use of Marine Renewable Energy

Surrounded by the sea on all sides, Japan is blessed with abundant sources of marine renewable energy. Ports and harbors in particular are garnering attention as sites for the installation of offshore wind-power generation facilities.

Under these circumstances, the amended Port and Harbor Act went into effect in July 2016, and an occupation application system was established by which the entities to occupy port and harbor areas and the like are determined through open applications. We used the system to develop operation guidelines that enable the smooth introduction of offshore wind-power generation in ports and harbors, and published those guidelines to coincide with the enforcement of the amended Port and Harbor Act. In September 2016, we began discussions in conjunction with METI to streamline the process of reviewing offshore wind-power generation facilities and ease the burden on business entities based on the Electricity Business Act and the Port and Harbor Act, and in February 2017, published a skeleton plan to describe the ideal state of structural review.

For marine energy such as wave and tidal power, MLIT is working on guidelines to secure the safety/environmental aspects of floating power generating facilities and promoting the realization of new re-useable marine energy in cooperation with the concerned government ministries.

Column Introduction of Offshore Wind Power Systems in Ports and Harbors

The long-term, demand-supply outlook for energy (announced in July 2015 by METI) expects that renewable energy sources will account for 22% to 24% of Japan's energy mix in 2030, and the government as a whole is implementing initiatives for introducing renewable energy sources in response to this outlook.

Among the different types of renewable energy sources, offshore wind power generation provides the advantage of high facility usage rates, as strong, stable winds are more available offshore than onshore. Additionally, larger wind turbines can be installed offshore as compared to onshore, because there are fewer constraints regarding their size. A 5-MW-class offshore wind power generation facility (annual power generation of approx. thirteen million kWh, corresponding to electricity for approx. 4,210 ordinary homes) would be an extremely large facility, with turbine blades reaching a maximum height of roughly 150 m, and spanning a diameter of 130 m. Ports and harbors are thus considered promising sites for introducing offshore wind power generation facilities, and various ports have begun to engage in initiatives for their introduction, as introduced below.

Initiatives from the Port of Kitakyushu

In August 2016, Kitakyushu City commenced a public invitation of proposals from offshore wind power generation businesses to install and operate a wind farm in waters within the Port of Kitakyushu (approx. 2,700 ha). This was the first implementation of the new public-offering system for the occupancy of ports and harbors under the revised Port and Harbor Act. In light of the Hibikinada area's vast industrial-use land and the high potential of its port and harbor facilities, the city set its eyes on wind power generation, par-

ticularly on its wide industrial base and high job creation effect, and launched the Green Energy Port Hibiki project in fiscal 2010 with the aim of creating a comprehensive center that brings together all the functions of industries related to wind power generation. Based on reviews and evaluations by a



third-party evaluation committee, in February 2017 the city selected Hibiki Wind Energy as the planned developer of the offshore wind farm, from the perspective of the consortium's ability to implement the project and contribute to the port and region. According to the consortium's plan, the project will cost a total of approximately 175 billion yen, and a maximum of forty-four 5-megawatt-class wind turbines will be erected. Construction will start from fiscal 2022, and the turbines will be sequentially put into operation.

Initiatives from Kashima Port

Ibaraki Prefecture commenced a public invitation of proposals from offshore wind power generation businesses to develop and operate a wind farm in waters within Kashima Port (approx. 340 ha) in March 2017.

Through reviews and evaluations by the prefecture, a developer is planned to be selected after late June.

Today, nine ports and harbors throughout Japan are engaging in initiatives to introduce offshore wind power generation, including the Port of Kitakyushu and Kashima Port. When all projects are completed, some two hundred wind turbines will have been constructed in nationwide ports and harbors. The MLIT will make continued efforts to promote such initiatives for the smooth introduction of offshore wind power generation in Japan.

Area within Kashima Port subject to the public invitation

Location of the Kashima Port offshore wind farm project

(2) Promoting Small Hydroelectric Generation

As initiatives toward a low carbon society, the implementation of small hydroelectric generation by using rivers is being pushed forward. Specifically, MLIT is working on the thorough use of unused energy by the promotion of subsidiary power generating based on a registration system, providing project formation support by field contact points, and support for the introduction of small-scale hydropower facilities at sediment control dams, as well as the proactive introduction of power generation facilities for dam management at dams directly controlled by MLIT.

(3) Promotion of the Use of Sewage Biomass

The MLIT is promoting the use of energy derived from sewage sludge and the use of sewage heat.

In May 2015, the Sewerage Act was amended, thereby allowing heat exchangers to be attached to sewage conduits by private businesses and mandating efforts to be undertaken by sewage administrators to reutilize sewage sludge as a source of energy or fertilizer. Through the use of PPP/PFI, we will promote the energy utilization of sewage sludge by the use of bio-gas and solid fuel, as well as the use of sewage heat as renewable energy heat.

Column

First in Japan! Promotion of Low-carbon Urban Development by Providing Heat from Sewer Pipes at the Initiative of Private-Sector Businesses

Sewage that flows under the city has the characteristic of being cooler than ambient temperature in summer and warmer than ambient temperature in winter. This difference in temperature can be used to achieve energy conservation and reduce greenhouse gas emissions. People are seldom aware of the amount of sewage that is discharged, as it ordinarily flows underground, but as much as 14.5 billion tons/year are discharged nationwide. Even when narrowed down to commercial and industrial areas that have a high heat demand, this has the potential equal to the amount of heat needed to satisfy roughly 800,000 homes' worth of air-conditioning demand per year.

There are only sixteen case examples of sewage heat being utilized, as of the end of 2016, but because these cases use heat that is collected at a sewage treatment plant, the utilization of sewage heat does not measure up to the above-mentioned potential. Sewer culverts are buried underground, and installation had, up until now, only been allowed by sewerage administrators. However, the development of heat collection technology from sewage and active discussions by sewage heat utilization councils, etc. have raised awareness in recent years, concerning the importance of utilizing untapped sewage heat energy now more than ever before.

Against this background, the Sewerage Act was revised in May 2015, and regulations were eased to allow private businesses to install heat exchangers in sewer culverts to utilize sewage heat.



Komoro City pursues the concept of a "compact city," and endeavors to develop into an efficient, environmentally friendly city by gathering public facilities and hospitals in the city center. The idea of utilizing sewage heat was adopted as part of the initiative to consolidate city functions and promote low-carbon, energy-efficient buildings, so it was incorporated into the project for the relocation and construction of Komoro Kosei General Hospital, built up on the old city hall site.

Source) Komoro City

The project was implemented as a joint undertaking by Komoro City, an energy service business, and a





manufacturer possessing sewage heat utilization technology; the utilization of sewage heat was decided at the proposal of the energy service business. To utilize sewage heat, a heat collecting pipe was set inside the sewer pipes bordering the site using lining material that is commonly used for pipe rehabilitation. The collected heat is recovered by a heat pump water heater and utilized to supply hot water to hospitals. This reduces the fuel consumption of hot water boilers that use city gas, and thereby also reduces CO₂ emissions and expenses.

This initiative, coupled with city development efforts, promotes not only regional revitalization, but also carbon reduction and the utilization of untapped resources in the city, while being an advanced, pioneering case study of public-private cooperation that is expected to further expand the initiatives for sewage heat utilization in the future.

Column Sewerage Innovation – Strategy for Creation of a "Resource Produced in Japan" (Productivity Revolution Project)

Sewage sludge has conventionally been treated as waste and disposed of as landfill, but owing to technological progress in recent years, it has come to be regarded as a "resource produced in Japan" that could be widely utilized as biogas, sludge fuel, or fertilizer. The thorough utilization of sewage sludge will contribute significantly to the local production, along with local consumption of energy, which is mostly dependent on imports at present, and to increasing agricultural productivity.

[Utilization of sewage sludge in Japan]



[The potential of sewage sludge]

- Sludge produced at nationwide sewage treatment plants contains enough energy to generate electricity for approximately 1.1 million homes.
- If the total amount of phosphate that flows into sewage treatment plants is used for agricultural purposes, imports of phosphate could be reduced by roughly 10% (approx. 12 billion yen/year).

[Targets]

- (1) Promote the thorough utilization of sewage sludge, and increase its usage ratio for energy and agricultural purposes from approx. 25% (at present) to approx. 40% (by 2020).
- (2) Use sewage sludge to produce energy worth approx. 20 billion yen/year in place of fossil fuels.
- Strategy for thorough utilization of sewage sludge in the energy creation sector
- Promote biogas power generation at the initiative of the private sector.
- Consolidate regional biomass to produce economy of scale.



- Agricultural use of phosphate resources, etc. (BISTRO sewerage system)
- Increase agricultural productivity (increased yield, reduced fertilizer expenses) by dramatically changing the image of sewage sludge fertilizers at the initiative of the sewerage system.



[Utilization effects of sewage sludge fertilizer (case study of a farmer in Saga City)]

(4) Promotion of Solar Power Generation Using Infrastructure Space

Based on the changes in energy supply and demand triggered by the Great Eastern Japanese Earthquake, and in addition to the effective utilization of the vast spaces of sewage treatment plants, ports and harbors, and airport facilities, steps have been taken to insure the installation and placement of solar power generation facilities by public entities in public infrastructure spaces, such as government buildings, and for private businesses that can install such facilities in roads and urban parks.

(5) Promotion of Contribution Towards the Hydrogen Society

With the need for hydrogen energy expected to expand in the future, such as fuel cells for residential use (introduced to the market in 2009) and fuel-cell cars (introduced to the market in 2014), MLIT is working on realizing a hydrogen energy fueled society by preparing a conducive environment for the manufacturing, storage/transportation and usage of hydrogen.

(i) Promotion of dissemination of fuel-cell cars

The MLIT will support the fuel-cell vehicle introduction projects of private businesses and others in an effort to work toward the world's fastest diffusion of fuel-cell vehicles, and with the understanding that the diffusion of fuel-cell buses and other vehicles that are expected to create a relatively consistent demand for hydrogen is particularly important in the development of hydrogen supply infrastructure. In FY2016, the MLIT provided support for the full-scale introduction of the first two fuel-cell buses in Japan.

(ii) Initiatives for the commercialization of vessels powered by hydrogen fuel cells

We are developing a foundation for enabling private-sector companies to participate in efforts to promote the use of hydrogen in the maritime sector, such as by conducting studies on the commercialization of hydrogen fuel cell ships with exceptional environmental capabilities and formulating safety guidelines.

(iii) Setting up a marine transportation system for liquefied hydrogen

Since FY2015, Kawasaki Heavy Industries and other companies have been producing hydrogen through the use of brown coal, an unutilized energy source in Australia, and implementing a project to establish a supply chain for transporting liquid hydrogen to Japan (METI Project to Demonstrate the Establishment of a Supply Chain for Hydrogen Derived from Unutilized Energy Sources (MLIT partnership project)).

The MLIT has spearheaded efforts to set global safety standards needed for the safe marine transportation of liquid hydrogen on a multilateral basis through the IMO (International Maritime Organization). In order to establish a highly efficient and safe method of loading and unloading liquid hydrogen, energy carriers associated with the Strategic Innovation Promotion Program (SIP) have been engaging in research and development since FY2014 on loading systems for liquid hydrogen in collaboration with the Cabinet Office.

(iv) Promotion of the manufacture, use and application of hydrogen derived from sewage sludge

Sewage sludge is stable in terms of both quantity and quality, and is consolidated at sewage treatment plants. The proximity to urban areas and other characteristics of sewage treatment plants create promise for the realization of an efficient, stable hydrogen supply. Toward that end, we support the development and experimentation of hydrogen production technology at sewage treatment facilities to promote the manufacture, use and application of hydrogen derived from sewage sludge, which is a form of renewable energy.

4 Promotion of Global Warming Countermeasures (Adaptation Measures)

We are comprehensively and systematically promoting initiatives to address the various consequences of climate change based on the National Plan for Adaptation to the Impacts of Climate Change, which was adopted by a Cabinet decision in November 2015. As part of this plan, the MLIT–which oversees various sectors, namely the conservation of national land, and is tasked with creating safe, secure national land and communities–formulated the MLIT Climate Change Adaptation Plan in November 2015, and is promoting adaptation measures.

Based on the MLIT Climate Change Adaptation Plan, we are engaged in efforts to discuss and develop comprehensive adaptation measures regarding both structural and non-structural aspects in the fields of natural disasters (floods, landslides, storm surges, tidal waves, etc.) and water resources and aquatic environments, as well as efforts regarding measures based on the Outline of the Policy Framework to Reduce Urban Heat Island Effects, which contribute to the continuous monitoring of climate change and the delivery of forecast data and other information, and to adaptation measures in the fields of national and urban lifestyles.

Section 2 Promoting the Creation of a Recycling Society

Advancing Recycling in Construction

Construction and demolition waste (CDW) accounts for approximately 20% of all industrial waste, and 20% of final disposed amount. Suppression of the generation of CDW, and recycling and reuse of those waste are major tasks. In FY2012, approximately 73 million tons of CDW was generated nationwide. The recycling/reduction rate improved grad-ually to 96.0%, but the impending maintenance and updating of social infrastructure and other factors will likely generate an increased amount of construction byproduct, and further efforts are required to prevention, recycle and reduce those amounts in order to promote the use of recycled materials and to effectively use of excavated soil.

Sewage sludge also accounts for 20% of all industrial waste, reaching approximately 77.7 million tons in FY2014. We

are working on recycling and reduction of sewage sludge.

Figure II-8-2-1 cle Rate of Construction By-products 14.19 Electricity, Gas leat Supply, Water 25.7% Agriculture Forestry 20.8% Construction

(1) Advancing Recycling in Construction

Based on the "Construction Material Recycling Act (Construction Recycling Law)," we are working to enforce proper measures through a simultaneous patrol throughout Japan.

In the "Construction Recycling Promotion Measures Subcommittee" that have been formed in both the Environment Committee of the Panel of Infrastructure Development and the Environment Committee of the Transport System Section of



Subject materials		2012 Results	2018 Target
Asphalt waste	Recycling rate (%)	99.5%	99% or higher
Concrete waste	Recycling rate (%)	99.3%	99% or higher
Wood waste	Recycling and reduction rate (%)	94.4%	95% or higher
Construction sludge	Recycling and reduction rate (%)	85.0%	90% or higher
Mixed waste	Ratio of mixed waste in the generated amount of total CDW	3.9%	3.5% or lower
	Recycling and reduction rate (%)	58.2%	60% or higher
Total CDW	Recycling and reduction rate (%)	96.0%	96% or higher
Excavated soil	Efficient utilization rate	_	80% or higher

Amount of Industrial Waste by Industry Sector and Recy-

Source) MLIT "2014 Construction Recycling Promotion Plan"

the Council for Transport Policy, the relevant parties involved in construction recycling put together the "Measures related to the Promotion of Construction Recycling," a recommendation to promote mid-term objectives for the recycling and appropriate disposal of construction by-products for the future, and MLIT formulated the fourth action plan, the "2014 Construction Recycling Promotion Plan" in September 2014.

results) of the Ministry of Environment

According to this plan, the MLIT will be promoting construction recycling by working on fortifying the monitoring of construction by-products logistics, prevention before the start of construction, promoting recycling/reduction by thorough on-site sorting and delivery to recycling facilities, promoting use of recycled materials, and promoting the efficient use and appropriate disposal of excavated soil.



(2) Reducing Sewage Sludge and Promoting Recycling

MLIT is promoting the recycling of sewage sludge (FY2014 recycle rate 63%) and moving forward with the use of sewage sludge made into solid fuel for energy. Furthermore, we are proceeding with the Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH Project) for proving innovative technology and systems for the effective use of sewage based resources.

2 Constructing a Resource Recycling Logistics System

(1) Forming a Resource Recycling Logistics System by Utilizing Shipping

In order to form the "loop" of reusable resources for creating a recycling society, MLIT have specified 22 ports throughout Japan as Recycle Ports (Integrated Reverse Logistic Base Port) for wide-spread flows concerning reusable resources. At the Recycle Ports, they undertake activities such as securing coastal facilities like wharfs, aiding in establishing facilities for handling reusable resources, promoting the public-private partnership, and improvements in operations related to handling reusable resources. MLIT has partnered with the Ministry of the Environment to engage in efforts to lower the carbon footprint and costs of reverse logistics through modal shifting and improvements in transportation efficiency through the "Project to Promote Low-Carbon Type Reverse Logistics by Model Shift / Transport Efficiency."



(2) Well-planned Acquirement of Bay Area Landfill Sites for Waste

Bay area landfills are being prepared in order to receive dredge soil produced by harbor improvement, or to receive waste materials that have difficulty finding landfill sites in inland areas. In the Osaka Bay area in particular, regional waste disposal sites are being developed to receive waste generated around the Osaka Bay area through the Osaka Bay Phoenix Project^{Note 1}. Construction waste soil generated in the Tokyo Metropolitan Area is transported by sea and used widely for land-reclamation in ports and harbors of the whole country in accordance with the Super Phoenix Plan^{Note 2}.

Note 1 Business to promote the orderly development of the port by properly disposing in the sea landfill the waste generated from the 6 prefectures and 168 municipalities of the Kinki region.

Note 2 A mechanism for adjusting at the national level, the effective use of the soil from construction in metropolitan areas as resources for port construction in ports that need landfill materials.

3 Recycling Vehicles and Marine Vessels

(1) Recycling Vehicles

In accordance with the Act on Recycling, etc., of End-of-Life Vehicles (Act for Automobile Recycling), a system for confirming that end-of-life vehicles are properly recycled is being implemented. When a vehicle registration is deleted, as provided for in the Road Transport Vehicle Act, the vehicle weight tax will be subject to a refund program. We are endeavoring to promote the proper disposition of used vehicles and prevent illegal dumping. In FY2015, vehicles confirmed to have been scrapped numbered 1,404,939.

(2) Recycling Marine Vessels

The recycling of large vessels (ship recycle)^{Note 1} has generally been conducted in developing nations such as Bangladesh and India, where the frequent occurrence of human casualty accidents and marine pollution in the facilities continue to raise concern. In order to solve these issues, Japan lead discussions with the International Maritime Organization (IMO), which resulted in the adoption of the "2009 Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (tentative name) (Ship Recycling Convention)." This convention mandates the inspection and retention of proof documents for marine vessels and ship recycling facilities respectively, and also bans the use of asbestos or polychlorinated biphenyl (PCB) in newly built vessels.

In Japan, studies are being carried out on enacting domestic laws required for conclusion of the Ship Recycling Convention with the aim of enforcing this convention as soon as possible. Conclusion by key recycling countries is also needed to put this convention into effect; thus the MLIT is holding intergovernmental discussions toward improving facilities for recycling ships in India, the world's largest recycler, and India's conclusion of the convention. At a meeting between Prime Minister Abe and Prime Minister Narendra Modi in November 2016, Prime Minister Abe indicated Japan's intent to support the improvement of facilities in India, and the two prime ministers pledged their intent to conclude the convention as soon as possible.

On other fronts, because pleasure boats are mostly made of fiber reinforced plastic (FRP), which is difficult to dispose, there has been a demand for a waste processing route for proper disposal. In response, we undertook activities in building a processing route, as well as developing recycling technologies for FRP boats. As a result, approximately 550 FRP vessels have been properly recycled yearly under the leadership of the Japan Marine Industry Association throughout Japan since 2005. This is undertaken using the National Permit System based on the Waste Management Law.

4 Efforts in Green Procurement Note 2

In light of partial revisions to the basic government policies, based on the "Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing)," the "Policy for promoting the procurement of ecologically friendly goods, etc." was adopted. Based on this policy, we are actively advancing the procurement of ecology-friendly goods for building materials, construction machinery, method of construction, and objectives in public construction work.

5 Promoting the Use of Wooden Building Materials

Because wood is an environment-friendly building material due to reasons such as requiring less energy to process in comparison to other materials, and long-term utilization in various applications contributing to preventing global warming and forming a recycling-oriented society, we strive to encourage the utilization of wooden materials in public construction.

Based on the "Act for Promotion of Use of Wood in Public Buildings," etc., national implementation status of wood usage promotion is published every year, and the "Plan for the promotion of the use of wood in public buildings" was formulated to work on the use of wood as building materials and for the interior of buildings. MLIT is working to set up technical stan-



dards relating to designing and building, and to disseminate these standards.

In order to advance the construction of wooden dwellings and buildings, various initiatives are being undertaken, such as supporting the construction of long-lasting quality housing built out of local wooden materials as well as other high-quality wooden housing; supporting the construction of medium-sized and large wooden buildings incorporating pioneering design and construction technologies; supporting the construction of wooden dwellings suited to regional climates; developing local programs for the production of wooden housing; and training leaders.

Section 3 National Land Development That Revives and Preserves the Natural Environment

Initiatives for Biodiversity Conservation

COP 10 was held in Nagoya, Aichi Prefecture of Japan in October 2010, where the Strategic Plan 2011 - 2020 (Aichi Targets) was adopted. In order to achieve these targets, MLIT has promoted various actions in nation-wide level. "The National Biodiversity Strategy 2012 - 2020" was formulated in September 2012, which aims at conservation, restoration, and creation of wildlife habitats in rivers, urban green areas, coastal areas, and harbors.

Efforts toward conservation of biodiversity have been deployed also in local municipal level. "Technical Guideline for Biodiversity Conservation in Basic Green Plan" was formulated in October 2011, which local governments refers to in formulating "Basic Green Plan" in each region in order to consider technical matters regarding biodiversity. Furthermore, a draft of "Urban Biodiversity Index" was formulated in May 2013, which aims at encouraging local governments' efforts toward urban biodiversity conservation by measuring its habitat potential and progress in implementing policies. In March 2015, MLIT, together with Ministry of the Environment and Ministry of Agriculture, Forestry and Fisheries, formulated the "Action Plan for protection from Alien Species" which aims for promoting management of Alien Species comprehensibly and effectively, and then conservation and sustainable-use of in rich biodiversity in Japan.

2 Creating Rich and Beautiful River Environments

(1) Creating and Conserving a Healthy River Environment

(i) Creating a rich river environment and stimulating revival

In river development, based on the "Basic Guideline for Rich River Development (established in October 2006)," we work for the conservation and restoration of animal habitats and diverse river scenery, while concurrently sustaining safety over flood control.

While promoting the restoration of marshland by nature restoration projects and the improvement of the upstream and downstream migration environment for fish by fixing the fish passage ways, we are also promoting the protection and restoration of the watershed ecosystem with the goal of forming an ecosystem network^{Note} by cooperating with various entities, as demonstrated in the project of rehabilitating storks to the wilds in Maruyama River (Toyooka City, Hyogo Prefecture).

Moreover, to effectively proceed with these activities, we are joining efforts with educated experts and various institutions, as well as utilizing research findings of government inspections of river areas and the Aqua Restoration Research Center, which has the largest experimental waterway in the world.

(ii) Countermeasures for non-native species in the waterways

Non-native species, which are one of the threats against biodiversity, have been expanding their habitat in the waterways all over Japan. As a countermeasure, we have circulated information such as the "Guideline for Countermeasures for Nonnative Plants in Rivers" and "Examples of Countermeasures for Non-native Fishes (December 2013)" and are implementing measures against foreign species in various locations.

(2) Initiatives to Recover the Water Supply in Rivers

In order to preserve a healthy river environment, it is essential to sustain a rich supply of water. For this reason, we have specified the required amount of water in the basic policies for river improvement, based on the habitat of plants and animals, scenery, and water quality. In addition to working to sustain the supply, we are proceeding with activities for clean river recovery in recession areas downstream from dams of hydroelectric power plants. Meanwhile, in order to preserve the river environment downstream of dams, flowing water is being retained in flood-control reservoirs to the extent that flood-control functions are not impeded and usable discharge dams are subject to elastic management practices and elastic management testing. (Water was retained using twenty-one dams in total in FY2016, nineteen of which were subject to the usable discharge of water.) Initiatives concerning medium-sized flash discharging to cause changes in river formations are also being undertaken. Furthermore, we are working to restore the water supply of rivers in urban areas, where the average amount of naturally flowing water has diminished, by pumping treated water from sewage plants.

(3) Promoting Activities in the Comprehensive Management of Sediment from Mountains to Coastal Areas

Concerned that water systems will accelerate problems such as variation in river environments caused by changes in sedimentary transport, diminishing sand supplies to the coast, and coastal erosion caused by changes in littoral drift, relevant institutions are working in cooperation to comprehensively control sediment transport from mountains to coastal areas. Specifically, in order to deal with the problem



Note Using districts which have excellent natural conditions as core areas and by connecting them organically to ensure the appropriate placement and connections between habitat spaces. caused by the sediment transport in mountain streams, dams, waterways and the coasts, in cooperation with the relevant organizations, MLIT is working on projects for formulating comprehensive sediment management plans for effective sediment management and building sediment control dams, building open-type sediment control dams so that sediment can be effectively washed downstream, improving existing sediment control dams, creating an effective flow of sediment by sediment bypasses for dams, and recovering of sandy beaches by such methods as appropriate sand and gravel extraction of the waterways, sand bypass and littoral nourishment.

(4) Environmental Education on Rivers

As natural environments close to communities, recently, rivers host a variety of activities such as environmental studies and natural experience activities. In addition, we are promoting projects and disseminating of information so children can safely learn and play by riversides. Because there are hidden dangers and proper knowledge is essential for safe activity, we cooperate with the NPO River Activities Council (RAC), a citizens' groups which played a central role in establishment, to promote the cultivation of river administrators.

Also, in order to widely disseminate environmental education on rivers in the schools, MLIT is providing information to textbook publishers to introduce environmental education projects.

Children's Riverside Rediscovery Project

With the cooperation of citizens' groups, educators, and river administrators, rivers are registered as Children's Riversides and receive various means of support from the Center for Supporting Children's Riverside Activities. 302 locations are registered as of the end of March 2016.

○ Riverside Fun School Project

Utilization is encouraged for riversides that are registered as Children's Riversides and undergo riverside improvements required for enhancing experiential activities. 287 locations are registered as of the end of March 2016.

○ National Aquatic Organism Study

Conducted with the goal to increase interest in rivers through a survey of life forms found in nearby rivers. In FY2015, 58,143 people participated. 62% of the inspection points (2,227 points) were judged to have "clean water."

3 Preserving and Improving Coastal Environments

Because we must preserve animal habitats, care for scenery, and sustain appropriate usage of beaches, while protecting the coast from storm surges, tsunamis, and high waves, we are proceeding with maintenance and conservation that balances between "defense," "environment," and "usage."

In addition, based on the "Law for Protecting Beautiful and Rich Nature through the Promotion of Disposing of Beached Coastal Waste and Contributing to the Preservation of Coastal Scenery and Conservation of the Environment (Coastal Waste Disposal Promotion Act)," we will implement effective measures for beached waste in close cooperation with relevant institutions in the future.

We are also providing support to administrative agencies for coasts under the "Project for Emergency Measures to Dispose of Large-Scale Driftwood and Other Debris Items that have Washed Ashore in Connection with Disasters" when large quantities of driftwood and other debris are washed ashore and impede the functions of coastal protection facilities.

We are also providing support for the processing of neglected and stranded vessels and the removal of slime that abnormally accumulates in sea areas in order to secure the functions of coastal protection facilities, conserve the coastal environment, and facilitate the proper use of coastal areas.

4 Greening Port and Harbor Administration

(1) Basic Direction of Future Port and Harbor Environment Policies

In order for ports and harbors in Japan to uphold their position as grounds for logistics, industry and living, and sustain continual growth, they must recover as much degraded or lost nature as they can, and incorporate environmental conservation in various port functions. For this reason, we are working towards greening port administration, which involves the two parts of port and harbor development and utilization, and conservation, revival, and creation of environments in to one consolidated subject.



(2) Actively Preserving, Reviving, and Creating a Healthy Sea Environment

We strive to efficiently utilize dredged sediment derived from harbor maintenance, by usage in creating tidal flats, sand capping, filling pits from deep digging, and disseminating port facilities that can coexist with organisms. At the same time, various organizations such as administrative agencies and research institutes will register environmental data and construct a sharable database on the ocean environment; gathering, accumulating and analyzing data. Together, we actively work to preserve, revive and create a rich natural environment in coastal areas.

In addition, the "Seaside Nature School," which utilizes the areas preserved, revived or created, is being held in various locations throughout Japan as an effort to create opportunities for learning the importance of the natural environment.

(3) Initiatives in Measures for Preventing Illegal Boat Parking

As there is concern that parked boats may mar the scenery, affect the navigation of other vessels, and cause secondary damage in the event of a tsunami, regulatory measures are being implemented, such as by improving the mooring and storage capacity of small vessels and by designating no-parking zones.

Mainly aquatic area administrative agencies and others are promoting efforts toward various measures for preventing

Example of Greening Roads (Chiyo-

illegal boat parking, based on the a promotion plan consisting of comprehensive measures for properly managing pleasure boats and improving their usage environment, which was formulated in May 2013.

5 Greening Roads and Promoting Natural Environmental Measures

Greening roads is crucial for providing a comfortable atmosphere for those who use them, creating favorable scenery that matches the surrounding scenery, and as a countermeasure against heat island effects. To this end, we are promoting the favorable greening of roads and the appropriate management of this process in accordance with technical standards pertaining to the greening of roads. Based on the recommendations provided in October 2016 by the Commission for Athlete-/Spectator-Friendly Road Development consisting scholars and experts in athletic competition, we are also endeavoring to green roads and initiatives for comprehensive measures to keep road surface temperature from rising in preparation for the Tokyo Olympic and Paralympic games in 2020.

Figure II-8-3-3 da-ku, Tokyo)

Source) MLIT

Section 4 Maintenance or Restoration of Sound Water Cycle

Aiming to Maintain a Society in which the Benefits of Water Can Be Savored for a Long Time to Come

In recent years, many issues and risks have threatened water resources in Japan, including the risk of widespread, long-term suspension of the water supply due to the vulnerability of the water infrastructure to large-scale-disasters and the like, and because of accidents due to aging water-related infrastructure, as well as the risk of water shortages due to climate change caused by global warming.

Given these circumstances, in March 2015, the Water Resource Development Subcommittee of the National Land Development Council recommended efforts toward shifting the focus of water resource policy from demand-driven water resource development to a stable supply of water based on risk management.

The Kumamoto Earthquake that struck in April 2016 caused substantial damage to water infrastructure, and water shortages from June to September resulted in widespread restrictions on intaking water. This reminded us of the problems and risks that stand in the way of a stable water supply.

In light of these circumstances and our renewed understanding, the six Basic Plans for Water Resource Development for seven river systems are required to review. In December 2016, the Minister of the MLIT requested opinions about the way of reviewing the Plans concerning the stable supply of water based on risk management, from the National Land Development Council. The Investigation Planning Committee of the Water Resource Development Subcommittee of has been discussing the matter since January 2017.

Column Dry Spells along the Tonegawa River System in 2016 and Countermeasures to the Water Shortage

In 2016, droughts in extensive areas throughout Japan caused water restrictions to be imposed in a variety of regions, including Kanto and Shikoku. The Tonegawa River system, in particular, began to see a decline in the flow of its rivers from after May, due to the smallest amount of snowfall ever recorded in its upper reaches, the melting of snow a month earlier than in usual years, and a decline in the amount of rainfall to roughly 48% (total rainfall 56 mm) of an average year.

In response to this situation, the eight dams upstream of the Tonegawa River (the Yagisawa, Naramata, Fujiwara, Aimata, Sonohara, Kusaki, and Shimokubo dams, along with the Watarase reservoir) managed by MLIT's Kanto Regional Development Bureau and the Japan Water Agency, acting as important water reserves for the Tokyo Metropolitan area, were replenished daily of the amount of water they lacked, so as to prevent disruption of the water supply or other adverse circumstances.

However, as there was no concentrated rainfall during this time, the water supply at each of the dams soon dropped to the lowest level in the twenty-five years since all eight dams were put into operation. Out of concern that the water shortage may have serious impacts on the Tokyo metropolitan area, the MLIT Drought Countermeasure Headquarters (headed by: Keiichi Ishii, Minister of MLIT) was established on June 14, and held a conference.

Minister Ishii issued instructions to "ensure smooth coordination among water consumers through a council for addressing the water shortage along the Tonegawa River system," "share and disseminate information on the water shortage situation and call on people's cooperation in saving water, to ensure effective utilization of limited water resources," and "make preparations so that relevant departments and bureaus can take the necessary measures in case the impacts of the water shortage expand further."

On June 16, the MLIT decided to impose a water restriction (10%) that would be the first restriction since 1987 to be imposed on the Tonegawa River during the month of June. In response to this, a call for water conservation was put out along the Tonegawa watershed by disseminating information via various media. Additionally, the monitoring and control system of the Tone-ozeki Dam was strengthened, and fine-tuned operational adjustments were made day and night, all days of the week, in an effort to save as much water as possible. Furthermore, in preparation for the worst-case scenario, in which all eight dams would have run dry, preliminary discussions were held with the electric company that owns the dam's water capacity exclusively for power generation, looking to obtain its cooperation in discharging water from the power generation capacity in case of emergency.

Additionally, in anticipation of a water shortage in summer due to the small snowfall and warm winter trend, water was intermittently conveyed from the Tonegawa River to the Edogawa River at the Kitachiba headrace channel located downstream of the Tonegawa River, while closely monitoring the flow of the river since February, as a measure to minimize water supply from the eight dams and preserve their reserves of water. It is thought the necessity of imposing a water restriction was able to be delayed by eight days, and that a 20% water restriction was averted, compared to if the water conveyance measure had not been taken.

While employing these initiatives against water shortage, there was fortunately a concentrated amount of rainfall, so the water restriction was fully lifted on September 2, and the water shortage was resolved. In the end, this 2016 water shortage did not develop into a serious situation that called for water supplies to be cut off, but it provided a renewed awareness of the importance of our limited water resources, and the need to make continued efforts ensuring effective utilization.



Minister Ishii issuing instructions at

the MLIT Drought Countermeasure Headquarters

Melting of snow in the upper reaches of the Tonegawa River system is

earlier than usual years (near Naramata Dam)

Source) Japan Water Agency

Water storage level at the eight dams upstream of the Tonegawa River in years of major water shortage



Source) MLIT

Notice of imposing a 10% water restriction along the Tonegawa River system (twitter)

〇〇 国土交通省

【節水にご協力を】首都圏に水を供給する利根 川上流8ダムの貯水量は、平成4年以降の同時

加上して最小の状況です。 本日から利根川水系で10%の取水制限を実施しています。節水にご理解とご協力をお願い します。



Source) MLIT

Examples of MLIT's drought countermeasures (information transmission, utilization of the Kitachiba headrace channel)

Information is provided to rive Information is provided Information is provided to to people visiting or passing by government offices (Kanto Regional users by posting a message calling users who pass through roads equipped with road for water conservation on river information provision devices patrol vehicles, etc. (Edogawa River (National Route 298) Development Bureau) 月川/ e watershed ar 8 1 li sid-Water accumulated downstream of the Toneg River is used as much as possible, to maintain the Information is provided using dam info boards (Ikari ter sto ed in the da Dam) Eight dams upstream of the Tonegawa River Information is provided to passersby in public facilities near train stations (Shiniuku South Exit traffic 4 Citv.w バスタ新宿

Source) MLIT

Source) MLIT

Poster calling for water-saving efforts put up in

フォローする





Source) MLIT

2 Initiatives in Improving the Water Environment

(1) Promoting Water Purification

The MLIT is implementing purification of contaminated water in rivers with seriously deteriorated water environments and water purification of dredged bottom mud. In addition, the local municipalities that are proactively working on the water environment improvement and related institutions, such as river administrators and sewage work administrators are working together to formulate the "Second Water Environment Improvement Urgent Action Plan (Clear Stream Renaissance II)" and implementing the plan (formulated in 32 locations).



(2) Water Quality Survey and Water Quality Accident Response

Water quality surveys are vital in conserving and maintaining a favorable water environment. In 2015, surveys were done at 1,079 locations on 109 water systems of Class A rivers.

The MLIT is creating water quality survey maps and conducting surveys of aquatic organisms in cooperation with citizens. As a result of surveys being conducted on Class A rivers in cooperation with the local residents—which were based on indices such as the amount of garbage and on odor—in 2015 approximately 24% (73 locations/303 locations) were judged to be "rivers that look clean enough for swimming."

In 2015, there were 1,120 water quality accidents in Class A rivers due to spillage of oil and chemical substances, a decline of 118 from the previous year. In terms of water pollution prevention, Water Pollution Prevention Liaison Councils composed of river administrators and related institutions have been put in place for all 109 waterways, and they are working on prompt information communication for incidents of water quality accidents as well as damage prevention by building oil fences.

- For Class A Rivers (including lakes and coastal areas), the proportion of survey sites that met the environmental standards for BOD (biochemical oxygen demand) or COD (chemical oxygen demand) value was 92% in 2015.
- For environmental standard items relating to the protection of human health (27 items such as arsenic), the proportion of survey sites that met the environmental standards was approximately 99%, with most sites meeting the standards.



(3) Improving the Water Environment of Enclosed Coastal Seas

Regarding the enclosed coastal seas of the Tokyo Bay, Ise Bay, Osaka Bay, and the Seto Inland Sea, because of the polluting load draining from land and deterioration of purification capacity in ocean areas duo to the loss of tidal flats and

seaweed forests, the fishing industry has suffered damages from the occurrence of red and blue tides. In addition to this, there have been occurrences of environmental deterioration, as well as navigational obstacles to vessels, due to drifting debris and oil.

To resolve the current state, we advance activities to revive beautiful oceans by (1) sediment dredging, sand capping, and back-filling pits from mining to improve the substratum, (2) creating habitats for organisms by reviving tidal flats and seaweed forests and disseminating buildings that can coexist with nature, (3) removing floating waste and oils by using sea environment maintenance ships, (4) reducing the amount of pollutants released into the ocean by improving sewage treatment facilities, and (5) developing a system to get various entities to improve the environment in collaboration with one another.

(4) Stimulating Sewage Maintenance to Improve the Water Environment

We will appropriately formulate and review the comprehensive basin-wide planning of sewage systems, and promote advanced treatment to remove nitrogen and phosphates that contribute to the eutrophication of enclosed bodies of water. In addition, we are working for early advancement in improving water quality and stratified advanced water treatment by partially renovating equipment and facilities in treatment plants that have not yet reached their scheduled renewal period.

As for the combined sewerage system, we plan to complete implementation of measures by the end of FY2023 through controlling the amount of water and the frequency at which untreated water is released in to streams during heavy rains.

3 Cultivating Water and Using It Efficiently

(1) Stable Supply of Water Resources

In order to secure stability in the utilization of water, there must be a variety of policies to meet the differing situations in communities, from the standpoints of both supply and demand. Specifically, in the case of demand, we are promoting measures to strengthen the recovery and reuse of water and increase awareness about conserving water. For supply, we are promoting measures to build and maintain facilities to supply water, including water resource development facilities such as dams, implementing countermeasures for aging facilities, and developing crisis management measures, etc. In addition to promoting sustainable conservation and use of groundwater, as well as the use of rainwater and recycled water, based on the "Special Measures for Water Source Area Act," work is being done to develop the living environment of water source areas and industrial infrastructures, along with prevention of water pollution of the dam reservoirs.

There is concern that climate change caused by global warming will lead to more frequent, severe droughts that last longer and give rise to more drought-related damage. For this reason, the MLIT will promote measures to prevent/mitigate the damage caused by drought, such as strategies to minimize damage at the time of critical droughts.

(2) Efficient Use of Water Resources

(i) Initiatives towards expanding the utilization of recycled water derived from sewage

Stable amounts of recycled water can be secured and is a valuable water resource in urban areas. Of all the treated sewage, approximately 1.3% undergoes treatment according to purpose, and recycled water is used in streams, sustaining water levels of rivers and the sanitation of toilets. We aim to further expand the utilization of recycled water.

(ii) Promoting the utilization of rain water

In order to efficiently utilize water resources, initiatives are being promoted to treat and use rainwater and wastewater from facilities for sanitation of toilets and sprinklers. There are approximately 2,100 facilities utilizing treated water as of the end of FY2015, and they use over 8.3 million m³ a year. The "Law for Promoting the Use of Rainwater (2014 Laws, Issue 17)" was enacted on May 1, 2014, and in March 2015 the "Basic Policy for the Promotion of Rainwater Use" and the "Goal for Establishing a Facility for the Use of One's Own Rainwater in Cases Where the Building is Equipped by the National Government or an Independent Administrative Agency" were established in order to promote the use of rainwater and thereby facilitate the effective use of water resources. Additionally, the government will formulate and enact comprehensive measures for the purpose of contributing to the containment of concentrated drain of rainwater to the sewers and waterways.

(3) Securing Safe and High Quality Water

In an effort to provide safe and high-quality tap water, we have worked to preserve water quality in public water areas, which serve as our source for tap water, by ensuring river flow rates required for river environments and for water use by relevant river users, by enhancing monitoring systems through coordination of river administrators, waterworks operators and other relevant organizations to prepare for unforeseeable incidents such as water quality degradation, and by implementing household wastewater measures based on the appropriate division of burdens between sewage systems, community wastewater facilities and septic tanks.

(4) Promoting Measures Concerning the Permeation of Rainwater

Due to the spread of impervious areas in recent years by urban development in basins, more rainwater flows into rivers in short periods of time instead of being absorbed into the ground. In addition to reducing flood damage from heavy rains by absorbing as much rainwater as possible into the ground, the improvement of rainwater storage infiltration facilities are being promoted through tax measures, for cultivating groundwater, contributing to the revival of springs, and building a sound water cycle system.

(5) Advancing the Conservation and Use of Sustainable Groundwater

It takes an extremely long time to recover from damage caused to groundwater, such as in the form of groundwater pollution or saline contamination. In particular, ground subsidence is an irreversible phenomenon. For this reason, we will engage in groundwater management in accordance with local conditions in order to prevent groundwater damage, conserve the ecosystem, protect local groundwater sources, and advance the conservation and use of sustainable groundwater to be used as a water resource.

4 Realizing Amenity by Promoting Improvements to Sanitary Drainage

Sewage is the indispensable social infrastructure for the development of healthy cities, treating waste, and preventing floods. In recent years, sewage systems have been asked to take on new roles in helping to form a low-carbon, recycling-oriented society and in maintaining or restoring a healthy water cycle.

(1) Dissemination of Sewage Processing with Sanitary Drainage

Although the dissemination of sewage treatment plants reached around 90% (with the dissemination of sewage systems at around 78%) of Japan as of the end of FY2014 (total of 46 prefectures, excluding some municipalities in Fukushima due to the effects from the Great Eastern Japan Earthquake), there is a large gap between regions. In particular, the dissemination rate of sewage treatment plants in small to medium communities with populations of less than 50,000 people remain low, only reaching a ratio of approximately 78% (dissemination rate of sewage systems approximately 50%). Focusing on improvement in areas with high population density, the advancement of efficient development



in accordance to condition of communities and the rectification of the gap between communities are seen as being of the utmost importance for developing sewage systems in the future.

(i) Initiatives towards the septic system overview in roughly 10 years

In regards to the maintenance of sewage treatment facilities, individual disposal by using septic tanks are economical in areas where households are widely distributed throughout a region, while the collective disposal with sewerage systems and drainage facilities for agricultural communities become more economical as the population density rises. For this reason, each prefecture has established a "Prefectural Plan," a compiled maintenance plan over sewerage treatment which reflects considerations over regional characteristics such as the economic efficiency and importance of protecting water quality. Currently, in light of the population decline of recent years, MLIT is promoting an immediate reexamination of prefectural schemes and the



Example of Implementing the Sewerage

Quick Project (Small-Scale Waste-water Treatment Facility in Engaru Town, Hokkaido)

creation of mid-term (action plan)/long-term equipping plans, in order to work towards a septic system overview in roughly 10 years. In addition, efficient means of maintenance are also being actively promoted through the implementation of cooperative schemes between other waste water treatment facilities such as cross-jurisdictional wastewater treatment.

Figure II-8-4-5

(ii) Sewage quick project

Taking into account the population decline and the difficult fiscal situation, this project seeks to widely introducewith the cooperation of the district citizens and verification of the performance by a committee of experts-maintenance methods that are not stuck in technological standards of the past, that meets the current conditions of the district, and that are low-cost, while making early and flexible maintenance possible. By FY2015, a social experiment was conducted in 14 municipalities, and 6 technologies-such as the "Small-Scale Waste-Water Treatment Facility (contact oxidation method)"-were determined to be effective, leading to a user's guide being put together for the use of these technologies. The verification/evaluation of the other technologies is in progress to make nationwide usage possible.

(2) Attaining Durability in Sewage Projects

(i) Proper stock management

Sewage systems possess enormous amounts of stock consisting of approximately 470,000 kilometers of pipes and conduits and approximately 2,200 terminal treatment stations (as of the end of FY2015).

Source) MLIT

As these systems were rapidly developed during and after the period of high economic growth, aging facilities are expected to rapidly increase in number in the future. Although in FY2015, mainly small scale issues were arising, road collapses have occurred in 3,300 places due to corrosion caused by hydrogen sulfide and aging of the conduit facilities. Because the sewage system is an important social infrastructure which supports the safe and secure social and economic activities of urban living and provides a lifeline that is difficult to replace with alternative means, there is a necessity to sustain the required functions by conducting efficient, planned measures to deal with aging facilities through the introduction of stock management that practices preventative maintenance, while at the same time considering the introduction of comprehensive private consignment and efficient pipe inspection methods.

In May 2015, the Sewerage Act was amended and standards for maintaining and repairing sewage systems were established. In response, it was decided that drainage facilities at significant risk of corrosion would be inspected at an appropriate frequency of at least once every five years and initiatives to ensure sustainable sewage functions are being undertaken. Under these amendments, a council meeting program for engaging in necessary discussions on widening the geographic scope of sewage works and forming partnerships among the administrators of sewage works shall be established and the provision of support to local governments will otherwise be reinforced to ensure the durability of sewerage projects.

(ii) Efforts to expand sewage systems

Amid concern over the vulnerability of sewage system management systems due to factors such as the decrease of skilled workers in municipalities throughout Japan, we are promoting various efforts to contribute to efficient business practices, such as merging treatment areas from multiple municipalities and treating sewage sludge together with liquid effluent. To further promote widespread cooperation between multiple sewage system administrators, we established a council meeting program in the Sewage Act, which was amended in May 2015, and have undertaken other efforts to ensure the sustainability of sewage operations.

(iii) Promoting financial health

In the operation of sewerage projects, it is a fundamental rule to cover costs (excluding portions covered by public expense) for treating waste water with money acquired from usage fees, and although financial health has been improving overall in recent years, the business environment is expected to grow more stringent in the future due to the impending decrease in income from user fees due to the reduced population and other factors, the increase of repair and update expenses due to deterioration of facilities, and other factors. To address these issues, we are pushing initiatives for the restoration of financial health in sewage business management by collaborating with the Japan Sewage Works Association to organize ideas for the future state of user fees for collecting the portion of expenses required for asset maintenance in advance, to prepare for future increases in repair and update expenses.

Column Initiatives for Widening the Scope of the Sewerage System under a Council System

Under the Sewerage Act that was amended in May 2015 (Article 31-4), a council system was established to provide a forum for discussions toward wide-area cooperation by multiple sewerage administrators.

In August 2016, sewerage administrators of Tondabayashi City, Taishi Town, Kanan Town, and Chihaya-akasaka Village in Osaka Prefecture established, for the first time in Japan, a legal council based on the amended Sewerage Act and are currently discussing measures for widening the scope of their clerical work from fiscal 2018.

In November 2016, the second council was established by Saitama Prefecture, municipalities in the prefecture, and the Saitama Sewage Systems Agency, to discuss their joint engagement in business administration, disaster prevention, and sludge treatment.

For the sustainable implementation of sewerage works, it will be necessary to expand the initiatives for wide-area cooperation nationwide, such as by utilizing the council system. Based on this awareness, the MLIT will also play its part in supporting these initiatives.



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(iv) Consigning facility management to private sectors and acquiring technical capabilities

Deliberations for the introduction of public facilities governance method for sewerage projects, and efforts for making further use of private sector consignment^{Note 1} for the maintenance management of sewage treatment plants, are both moving forward. Based on demands from local public organizations, the Japan Sewage Works Agency provides technical support for constructing sewage facilities, as well as for optimizing their operation and maintenance, and cultivating technical experts at local public organizations, while developing new technology.

(3) Revitalizing Communities through Sewage

The proper treatment of wastewater through improvements in sewage, and the preservation or creation of healthy water environments, stimulates promotion of tourism and industry. In addition, by creating river fronts using recycled water from advanced wastewater treatment, stimulating regional activities through the operation and management of water amenity spaces by citizens, utilizing space above wastewater treatment facilities, transferring sewage heat to be used as district heating or for melting snow, utilizing sewage sludge as fertilizer, utilizing bio-gas as energy and efficiently using sewage resources, sewage contributes to regional vitalization in numerous facets.

(4) Promoting Environmental Education in the Field of Sewage

Working groups, consisting of elementary school teachers and sewage administrator representatives, created teacher edition textbooks that were well suited for classroom use for sewage education. In order for teachers to freely make use of these teaching materials regarding sewers, they are being offered through the "Sewer Systems, the Path of Circulation Environmental Education Portal Site^{Note 2}." Additionally, subsidies are granted by Sewer Systems: the Path of Circulation Environmental Education Assistance Council Meeting Program



Source) MLIT

to each elementary and middle school for supporting environmental education on sewage.

Note 1 A method of facility management that reflects original ideas of private contractors by consigning details of operation methods in order to optimize operation while charging the responsibility to secure a specified level of capabilities such as sustaining the quality of released water to optimize operation.

Note 2 "The Path of Recycling Sewerage Environmental Education Portal Site" http://www.jswa.jp/kankyo-kyoiku/index.html
Section 5 Protecting the Marine Environment

(1) Control Policies over Large Scale Oil Pollution

In order to eliminate the substandard vessels (a major factor for large scale oil pollution), Japan actively participates in international initiatives, such as the formulation of the international shipping database (EQUASIS), while also strengthening Port State Control (PSC), which ensures that vessels meet standards, by conducting on-site inspection of vessels that enter Japanese ports. In addition, the scheme under which an IMO audit team audits whether a flag state's government is fulfilling the duties of monitoring and supervising its own ships was approved for establishment as a voluntary scheme at the IMO General Assembly in 2005, based on a proposal from the Japanese government. The audit scheme became mandatory in January 2016. The Japanese government introduced a quality management system based on ISO 9001, and established a system on international level for implementing conventions.

In other fronts, as countermeasures for occurrences of large scale oil pollution in the Sea of Japan, Japan is working on strengthening international cooperation and collaborative systems by drawing up plans such as the "NOWPAP Regional Oil and HNS Spill Contingency Plan" through the "Northwest Pacific Action Plan (NOWPAP)," the framework for joined efforts between Japan, China, Korea and Russia for protecting the marine environment. As for large-scale oil spillages that occur in the sea around Japan, we have formulated the Plan for Preventing and Removing Discharge Oil, etc., which sets out prevention and removal regulations and the like, and have established measures for promptly and reliably responding through the utilization of large trailing suction hopper dredgers.

The MARPOL Convention^{Note} imposes controls on the discharge of oil and garbage by vessels. In Japan, taxation and other forms of support for the development of facilities to receive waste oil or garbage generated inside vessels are being provided and the (draft) "Guidelines for Reception Facilities of Ship-generated Garbage in Ports and Harbors" have been formulated to ensure that oil and garbage are appropriately received in ports and harbors.

(2) Control Measures on Air Pollution from Ships

Sulfur oxide (SOx) in the exhaust gas of ships can cause respiratory illnesses and otherwise negatively affect the human body. The International Maritime Organization (IMO) regulates sulfur concentrations in fuel oil used in ships based on the MARPOL Convention, which sets out standard values for each sea area in which ships navigate. Presently, the convention stipulates a maximum sulfur concentration of 0.1% in certain sea areas subject to strict controls (special sea areas) and a maximum concentration of 3.5% in all other sea areas (general sea areas), which will be 0.5% as of January 1, 2020. Regarding the beginning of the strengthening of the controls in 2020, the convention includes a stipulation for review that allows the IMO to determine the availability of compliant fuel oil and, if it deems that compliance by vessels by January 1, 2020 is impossible, to change the effective date to January 1, 2025. At the 70th session of the IMO Marine Environment Protection Committee (MEPC70) held in October 2016, the decision was made to put the change into effect in 2020 as stipulated. Furthermore, at the fourth session of the IMO Sub-Committee on Pollution Prevention and Response (PPR4) held in January 2017, matters such as the creation of controlling mechanisms to prevent the unauthorized use of non-compliant fuel oil along with international standards on the quality of compliant oil were reviewed, and the decision was made to continue to promote specific discussions in pursuit of worldwide observance of these regulations.

In addition to participating in IMO discussions pertaining to SOx emission reductions, Japan has engaged in other initiatives with a view to promoting the use of natural gas-fueled ships that can significantly reduce the amount of SOx emission, such as by formulating safety standards and codifying them into international rules and providing construction support.

Note International Convention for the Prevention of Pollution from Ships.

(3) Responding to Issues of Invasive Aquatic Species Carried by Ships

It is pointed out that the transfer of aquatic species via ships' ballast water^{Note 1} and ships' biofouling would threat marine ecosystem in waters where these ships navigate in. In order to prevent the transfer of invasive species, "International Convention for the Control and Management of Ships' Ballast Water and Sediments in 2004" and "the 2011 Guidelines for the Control and Management of Ships' biofouling to minimize the transfer of invasive aquatic species in 2011" were adopted at the IMO. With the necessity to take action to prevent the disruption to the ecosystem caused by the harmful ballast water from international shipping and to fulfill the international responsibility under the international cooperation, the Government of Japan proposed the law to implement the Ballast Water Management Convention (amendments Act on Prevention of Maritime Pollution and Maritime Disaster) to the 186th ordinary session of the Diet, and it passed with an unanimous vote^{Note 2}. In light of these developments, Japan ratified the convention in October 2014. In an effort to put this convention into force as soon as possible, Japan called on countries that had not yet ratified it to do so as soon as possible. As a result, the requirements for putting the convention into force were fulfilled on September 8, 2016, and the convention entered into force on September 8, 2017. Japan will continue to participate actively in discussions of the International Maritime Organization (IMO) regarding the convention and guidelines toward the smooth implementation of the convention.

Column Educational Activities on Marine Conservation

Under the slogan, "Preserving Blue Sea for the Future," the Japan Coast Guard engages in various instructional and educational activities for conservation of the marine environment. As example, it holds marine conservation lectures that aim to raise awareness of legal compliance in the maritime and fisheries sectors, sponsors coastal cleanup activities, and holds environmental lessons for the general public. A couple of major activities are introduced below.

(1) "Preserving Blue Sea for the Future" Japan Coast Guard drawing competition

The Japan Coast Guard hosts an annual drawing contest with the aim to spread the concept of marine conservation among children who will inherit the future.

The 17th competition was held in 2016, with 33,298 entries collected from primary and junior high school students throughout Japan.

As a result of a rigid screening process, one entry was selected for the special award (MLIT Minister's Award) and three entries were selected for the Award of the Director-General of the Japan Coast Guard. On December 21, 2016, an award ceremony for the special award (MLIT Minister's Award) was held in the MLIT Minister's Office, and Minister Keiichi Ishii personally presented an award certificate to the winner of the award, Ms. Mao Suzuki, a third-grade student at Jutoku Elementary School in Fukuyama City, Hiroshima Prefecture.

The winning entry is being displayed in various places and used in PR activities to widely spread the concept of marine conservation.

Note 1 Sea water loaded as weight to balance the ship when it carries no cargo.

Note 2 Also, a proposal to obtain the approval for conclusion of the Convention was submitted to the 186th ordinary session of the Diet, and the proposal passed with unanimous vote.







Source) MLIT

Source) MLIT

(2) A first achievement in the Ocean and Japan Project

The Japan Coast Guard designates June of every year as marine conservation promotion month, and carries out various activities for marine conservation. In 2016, it participated in the Ocean and Japan Project, implemented in 2015, as a new initiative to be pursued during the month's promotion.

In the coastal clean-up program, which was part of the new initiative, the idea of using garbage bags with the same design throughout Japan and creating a sense of unity resulted in a collection and sorting of some 3,600 bags of rubbish (the target was 1,000 bags) by 5,392 participants in thirty-five coastal regions within twenty-two prefectures. The program also promoted understanding of the impacts that rubbish in our immediate surroundings have on the environment.

Marine conservation activities will continue to be promoted while strengthening cooperation with the Ocean and Japan Project, to provide more opportunities for participation by many people, and to further disseminate the concept of marine conservation.

Marine conservation program for the general public



Source) MLIT

Section 6 Improving Living Environments by Preventing Atmospheric and Noise Pollution

Policies for Environmental Issues Related to Road Traffic

(1) Measures for Individual Vehicles

(i) Exhaust gas reduction measures

Regarding measures for emissions of new vehicles, we have introduced the Worldwide Harmonized Heavy-Duty Certification (WHDC) for diesel heavy duty trucks and buses, reinforced regulatory values for nitrogen oxides, introduced exhaust regulations for off-cycle emissions, and mandated that vehicles be equipped with advanced on-board diagnostic systems. In addition, for two-wheeled motor vehicles, we have reinforced regulatory values for exhaust, introduced fuel evaporation gas measures and mandated that vehicles be equipped with advanced on-board diagnostic systems, and began to apply these measures in October 2016. Furthermore, in October 2016, we promulgated amendments of standards regarding the introduction of the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), a global harmonized standard for testing the emissions and fuel efficiency of passenger vehicles and light duty vehicles. The amendments will begin applying sequentially from October 2018.

Regarding the Volkswagen emissions scandal that came to light in September 2015, we partnered with the Ministry of the Environment to host an expert review meeting to revise inspection methods of diesel passenger vehicles and others. In April 2016, the expert review meeting announced an intermediate summary. They recommended to introduce on-road driving tests to detect illegal software and to reduce real driving emissions and recommended to formulate guidelines regarding operating ranges of engine control required for the protection of engines and other parts genuinely (temperature ranges for control when temperatures are low, etc.). Discussions at these review meetings regarding these recommendations have continued while accounting for regulatory trends in Europe and the like, and the final summary was set to occur in the spring of 2017.

We are also implementing a program to certify low-exhaust gas vehicles that emit harmful substances from their exhaust pipes at levels far below regulatory values. These vehicles will be certified according to the level of their reduction of exhaust gas in an effort to help consumers identify and select vehicles that perform exceptionally well in terms of reducing emissions.

Exhaust gas measures in large cities, such as Tokyo, Nagoya or Osaka, such as those based on the Amendment Act on the Reduction of the Total Amount of Nitrogen Dioxide and Particulate Matters Originating from Automobiles in Designated Areas (Automobile NOx PM Law) are being implemented.

(ii) Reinforcing noise regulations

Regarding measures for automobile noise, we have introduced international standards for evaluating the levels of noise generated by acceleration in actual urban driving conditions to regulate the noise generated by four-wheeled vehicles, and began applying the measures progressively in October 2016.

(2) Promotion of Traffic Flow Measures

(i) Countermeasures for air pollution

The volume of particulate matter (PM) and nitrogen oxide (NOx) emissions from automobiles is increasing because of the increasing frequency of stop-and-go traffic and the reduced travel speed. For this reason, we are advancing the shift through traffic in urban areas to bypasses as a way to improve the roadside environment.



Chapter 8 Creating and Preserving a Beautiful and Healthy Environment

(ii) Countermeasures for noise pollution

2

Japan is proceeding with the lamination of low-noise pavement, installation of noise barriers, and maintenance of environmental roadside facilities. Based on the "Law for the Improvement of Areas along Trunk Roads," in addition to preventative measures for issues caused by traffic noise, financial assistance is being provided for buffer buildings and noise insulation work for housing in construction projects in areas alongside roads.

Environmental Measures for Airports and Surrounding Areas

In Japan, we have been steadily implementing various measures to deal with aircraft noise through improvements in materials made possible by the introduction of low-noise aircraft, restrictions on departures and arrivals imposed via regulations governing night-time flights, improvements in flight methods based on noise-abatement operations, upgraded airport structures, and measures concerning the peripheral environment, including sound-insulation work and the provision of compensation for relocation. In recent years, the growing popularity of low-noise aircraft accounts for a reduced impact that aircraft noise is having on areas surrounding airports even as the number of departures and arrivals by aircraft is rising.

We will need to strive to accommodate the growth of areas surrounding airports and the desire to conserve the local environment by continuing to take comprehensive measures to deal with aircraft noise while gaining the understanding and cooperation of local residents in accordance with changes in such conditions as the demand for air travel.

3 Countermeasures for Railway Noise

We are installing noise barriers, raising embankment heights and implementing other measures for noise generated by Shinkansen trains to enable the achievement of environmental standards based on the Environmental Quality Standards for Shinkansen Superexpress Railway Noise announced by the then-Environment Agency in 1975.

As for local railway lines, we are switching to continuous welded rails and implementing other measures to satisfy guidelines based on Noise Countermeasure Guidelines for the New Construction and Large-Scale Improvement of Local Railways, announced by the then-Environment Agency in 1995.

4 Countermeasures for Urban Heat Islands

The heat island effect refers to the phenomenon in which the temperature in the central area of a metropolis is significantly higher than the areas that surround it. Due to the effects of global warming, the global annual mean temperature is rising at a rate of around 0.7° C per century, while that of Japan is rising at a rate of around 1.2° C per century. In contrast, the temperature is rising roughly 2°C to 3°C in Japan's major cities; the addition of the effects of urbanization to the trend of global warming is producing these remarkable increases in temperature.

In order to advance comprehensive and effective measures for dealing with the urban heat island effect, we are engaged in various initiatives according to the Outline of Measures for Dealing with the Heat Island Effect (formulated in 2004, revised in 2013), which systematically summarizes specific measures put forth by relevant ministries and agencies. These initiatives include the following: Initiatives that reduce artificial heat emitted by air-conditioning systems and automobiles, initiatives that improve ground surfaces based on the greening of public spaces and the use of water, initiatives that consist of urban development projects that take wind channels into account, and initiatives for which observations, monitoring, and surveys are conducted with respect to the heat island phenomenon.

5 Countermeasures for Sick Building Syndrome and Soil Contamination

(1) Countermeasures for Sick Building Syndrome

Sick building syndrome describes a situation where materials used in the interior of a building disperses chemical substances which are hazardous to health. Japan is taking measures such as regulations on building materials and ventilation in the "Building Standard Act," and formulating performance labelling systems based on the "Housing Quality Assurance

Act."

In the maintenance of government facilities, Japan has implemented restrictions over the usage of building materials containing chemical substances, as well as measuring the indoor concentration of airborne chemical contaminants after completing construction.

(2) Countermeasures against Issues Related to Dioxins

Studies over the water and earth quality of class A river systems throughout Japan are being conducted for dioxins specified in the "Act on Special Measures concerning Countermeasures against Dioxins." In FY2015, the sediment of all locations and the water quality of 98% (220 locations out



of 225) of the locations satisfied environmental standards.

For rivers, ports, and harbors, we have implemented dioxin countermeasures as required according to the Manual on Measures to Deal with Dioxins at the Bottom of Lakes (proposed), which was revised in April 2008, and the Technical Guide on Measures to Deal with Dioxins at the Bottom of Ports and Harbors (revised edition). Support for programs involving pollution-prevention measures is being provided for rivers, ports, and harbors where dioxins exceeding standards have been detected in samples taken from the bottom of these locations.

(3) Measures against Asbestos

Issues concerning asbestos are life-threatening. As buildings that were built in the 1970s—when mass amounts of asbestos was imported to Japan—each their dismantling period, it is important to implement pre-emptive measures to prevent injuries from occurring.

In order to accurately and efficiently determine the actual use of asbestos building materials, investigators are being trained based on the system for investigators of structures containing asbestos building materials, which was created in 2013.

Also, based on the "Building Standards Law," the removal of sprayed asbestos when renovating a building is required, auxiliary system of comprehensive grants for social capital development is in place to promote the asbestos removal in existing buildings and follow ups are being done for the situation of the removal and anti-scattering of asbestos in the existing facilities under the jurisdiction of national ministries and agencies.

Furthermore, Japan is promoting the dissemination of information in efforts such as compiling data bases on referential cost estimates for removal work of spray-applied asbestos insulation, documents useful for identifying building materials containing asbestos (Visually identifiable building materials containing asbestos) and information on such materials, as well as pamphlets for measures related to asbestos in buildings.

6 Environmental Measures in Construction

The gas emissions measures (NOx, PM) for construction machinery that are not driven on public roads, the registration, certification and approval are being handled based on the "Act on Regulation, Etc. of Emissions from Non-road Special Motor Vehicles." Things like the low interest loan system is in place to provide assistance for the purchasing of construction machinery that have been adapted to be environment-friendly by meeting the latest emission standards and having reduced noise.

Section 7 Observing, Monitoring, and Forecasting Changes in the Global Environment

Observing and Monitoring the Global Environment

(1) Observing and Monitoring Climate Change

In order to grasp the status of greenhouse gases (GHGs), the Japan Meteorological Agency (JMA) is observing GHG concentrations in the atmosphere at three stations in Japan. CO_2 concentrations in the marine atmosphere, as well as those in the sea surface water are being observed in the western North Pacific by research vessels. GHGs in the middle-troposphere in the western North Pacific is also being observed. Furthermore, JMA conducts observation of solar and infrared radiation at five stations in Japan in order to monitor



climate changes and reduce uncertainty in global warming projections.

In addition, JMA observes sea level rise accompanied by global warming, and publish information on the long-term change in sea levels around Japanese coasts.

The JMA also produced the Japan 55-year Reanalysis (JRA-55), a historical global atmospheric data with homogeneity in space and time, and is using it to monitor climate change and improve the accuracy of seasonal forecasting.

Moreover, the "Climate Change Monitoring Reports" and the "Report on Climate Change and Extreme Weather" (in Japanese) are being compiled based on the results of observation, and future projections of climate change, extreme weather events and global warming are being disclosed to the public. Serving as the World Data Centre for Greenhouse Gases (WDCGG) of the World Meteorological Organization (WMO), the JMA also archives and provides observation data on greenhouse gases around the world.

(2) Observing and Monitoring Extreme Weather Events

The Japan Meteorological Agency (JMA) monitors unusual weather events occurring in Japan and elsewhere in the world and summarizes and releases periodic and extraordinary information concerning weather disasters and areas where extreme high and low temperatures, heavy and light rainfalls, and other such events have been observed. Also, when extreme weather conditions are occurring that significantly affect the public, summary reports are given covering the information regarding features, factors and the outlook.

Furthermore, as a Regional Climate Center of the World Meteorological Organization (WMO), JMA provides information such as monitoring and analysis of extreme weather as well as technical assistance through training and dispatch of experts to National Meteorological and Hydrological Services in Asian countries to support the climate service in the Asia Pacific region.

(3) Observing and Monitoring using Geostationary Meteorological Satellites

The JMA continues to operate the geostationary meteorological satellite Himawari-8, and launched the Himawari-9 on November 2, 2016. It began backup operation in March 2017. With the launches of Himawari-8 and Himawari-9, the JMA has established a two-satellite system that is crucial for continuous and consistent observation. By using these satellites, in addition to improving the disaster prevention function against such things like tropical cyclones and torrential rainfalls, Japan is leading the world in strengthening its monitoring function of the Earth's environment, including global warming.

(4) Observing and Monitoring the Ocean

The ocean is greatly impacting the earth's climate by storing a much larger amount of heat than the atmosphere, and it is also easing the progression of global warming by absorbing CO₂ discharged by human economic activity. In order to monitor global warming, an accurate grasp of oceanic conditions is essential.

The Japan Meteorological Agency (JMA), under the international cooperative structure, monitors oceanic conditions by carrying out ocean observation with high accuracy from research vessels in the western North Pacific along with using data from satellites and Argo floats, or profiling floats to automatically observe the ocean interior.

JMA website "Marine Diagnosis Report" provides information on the present status of the ocean such as sea surface temperatures, ocean currents, sea level, sea ice, as well as the prospect for the future.

The Japan Coast Guard uses autonomous ocean vehicle (AOV), drift buoys and High Frequency radar to constantly monitor and fully understand the state of ocean around Japan, and publishes their observation results. In addition, the Japan Oceanographic Data Center collects and manages data obtained by Japanese marine research organizations, and discloses it to relevant institutions and to the public.

(5) Observing and Monitoring the Ozone Layer

The Japan Meteorological Agency annually publishes the outcome of observations on ozone and ultraviolet radiation. According to these studies, the global amount of ozone continues to be low from a long-term perspective. Additionally, in order to prevent adverse effects to the human body by ultraviolet radiation, information on the topic is published daily using a numerical index (UV index) for easy comprehension of the intensity of ultraviolet radiation.

(6) Promoting Routine Operational Observation in the Antarctic

The Geospatial Information Authority of Japan facili-



The long-term changes in hydrogen ion exponents (pH) at latitudes 10, 20, and 30 degrees north along 137 degrees east meridian (left) and the area map for data analysis (right). The numbers in the graph indicate the decreasing rates per 10 years. The lesser pH indicates the more progress of "ocean acidification. Source) Japan Meteorological Agency



ellite Himawari data ·Sea surface temperature composite image based on Himawari-8 data. The image shows

distributed widely southeast of Hokkaido and the Kuroshio warm water extending east of Honshu. The improvement of sensors on board Himawari-8 and cloud area discrimination process make it possible to provide high-resolution, high-precision sea surface temperature product. Source) Japan Meteorological Agency

tates activities carried out by Antarctic research expeditions. At the same time, it makes geodetic observations, produces and updates topographical maps, and develops satellite image maps on the Antarctic region in order to contribute to international activities relating to research on global environmental changes and geodetic surveys.

The Japan Meteorological Agency continues to conduct observation of ozone, solar and infrared radiation, surface and upper-air at the Syowa Station (Antarctica). Accumulated meteorological data contribute to monitor and research the global environment, such as the changes in Antarctic ozone hole and global climate, and are utilized for the formulation

maximum values of sea surface temperature during the composite period. Areas where sea surface temperatures cannot be retrieved due to cloud cover throughout the entire period are shown in white.

⁽Image of sea surface temperatures on March 17, 2016 (09-20 JST)) It can be seen that sharp fronts lie between the Oyashio cold water

of international policies.

The Japan Coast Guard is conducting topographical studies on the sea floor. The observation data is being used for compiling nautical charts and as the basis for research related to past environmental conditions such as glacial erosion and sedimentary environments. In addition, they conduct tidal observations and monitor the fluctuations in sea levels, which are closely tied to global warming.

2 Research of and Predictions of the Global Environment

The Japan Meteorological Agency and the Meteorological Research Institute are developing prognostic models on changes in climate around Japan and the world, and actively participate in international research programs such as the World Climate Research Programme (WCRP). Earth system models that track the carbon cycle process and other changes and higher resolution regional climate models are being developed, and research for making warming predictions is being conducted. In FY2016, the JMA released Global Warming Projection Volume 9, which takes uncertainty into account as it shows detailed warming predictions for the area around Japan based on a highly developed regional climate model. In addition, the JMA made proactive contributions to the fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC) (released in 2013-2014), the National Plan for Adaptation to the Impact of Climate Change (adopted by a Cabinet decision in November 2015), the Plan for Global Warming Countermeasures (adopted by a Cabinet decision in May 2016), and efforts toward the development of adaptation measures by local governments and others.

The National Institute for Land and Infrastructure Management released the results of research into climate change adaptation conducted from the standpoints of flood control, water utilization, and the environment through the Report on Research into Climate Change Adaptation (2017) and other documents. These results have been incorporated into various materials, including Adapting to Climate Change in the Area of Water Disasters (August 2015), a report issued by the Social Development Council, and a plan for adapting to climate change (November 2015) as formulated by the MLIT.

3 Promoting Worldwide Geodetic Observation

The objectives of the Global Mapping Project, in which basic geospatial information for all the land on the planet was developed, were achieved. Thus the Geospatial Information Authority of Japan implemented coordination to conclude the project as the Secretariat of the International Steering Committee for Global Mapping, and transferred the Global Map data to the Geospatial Information Section of the United Nations. In addition, the Geospatial Information Authority of Japan and the Japan Coast Guard contribute to the determination of the shape and movement of the Earth through activities such as international observations using Very Long Baseline Interferometry (VLBI, a method of observation using radio waves from quasars) and Satellite Laser Ranging (SLR, a method of measuring the distance to artificial satellites using lasers), tide observations, absolute gravity measurements, and participation in the International GNSS Service (IGS), and is promoting the establishment of a global geodetic reference frame.

Column **Publication of Global Warming Projection Vol. 9**

The Japan Meteorological Agency has released the results of global warming predictions based on a numerical model running since fiscal 1996, in the form of the "Global Warming Projection," to contribute to implementation of measures for mitigation and adaptation, and to disseminate scientific knowledge related to global warming. In March 2017, it compiled and released the latest of the series, Global Warming Projection Vol. 9, using the results of predictions made by the Program for Risk Information on Climate Change, a project of the Ministry of Education, Culture, Sports, Science and Technology.

The Intergovernmental Panel on Climate Change (IPCC) presents several scenarios on greenhouse gas emissions, but Vol. 9 bases its predictions on the scenario in which greenhouse gas emissions continue at the highest level (the RCP 8.5 scenario), from the perspective of heightening disaster prevention awareness. It also provides information on the range of annual changes and the results of a reliability evaluation.

Vol. 9 predicts that annual average temperatures in Japan in the late 21st century will increase dramatically by +3.3 to +4.9°C, depending on the region, compared to the late 20th century. There will be a significant increase in the number of extremely hot days with temperatures topping 35°C, and a significant decrease in the number of midwinter days when temperatures do not rise to 0°C. Furthermore, it predicts a nationwide frequency increase in heavy rains and short-term downpours, with the number of days of heavy rains that bring more than 200 mm/day of rainfall, and the frequency of waterfall-like rains (short-term downpours that bring more than 50 mm/hour of rainfall) both more than doubling. At the same time, the number of dry days is also predicted to increase on a nationwide scale, possibly impacting water resource management. Snowfall is predicted to decrease significantly on the Sea of Japan side of the main island of Japan, but the same amount of snow as in the late 20th century is predicted to fall in some years of the late 21st century, so measures against heavy snow will continue to be needed.



[Change predictions in temperature and rainfall in the late 21st century, compared with the late 20th century] (Left) For each region, the thin line on the left indicates the range of yearly differences in annual average temperatures in the

late 20th century; The bar graph indicates changes in annual average temperatures in the late 21st century; And the thin line on the right indicates the range of yearly differences (unit: °C).

(Middle) Change distribution in annual average temperatures (unit: °C)

(Right) Change distribution in the frequency of yearly occurrences regarding rainfalls releasing more than 50 mm/hour (unit: frequency) (only regions with reliable predictions are displayed). Source) Global Warming Projection Vol. 9

Chapter 9

Strengthening Strategic International Expansion and Contributions

Section 1 Promoting the Export of Infrastructure Systems

1 General Direction of Government Policy

The government established the "Infrastructure Strategy Economic Cooperation Meeting" in March 2013 and compiled the "Infrastructure System Export Strategy" based on deliberations carried out by relevant ministers, including the Minister of Land, Infrastructure, Transport and Tourism, regarding government policies in May of the same year. A revised version of this strategy was formulated in May 2016 with the aim of helping Japanese companies secure orders for overseas infrastructure systems totaling approximately JPY 30 trillion in 2020 (approximately JPY 10 trillion in 2010). The active implementation is incorporated in "Japan Revitalization Strategy 2016" (approved by the Cabinet in June 2016).

In May 2015, a quality infrastructure partnership incorporating the provision of quality infrastructure investments in the Asian region over the next five years was announced by Prime Minister Abe. Through this partnership, the government aims to further mobilize private-sector funds and expertise to realize infrastructure investments that are sufficient in terms of both quality and quantity. In November of the same year, the Prime Minister announced that systemic improvements to yen loans and overseas investments and loans and other more specific measures for the Partnership for Quality Infrastructure would be carried out.

Prior to the G7 Ise-Shima Summit in May 2016, the Quality Infrastructure Export Expansion Initiative announced by Prime Minister Abe set out policies to expand the target area from Asia to the entire world, and to provide USD 200 billion of investments over the ensuing five-year period. The participants of the G7 Summit reached a consensus regarding the importance of the global community achieving a common understanding of the basic elements of Quality Infrastructure Investment, and agreed upon the G7 Ise-Shima Principles for Promoting Quality Infrastructure Investment.

2 Initiatives of the Ministry of Land, Infrastructure, Transport and Tourism

In accordance with the same strategy and by making the most of the aforementioned systemic improvements, MLIT will powerfully advance the overseas expansion of infrastructure systems in the land, infrastructure, transport and tourism sectors. In order to successfully overcome competition from foreign countries and win bids for Japanese companies, we must rely on Japan's strengths, such as by building safe and reliable systems that combine structural and non-structural aspects, while addressing the needs of recipient countries with flexibility. Therefore, we are planning to promote three pillars of the applicable measures as follows: (i) "upstream" planning and information sharing, (ii) mitigation of business risks, and (iii) overseas development of soft infrastructure.

(i) 'Upstream' planning and information sharing

In order to promote participation from the concept stage of each project (upstream), Japan will appeal its technology to foreign countries, especially how it provides safety, reliability, and superior cost-effectiveness on a comprehensive basis, including with respect to the operations stage. Japan will share these information by utilizing trade promotion activities carried out through joint efforts by leaders in the public and private sectors, organizing city tours for foreign embassies in Japan, and taking advantage of opportunities at international conferences.

(ii) Mitigating business risks

We established the Japan Overseas Infrastructure Investment Corporation for Transport and Urban Development (JOIN) in October 2014 to reduce business risks—such as huge initial investments, long-term maintenance requirements, and demand risks—incurred by companies expanding into downstream (management and operations) functions in the field of transportation and urban infrastructure, and are seeking to provide multifaceted support to Japanese companies involved in the overseas development of infrastructure systems through the proactive use of JOIN, as well as through such means as the establishment of a hotline for overseas construction and safety measures to serve as a liaison to help resolve problems faced by companies that expand into overseas markets; the dissemination of updated information through databases of overseas construction, real estate markets and the like; support through mission dispatches and other efforts to help core, small and medium-sized construction companies expand into overseas markets; and support for expanding into third countries that collaborate with geopolitically important countries.

(iii) Overseas development of soft infrastructure

Various efforts are underway to create an environment ideal for Japanese companies to participate in projects, including international standardization of Japanese technologies and systems and/or become the "de facto standard" of partner countries, support for institutional development of partner countries to improve the business environment for Japanese companies, and support for training engineers and skilled workers that contribute to sustaining administration and maintenance of infrastructure in partner countries.

(1) Top Sales Promotion

In FY2016, the Minister of Land, Infrastructure, Transport and Tourism visited eight countries including Malaysia, Singapore and Indonesia, and engaged in top sales on Japanese infrastructure systems by holding discussions and exchanging opinions with top officials and cabinet ministers in charge of the land, infrastructure, transport, and tourism sectors in these countries. In addition, the State Minister and Parliamentary Vice-Minister visited a total of twelve countries, including Kenya, Peru and the Philippines, to promote Japan's infrastructure systems to meet the infrastructure needs of these countries. Additionally, visits to Japan by foreign ministers and dignitaries, the hosting of seminars, and other such opportunities were actively used to tout the superiority of Japanese infrastructure systems.

Column

Strong Promotion of Top Sales

During FY2016, the Minister and the State Minister of MLIT and the Parliamentary Vice-Minister conducted sales promotion of Japan's infrastructure systems to key government officials. Six case examples are introduced below.

(1) Official trip to Malaysia and Singapore by Keiichi Ishii, Minister of MLIT

In July 2016, Keiichi Ishii, MLIT Minister, held bilateral meetings with government officials in Malaysia and Singapore. In addition to engaging in dialogue regarding cooperation in the land, infrastructure, and transport sectors in reference to ports and harbors, urban development, and productivity improvement in the construction industry, the Minister brought attention to the advantages that the Shinkansen would bring to the Malaysia-Singapore high-speed rail project, and conveyed the Japanese government's willingness to provide maximum support in the financial and human resource development aspects.

In addition to the above, Minister Ishii participated in the High-speed Rail Symposium in Singapore and introduced Japan's Shinkansen system, with a focus on Japan's excellent project management capabilities that ensure safety, sustainability, reliability, on-time delivery, and human resource development capabili-

ties. He also attended the Port of Yokohama LNG Bunkering Mini Seminar in Singapore hosted by the MLIT, and introduced the LNG bunkering initiatives of the Japanese government and private sector businesses in Japan.

(2) Official trip to Thailand and Vietnam by Keiichi Ishii, Minister of MLIT

In August 2016, Minister Ishii held bilateral meetings with government officials in Thailand and Vietnam, promoting Japan's infrastructure systems in the railway, aviation, and urban development sectors. In Vietnam, Minister Ishii and his Vietnamese counterpart signed a memorandum of understanding on technical cooperation in the areas of water disaster prevention and water resources.

In Thailand, Minister Ishii and Mr. Arkhom Termpittayapaisith, Minister of Transport, signed a memorandum of cooperation in the Bangkok-Chiang Mai high-speed railway project, and marked a large step toward realization of the project by agreeing to formulate a specific cooperation scheme between the two countries, under the premise that the project will adopt Japan's Shinkansen system. The Thailand-Japan relationship was further strengthened by the signing of a memorandum of cooperation in the traffic safety sector.

(3) Participation in TICAD-VI (Kenya) by Shinsuke Suematsu, State Minister of MLIT

In August 2016, Shinsuke Suematsu, State Minister of MLIT, attended the Sixth Tokyo International Conference on African Development (TICAD-VI) and the Africa-Japan Public-Private Conference for Quality Infrastructure, which MLIT co-organized with the Kenyan government as one of the TICAD-VI seminars. In the latter conference, State Minister Suematsu and African ministers in charge of infrastructure agreed to and signed the Leaders' Statement on Promotion of Quality Infrastructure Investment, toward promoting quality infrastructure investment in Africa. Meeting with Mr. Liow Tiong Lai, Malaysian Minister of Transport



Source) MLIT

Meeting and the signing of a cooperation memorandum with Mr. Arkhom Termpittayapaisith, Thai Minister of Transport



Source) MLIT

Leaders' Statement signing ceremony



Source) MLIT

State Minister Suematsu also took the occasion of TICAD-VI to exchange views with ministers from Kenya, Ethiopia, Mozambique, and Tanzania, on infrastructure projects that are being implemented in each country, including the projects for the development of Mombasa Port and Nacala Corridor, as well as on the possibility of utilizing Japan's technologies for those projects.

(4) Official trip to Peru and Colombia by Yasutada Ohno, Parliamentary Vice-Minister of MLIT

In September 2016, Yasutada Ohno, Parliamentary Vice-Minister of MLIT, held meetings with government officials in Peru and Colombia, and inspected local transportation infrastructures.

The officials of the two countries expressed strong interest in Japan's experience and technologies, and agreed to deepen cooperation with Japan for the general development of national infrastructure. Discussions were also held on specific cooperation schemes for urban transportation development and the formulation of a port and harbor master plan in Colombia.

(5) Official trip to Myanmar and Indonesia by Minister Ishii

In December 2016, Minister Ishii held bilateral meetings with governmental officials in Myanmar and Indonesia. He exchanged views regarding railways, ports and harbors, disaster prevention, roads and urban development in Myanmar, as well as the Patimban Port and the North Java trunk railway line in Indonesia, while signing a memorandum of cooperation with Myanmar's Ministry of Construction and Indonesia's Ministry of Public Works and Housing, respectively.

(6) Official trip to Uganda and Zambia by State Minister Suematsu

In January 2017, State Minister Suematsu held a Public-Private Conference for Quality Infrastructure in Uganda and Zambia, accompanied by member companies of the Japan-Africa Infrastructure Development Association (JAIDA), which was launched in September 2016. In the conference, State Minister Suematsu and his counterpart signed a memorandum on the promotion of Quality Infrastructure Investment with the continuation of the cooperative relationship between Japan and the two countries, agreeing to launch a Quality Infrastructure Dialogue for continued talks after the conference.

State Minister Suematsu and the delegation of Japanese companies also paid courtesy calls on Mr. Ruhakana Rugunda, Prime Minister of Uganda, and Mr. Ronald Chitotela, Zambian Minister of Housing Tour of Medellín, Colombia by Parliamentary Vice-Minister Ono



Source) MLIT

Meeting with Mr. Budi Karya Sumadi, Indonesian Minister of Transport



Source) MLIT

Memorandum signing ceremony in the Zambia-Japan Public-Private Conference for Quality Infrastructure



Source) MLIT

and Infrastructure Development, exchanging views on the Kampala Flyover Construction & Road Upgrading Project, along with other such projects that seek the cooperation of Japanese companies.

(2) Formulating Action Plan 2017 of the Ministry of Land, Infrastructure, Transport and Tourism for Overseas Expansion of Infrastructure Systems

The demand for infrastructure has rapidly increased in various countries including neighboring ASEAN member countries, and the heightened competition of winning orders has been getting fiercer. The government as a whole has strived to achieve the "Partnership for Quality Infrastructure" delivered by Prime Minister Abe through, for example, fundamental institutional expansion to win more orders. The role of the MLIT is large in Japan's overseas expansion of infrastructure, and this must be further promoted through new activities which are also responding to changes in the present situation in concert with national diplomacy strategies while continuing and strengthening current efforts and making most of institutional expansion. For this purpose, an action plan of the MLIT (Action Plan of the MLIT for the Overseas Expansion of Infrastructure Systems) was launched in March 2016, and revised in March 2017. In this revision in particular, six cross-project promotional measures to be strengthened were added to make MLIT's efforts more effective: Strengthening competitiveness to win bids amidst severe competition, reinforcing the promotional system for the overseas expansion of infrastructure systems, increasing private investment in the overseas expansion of infrastructure, using new technology for renewal of the overseas expansion of infrastructure, getting actively involved in the upstream planning phase including national and regional land development plans and master plans, and promoting bilateral cooperation for expansion into third countries. The MLIT shall strategically carry out the overseas development of quality infrastructure systems in line with this action plan according to a schedule deemed to be most effective.

(3) Further Use of Private-sector Funds for the Overseas Development of Infrastructure Systems

The world infrastructure market is projected to continue growing due to rapid urbanization and rapid economic growth in emerging countries. In particular, we are seeing more requests for development and operation of infrastructure through public-private partnerships (PPP) based on the use of private-sector funds. However, transportation and urban development projects are characterized by long-term development windows, demand risks during the operations stage, and local government organs exercising their influence, meaning that participation by private-sector players only is sometimes challenging.

For this reason, the MLIT established the Japan Overseas Infrastructure Investment Corporation for Transport and Urban Development (JOIN) in October 2014 to carry out capital investments and participate in projects on an integrated basis in accordance with demand risks in order to help Japanese private companies participate in overseas markets for transportation and urban development. To date, JOIN has decided (with the authorization of the Minister of the MLIT) to provide support on six projects involving ports and harbors, railways, urban development and logistics. In addition, in light of the Quality Infrastructure Export Expansion Initiative announced by Prime Minister Abe in May 2016, we have implemented further systemic improvements for the export of quality infrastructure, such as revising ordinances and relaxing the "biggest investor standard." Furthermore, we have concluded memorandums of understanding with private companies and relevant government organizations from Singapore, Argentina and other countries. In FY2017, JPY 113.7 billion was posted to the Fiscal Investment and Loan Program (JPY 64.9 billion for industry investments and JPY 48.8 billion for government guarantees). JOIN will continue to be proactively utilized.

(4) Promoting Outbound Strategic Publicity

In order to further advance the overseas development of infrastructure systems, initiatives for strategic publicity shall be promoted, such as by producing and effectively highlighting publicity to convey the concept of a quality infrastructure, a salient feature of infrastructure systems in Japan, in an easy-to-understand manner. In addition to producing videos to specifically convey the concept of quality infrastructure and utilizing these videos for top-level trade promotion activities and when dignitaries visit Japan and seminars been held, we will harness online broadcasting channels and transmission media to reach broad audiences in targeted countries and regions.

(5) Initiatives in Different Countries and Regions

In addition to the aforementioned initiatives, public-private partnership-based infrastructure conferences and bilateral dialogues are being continued to promote greater understanding of quality infrastructure investments advocated by Japan as a way to create opportunities to advance the overseas development of infrastructure systems through public-private

partnerships. Overseas public-private partnership councils have also been established in different fields of infrastructure—namely eco-cities, water, roads, disaster prevention, rail, ports and harbors, and aviation—to facilitate the sharing of information on Japanese infrastructure.

For example, in developing Talks for Cooperation in Disaster Prevention in the pursuit of solutions for an emerging country dealing with disaster-prevention issues in collaboration with academic, business, and government circles in both countries, Japanese technologies would be introduced and proposed to the government of the other country through a partnership with the Japan Disaster Prevention Platform, an organization building a cooperative framework among academic, business, and government circles established in June 2014. In order to promote such projects as those involving participation in the development and operations of ports and harbors in Myanmar, Indonesia, Kenya, and Mozambique, the introduction of overseas port EDI system in Myanmar and the introduction of technical standards applicable to ports and harbors in Vietnam, the development of human resources is being enriched, and opinions and data are being exchanged through the Overseas Port Logistics Projects Council. In addition, public-private partnership initiatives are being carried out through Japan Conference on Overseas Development of Eco-Cities and other such bodies tasked with promoting urban development overseas, and support was provided for Japan to have an exhibition booth at MIPIM, an international real estate show for professionals (held in Cannes, France in March 2016) and for the organization of MIPIM Japan – Asia Pacific 2016 (held in Osaka in September 2016), a Japanese version of MIPIM.

In addition, we have implemented verification projects regarding the modernization of agricultural product logistics systems in Myanmar and the promotion of the use of freight railways in India as a logistics pilot project for the overseas development of Japanese quality logistics systems.

Discussions, collaborations, and other initiatives promoting the overseas development of infrastructure systems and undertaken with different regions and countries in FY2016 are outlined below.

(i) ASEAN region

In the ASEAN Economic Community (AEC), which was launched at the end of 2015 in pursuit of the realization of a giant single market, emphasis on economic development through the reinforcement of regional connectivity and other efforts have produced expectations of increased activity in the movement of people, goods and other items in the future.

In FY2016, we implemented the following bilateral efforts with the respective ASEAN member states.

- Indonesia

In October 2016, JOIN decided (with the authorization of the Minister of the MLIT) to provide support for a project to develop detached housing and commercial facilities in the suburbs of Jakarta. Furthermore, in January 2017, JOIN decided (with the authorization of the Minister of the MLIT) to provide support for a project to establish and operate refrigeration and cold storage warehouses in the suburbs of Jakarta.

In December 2016, the seventh meeting of the Japan-Indonesia Senior Transport Officials was held in the city of Medan, Indonesia. At this meeting, opinions were exchanged on solutions to issues and the future direction of cooperation between the two countries concerning cooperation and recent challenges in different areas of collaboration, including railways, automobiles, ports and harbors, maritime traffic, aviation, and logistics. Indonesia has expressed great interest in Japanese support for the improvement of its transportation infrastructure. In addition, introductions have been made regarding concepts and challenges in land, air and sea networks and the improvement of airports and other infrastructure, and Japan and Indonesia are interested in working together closely in various fields in the future.

That same month, Minister Ishii of the MLIT held discussions in Jakarta with key people in the Indonesian government at which they exchanged opinions regarding cooperation and other efforts in ports and harbors, railways, airports, urban development and other infrastructure and transportation fields, and the two sides concluded a memorandum of cooperation to further enhance cooperation on social infrastructure development.

In February 2017, the fourth meeting of the Japan-Indonesia Senior Construction Officials was held in Jakarta in conjunction with the Indonesian Ministry of Public Works and Public Housing. The overall meeting was broken down into two themes: of public-private partnership and national/regional planning. The fields of roads, urban areas, housing, buildings, sewage systems, human resource development, and construction were discussed in individual work groups; the two sides exchanged information about efforts, challenges, technology and other matters in both countries; public-private

workshops organized with Indonesia were held as part of the Talks for Cooperation in Disaster Prevention; and efforts were made toward public-private cooperation to enhance disaster prevention in both countries.

- Thailand

In August 2016, Minister Ishii of the MLIT traveled to Thailand to participate in bilateral discussions with Minister Arkhom Termpittayapaisith of the Thai Ministry of Transport regarding railways, urban development, transportation safety and other fields. In addition, Minister Ishii signed a new memorandum for railway cooperation, which sets out details about bilateral cooperation and other matters under the assumption of the further development of Japanese Shinkansen technology for the high-speed railway from Bangkok to Chiang Mai, and attended the opening ceremony for the Bangkok MRT Purple Line, which is one of the first projects in which Japanese railway operators were tasked with total maintenance regarding rolling stock and above-ground facilities. Furthermore, Minister Ishii signed a memorandum of understanding pledging cooperation in using Japanese knowledge and experience in Thailand's efforts toward transportation safety.

- Vietnam

In May 2016, a meeting between the Japanese and Vietnamese vice ministers of construction was held in Tokyo with Parliamentary Vice-Minister Ejima in attendance, and participants discussed the themes of construction management, sewage systems and human resource development, and confirmed that both countries will continue to promote cooperation in the construction sector.

In June of that year, Parliamentary Vice-Minister Miyauchi visited Vietnam, and confirmed the intent to further enhance the cooperative relationship between the two countries regarding urban development, roads, sewage systems, railways, airports and other infrastructure projects and human resource development and the like.

In accordance with a memorandum of cooperation concerning the sewage sector concluded in 2010 (renewed in March 2014), the ninth and tenth intergovernmental meetings were held in July 2016 and March 2017, respectively, and support has been provided for the enactment of standards for the pipe-jacking method used for sewage systems and the diffusion of pipeline regeneration methods. In August 2016, Minister Ishii of the MLIT visited Vietnam, where he promoted trade regarding airports, urban development, railways and other sectors to key people in the government, and concluded a new memorandum of understanding regarding technical cooperation for water disaster prevention and water resources.

In September, the sixth Vietnam-Japan Conference on Construction was held to promote mutual understanding between construction-related sectors in the two countries and to improve Japan's presence, among other aims. In addition, the MLIT worked together with the National Graduate Institute for Policy Studies to implement training for Vietnamese government personnel to support the improvement and diffusion of land-related systems.

In December, MLIT and Ministry of Agriculture and Rural Development (MARD) organized a Disaster management Collaborative Dialogue workshop to enhance disaster prevention in both countries under public-private cooperation.

- Malaysia and Singapore

In April 2016, State Minister Yamamoto of the MLIT visited Malaysia and Singapore, approached key people in each country's government about introducing the Japanese Shinkansen system into their plans for high-speed railways, and attended a symposium on high-speed railways in Malaysia. In July of that year, Minister Ishii of the MLIT visited Malaysia and Singapore, made a second approach regarding the introduction of the Japanese Shinkansen system, and in Singapore attended a symposium on high-speed railways and a mini seminar on LNG bunkering in the Port of Yokohama.

In August of that year, the Malaysia-Japan Road Disaster Prevention Technology Seminar was held, and Japanese road disaster prevention technology was showcased at this event.

In September of that year, Singaporean Minister of State Josephine Teo, who is responsible for the prime minister's office, foreign affairs and transport, visited Japan, and listened to Minister Ishii of the MLIT make a pitch for the introduction of the Shinkansen system.

In October of that year, in conjunction with an international bunkering conference held in Singapore, eight representatives of port authorities from seven countries concluded the Memorandum of Understanding on Cooperation on the Development of LNG as a Marine Fuel in an effort to establish a global network of LNG bunkering ports.

In addition, in November of that year, we held the Urban Development Seminar to support Japanese companies' participation in the formulation of an urban planning master plan and urban development projects for the Jurong Lake District, which is the planned Singapore-side terminus of the high-speed railway between Malaysia and Singapore.

- Myanmar

In June 2016, a meeting of Myanmar-Japan Senior Transportation Officials was held in Myanmar, and participants shared information and exchanged opinions about efforts, challenges, technology and other matters regarding railways, air transport, ports and harbors and other transportation sectors in both countries. In addition, in October of the same year, Minister Thant Sin Maung of the Myanmar Ministry of Transport and Communications was invited to Japan, where he and Minister Ishii of the MLIT concluded a memorandum of cooperation regarding the transportation sector.

In July of that year, JOIN decided (with the authorization of the Minister of the MLIT) to provide support for an urban development project that calls for the construction and operation of a landmark complex near Yangon Central Railway Station.

In August of that year, the minister of the Myanmar Ministry of Construction was invited to Japan, and met with Minister Ishii of the MLIT, participated in on-site inspection tours toward the formulation of future infrastructure projects, and exchanged opinions with private companies.

In September of that year, the MLIT helped host the Myanmar-Japan Construction Round Table to facilitate practical discussions regarding highly detailed and urgent issues in the construction sector.

In addition, in December of that year, we organized priority matters regarding the alleviation of traffic, transportation safety measures and maritime transportation, which are the most pressing urban transportation issues in the Yangon region, into action plans to be taken within the next year and within the next three years. During that month, Minister Ishii of the MLIT visited Myanmar, where he promoted trade regarding airports, roads and bridges, railways, urban development and other sectors introducing their companies and products to key people in the government, and renewed a memorandum of cooperation regarding the housing and urban sectors with Minister Win Khaing of the Ministry of Construction to clarify support regarding home financing. In addition, we implemented a structural earthquake resistance seminar in Yangon.

In February 2017, we held Talks for Cooperation in Disaster Prevention with the Myanmar Ministry of Agriculture, Livestock and Irrigation, the Ministry of Transport and Communications, and the Ministry of Social Welfare, Relief and Resettlement, and exchanged opinions regarding cooperation concerning disaster prevention policy in both countries.

In addition, in March of that year, the fourth meeting of Myanmar-Japan Senior Construction Officials was held, and participants participated in policy discussions regarding roads, the construction industry, urban development and housing. That same month, we organized a report of a project identification and formulation survey for the eastern section of the outer ring road of Yangon, and made a report to our counterpart.

- Cambodia

In June 2016, Parliamentary Vice-Minister Miyauchi visited Cambodia, where he promoted trade regarding roads and bridges, automobiles, ports and harbors, sewage and other sectors to key people in the government.

In August of that year, the Japan International Cooperation Agency (JICA) began implementing a three-year plan entitled The Project for Modernization of Vehicles Registration and Inspection Administration System, and the MLIT has dispatched one expert from its ranks and has engaged in other efforts to proactively provide technical assistance. During that same month, JICA began implementing a three-year Country-Focused Training plan entitled Housing Policy in response to a request from the Cambodian government, and has implemented Technical Training in Japan (August) and seminars in Cambodia (December).

In January 2017, Cambodian Senior Minister Chea Sophara, who is also the Minister of Land Management, Urban Planning and Construction, was invited to Japan, and met with Minister Ishii of the MLIT. They concluded a comprehensive memorandum of cooperation between the ministries, and participated in on-site inspection tours toward the formulation of future infrastructure projects.

In February of that year, the Director-General of the Cambodian Ministry of Public Works and Transport visited Japan, where he met with State Minister Suematsu and concluded a memorandum of cooperation between the ministries regarding the sewage sector.

(ii) South Asia

- India

In July 2016, the ninth Japan-India Joint Working Group on Urban Development was held, and participants shared information and exchanged opinions about urban transportation, urban development and aquatic environments.

In November of that year, a Japan-India summit meeting was held with Indian Prime Minister Narendra Modi, who was in Japan on a visit. Prime Minister Modi announced the goal to open a high-speed railway between Mumbai and Ahmedabad by 2023, which represents the first project to be implemented as a total package for the Japanese Shinkansen system, and also visited a Shinkansen rolling stock plant.

Furthermore, in October of that year, the third meeting of the Japan-India Joint Working Group on Road and Road Transport was held, and participants discussed the improvement of roads in mountainous areas, bridge technology and ITS/transportation safety policy.

- Sri Lanka

In June 2016, the MLIT hosted the Sri Lanka-Japan Construction Industry Round Table to provide Japanese technology, know-how and experience as a way to help promotion of the Megapolis and Western Development Conceptual Plan.

(iii) United States of America

In June 2016, Robert Lauby, the Deputy Associate Administrator of the United States Federal Railroad Administration, and others visited Japan, and the first Japan-U.S. Conference on Cooperation for Railways was held. Participants discussed the ideal state of high-speed railway maintenance and other matters. In August of that year, the Japanese government and the state of Maryland concluded a memorandum of cooperation that confirmed cooperation for maglev trains and for other areas. In September of that year, Minister Ishii of the MLIT met with United States Secretary of Transportation Anthony Foxx, who was visiting Japan for the G7 Summit for transportation ministers, and they confirmed their intent to enhance the cooperative relationship between the two countries toward the development of specific projects regarding maglev and high-speed railway plans.

(iv) Middle East

After international economic sanctions were lifted in January 2016, a meeting of Iran-Japan Senior Transportation Officials was held in July of that year, and the participants shared information, exchanged opinions and signed a memorandum of cooperation regarding infrastructure projects in the transportation sector.

In addition, in January 2017, Minister Ishii and Vice Minister Tanaka of the MLIT visited Turkey, where they met with President Recep Tayyip Erdoğan, Prime Minister Binali Yıldırım, and Minister Ahmet Arslan and Vice Minister Coskunyurek of the Ministry of Transport, Maritime Affairs and Communications, and promoted trade regarding the Çanakkale Strait Bridge Project, which includes the construction of a bridge with the longest center span in the world.

(v) Russia

The MLIT drove cooperation in the urban environment and transportation infrastructure sectors based on the Cooperation Plan for Russia Living Environment Superpower, Industrial/Economic Reform, which is a comprehensive policy of the Russian government. We are driving forward with cooperation for Russia's urban environment through the Japan-Russia Urban Environment Issues Working Group, which works toward the realization of creating comfortable, clean cities that are easy to live and move about in, which is one of the eight items in the Cooperation Plan. The fifth general meeting was held in May 2016, and the sixth was held in November of that year. We are moving forward with efforts such as formulating urban environment development standards and a pilot project to make Voronezh and Vladivostok model cities.

In addition, the third senior officials' meeting of the Japan-Russia Working Group on Transportation was held in August of that year, and the participants exchanged opinions about railways, ports and harbors, air transport and other sectors. In addition, in December of that year, a meeting of Japanese and Russian port authorities, as well as public-private seminars were held based on the memorandum of understanding for the ports and harbors sector concluded with the Russian Ministry of Transport in August of that year.

(vi) Central Asia

In light of the Prime Minister's visit to the Central Asia region in October 2015, we held public-private infrastructure conferences at which we encouraged understanding of Quality Infrastructure Investment in the Central Asia region in Uzbekistan and Kyrgyz in October 2016. In addition, as a follow-up to these conferences, we are hosting sector-focused conferences in Uzbekistan and other places and driving forward with other efforts to provide support for Japanese companies involved in infrastructure to expand and develop business in this region. That same month, Minister Ishii of the MLIT signed a memorandum of cooperation for the purpose of promoting infrastructure development, technical cooperation, and private-sector business across all transportation sectors with the Kazakh Ministry for Investments and Development.

In January 2017, State Minister Tanaka visited Georgia, and, among other things, discussed policy regarding cooperation in the transportation infrastructure sector.

(vii) Latin America

In April 2016, when President Juan Carlos Varela of the Republic of Panama visited Japan, we provided on-site inspection tours of the Tama Toshi Monorail Line to promote Japanese monorail technology.

In September of that year, Parliamentary Vice-Minister Ono visited the Republic of Peru and the Republic of Colombia, where he discussed specific methods of proceeding with cooperation regarding the improvement of urban transportation in both countries, and the development of a master plan for ports and harbors in Colombia.

In light of the Prime Minister's visit to Cuba that same month, in February 2017, we held a public-private infrastructure conference in Cuba, at which we encouraged an understanding of Quality Infrastructure Investment and provided support for Japanese companies involved in infrastructure to expand and develop business in this region.

(viii) Africa

Based on the ministerial declaration adopted at the Japan-Africa Public-Private Infrastructure Conference held in August 2016 to coincide with TICAD VI, we founded the Japan-Africa Infrastructure Development Association (JAIDA) for the purpose of proactively disseminating information to the nations of Africa regarding Japanese technology and experience in supporting Quality Infrastructure, and of building relationships with both public and private entities and partner countries.

In January 2017, JAIDA accompanied us on a trip to Uganda and Zambia to hold public-private infrastructure conferences, which to that point had been held in six African countries (Kenya, Ethiopia, Mozambique, Tanzania, Côte d'Ivoire and Nigeria). We agreed with the partner countries to launch Quality Infrastructure Dialogues (QID) as a way to continue the good relationships built at the conferences and to provide regular opportunities for the people concerned to exchange opinions.

In February of that year, we hosted an Urban Transportation Seminar in Mombasa, Kenya, to promote the overseas development of Japanese urban transportation systems.

(ix) Australia

The joint statement made at the Japan-Australia Summit Meeting in December 2015 included a pledge to launch regular high-level meetings to include matters related to urban transportation and high-speed railways; in light of this pledge, the MLIT hosted the first meeting of Japan-Australia Senior Transportation Officials in November 2016. The MLIT, the Australian Department of Infrastructure and Regional Development and Australian state and territorial governments exchanged opinions regarding the ideal state of urban railway and high-speed railway improvements, measures to promote the use of public transportation, public transportation-oriented development and other issues shared by the two countries.

Section 2 Promotion of International Cooperation and Negotiations

Initiatives in the Field of Economic Partnerships

(1) Trans-Pacific Strategic Economic Partnership (TPP) Agreement

The TPP Agreement constitutes an economic partnership agreement forming the basis of rules governing trade and economic activities in the Asia-Pacific region, which accounts for forty percent of global GDP, as well as a pillar for a Japanese growth strategy to help the Asia-Pacific region grow. Japan participated in negotiations in July 2013 and a broad outline of the TPP Agreement was agreed to in October 2015. The key provisions of the agreement as it affects the land, infrastructure, transport, and tourism sectors entailed an agreement to promote the international harmonization of environmental and safety standards for automobiles without lowering domestic standards. As for government procurement activities, general competitive bidding will be newly mandated in Malaysia, Vietnam, and elsewhere, a change that is expected to lead to the promotion of the overseas development of Japanese infrastructure systems. In November of the same year, the government compiled a comprehensive set of TPP-related policy principles to directly tie the TPP to economic revitalization and the emergence of regions in Japan. The agreement was signed in February 2016, and in December of that year, the Diet approved it and drafted related bills. In January 2017, we notified the depository (New Zealand) of the completion of domestic procedures.

(2) Japan-EU EPA and Other Economic Partnership Agreements and Free Trade Agreements (EPA/FTA)

Japan is strategically promoting economic partnerships with the Asia-Pacific region, the East Asia region, Europe, and elsewhere. As of March 2016, EPAs with fifteen countries and regions (excluding the TPP) have been put into effect, signed, or are otherwise under negotiations with a view to eventually being concluded, examples of which include the Japan-EU EPA and the Regional Comprehensive Economic Partnership for the East Asia region (RCEP). These arrangements will serve to strengthen the international competitiveness of Japan's transport, construction, and other industries, promote international development and the opening of the service sector in partner countries, including by way of the abolition or deregulation of foreign capital restrictions, and promote the expansion of participation opportunities relating to government procurement.

It was decided that negotiations for a Japan-EU EPA would be commenced in March 2013. Seventeen negotiation sessions have been held as of March 2017. Given that both Minister Kishida of MOFA and European Commissioner Cecilia Malmström agreed to strive for a broad agreement as soon as possible in December 2016, the entire Japanese government, including the MLIT, has thus accelerated its efforts to facilitate the conclusion of an agreement at the earliest possible point in time.

Sixteen countries, including the countries of the ASEAN bloc, China, South Korea, and Australia, are participating in negotiations with respect to the RCEP. These negotiations began in May 2013 and seventeen negotiation sessions have been held as of March 2017.

(3) World Trade Organization (WTO)

Discussions among like-minded countries and regions, including Japan, have been undertaken with a view to enacting a new Trade in Services Agreement (TiSA) in order to further liberalize trade in service sectors. Negotiations began in June 2013.

2 Contributions to and the Strategic Use of International Organizations

(1) G7 Transport Ministers' Meeting in Karuizawa, Nagano

In 2016, Japan presided over the G7 Summit. In addition to hosting the summit at Ise-Shima in May, 10 relevant ministers' meetings were held at different locations across the country.

The MLIT hosted a meeting of the G7 Transport Ministers in Karuizawa Town, Nagano Prefecture, in September of the same year. At this meeting, discussions on the two themes of developing and disseminating the latest technologies concerning automobiles and roads, and basic strategies for dealing with the development and obsolescence of transportation

infrastructure, were undertaken based on discussions that took place at the meeting of the G7 Transport Ministers held in Germany in September 2015, and ministerial declarations were issued for each.

Column

G7 Transport Ministers' Meeting in Karuizawa, Nagano

The MLIT hosted the G7 Transport Ministers' Meeting in Karuizawa, Nagano from September 23 to 25, 2016, under the chairmanship of Minister Keiichi Ishii. Members from the G7 countries included Mr. Marc Garneau (Canadian Minister of Transport); Mr. Francois Poupard (French Director General for Infrastructure, Transport and the Sea); Mr. Alexander Dobrindt (German Federal Minister of Transport and Digital Infrastructure); Mr. Graziano Delrio (Italian Minister of Infrastructures and Transport); Mr. Chris Grayling (British Secretary of State for Transport); Mr. Anthony Foxx (American Secretary of Transportation); and Ms. Violeta Bulc (European Commissioner for Mobility and Transport). Following the first and previous meeting, which was hosted by Germany in September 2015 in Frankfurt, this was the second meeting, held in Japan for the first time. The ministers discussed two important themes, "Development and widespread utilization of advanced technology for vehicles and roads" and "Basic strategy for developing new transport infrastructure and renovating aging and/or deteriorated transport infrastructure," and issued a G7 Transport Ministers' Declaration for each.

A significant achievement of holding this second G7 Transport Ministers' Meeting in Japan was that an ongoing framework was able to be established for discussing and cooperating in addressing important transport issues common to the G7 countries. With hopes that this framework will continue to provide a significant forum for advanced discussions on global transport issues, Japan will continue to make an active contribution to future G7 Transport Ministers' Meetings.



Source) MLIT

Session on "Development and widespread utilization of advanced technology for vehicles and roads"



Source) MLIT

Welcome reception hosted by the MLIT and the local community (raising glasses in a toast)



Source) MLIT

(2) Asia-Pacific Economic Cooperation (APEC)

APEC is a framework for economic cooperation through which activities to promote trade and investment liberalization, business facilitation, economic and technical cooperation, and other such objectives are carried out to promote the sustainable growth and prosperity of the Asia-Pacific region. The MLIT is proactively involved in ministers' meetings and working groups that pertain to APEC's transportation and tourism sectors.

In the transportation sector, meetings of the transportation ministers to facilitate the flow of goods and people and support trade and investment within the given area are held. At the eighth APEC Transport Ministers' Meeting held in Tokyo in September 2013, the topic of enhancing connectivity through high-quality transportation within the APEC region in terms of basic themes was discussed. As proposed by Japan, the ministerial joint statement that was released at the time came to incorporate three concepts constituting the keys to the development of transportation in the APEC region: enhancement of connectivity, development of a transportation infrastructure based on the use of private funds, and deployment of high-quality transportation. At the ninth APEC Transport Ministers' Meeting held in the Philippines in October 2015, Japan presented a report on three initiatives that resulted from discussions that were held at the eighth APEC Transport Ministers' Meeting: (i) connectivity map; (ii) sharing best practices for infrastructure investing, financing, and operations; and (iii) a vision for high-quality transportation.

The 10th APEC Transport Ministers' Meeting is scheduled to take place in Papua New Guinea in October 2017.

(3) Cooperation with Association of Southeast Asian Nations (ASEAN)

In an effort to further promote quality transportation in ASEAN, the MLIT is implementing various cooperation projects for overland, maritime and air transport under the ASEAN-Japan Transport Partnership, a cooperative framework for the transportation sectors in Japan and ASEAN established in 2003. The projects include joint research on paving technologies and overload management technologies in support of global road networks, joint research regarding port and harbor technology, re-surveying of channels and improvement of nautical charts for the Singapore Strait and Strait of Malacca, and support for air transport security systems. The "ASEAN and Japan Transport Ministers Meeting" is held every year to monitor the progress of current projects and to discuss new projects and future direction.

At the 14th ASEAN and Japan Transport Ministers Meeting held in the Philippines in November 2016, the ASEAN-Japan Transport Partnership Work Plan for 2016-2017, which is a specific implementation plan of the ASEAN-Japan Transport Partnership, was approved, as well as four new cooperation projects: Implementation of the New ASEAN-Japan Action Plan on Environment Improvement in the Transport Sector, Project for Encouraging the Use of Environmentally Friendly Ships in ASEAN, and Implementation of the Green Logistics Vision and Action Plans and Regional Action Plan on Port Security (RAPPS) 2017 under ASEAN-Japan Maritime Security Transport Programme. In addition, ASEAN models of the Audit Training Programme and Maritime Security Training of Trainers (ToT) Programme was approved as a project output.

(4) Organization for Economic Co-operation and Development (OECD)

The MLIT participates in the activities of multiple OECD organizations, including the International Transport Forum (ITF), the Council Working Party on Shipbuilding (WP6), the Regional Development Policy Committee (RDPC), the Tourism Committee, and the Joint Transport Research Centre (JTRC) of the ITF.

The ITF is an international framework in which transport ministers from 57 countries play a central role in annual meetings to facilitate high-level and open discussions with world-renowned experts and business persons regarding transport policy. Previous topics discussed include climate change in the transport sector and globalization. At a ministers' meeting in May 2016, discussions based on a theme of eco-friendlier, universally accessible transportation were held, with an exploration of various perspectives. Participants discussed matters such as plans for the realization of the Paris Agreement adopted at COP21, the realization of universally accessible transportation, and the effects of the use of new technologies and big data.

In order to foster normal competitive conditions in the shipbuilding industry, WP6 works towards to increase transparency by conducting reviews of the shipbuilding policies of each country and Inventory of subsidies and other support measures. In light of excessive government interference in the shipbuilding industry through massive financing by government and public bodies for struggling shipbuilders in some countries in recent years, WP6 has discussed the disciplines on public support to avoid the market distortion.

The RDPC proactively conducts reviews of the policies of member countries with respect to land and regional policies, studies on urban policies in the context of green growth strategies, and surveys on resilient cities, and in April 2016, the decision was made to implement projects involving the improvement of productivity in urban and regional areas. In addition, a second review by country was announced for Japan's land and regional policies in the same month. This review positively recognized that Japan, a society that is undergoing a population decline and is aging at the same time, is attempting to convert this crisis into an opportunity through a long-term, comprehensive land plan.

The JTRC conducts surveys and research on policy issues commonly applicable to member countries. Japan also participates in a working group focused on smart road use methods proposed and adopted by Japan.

(5) United Nations (UN)

(i) International Maritime Organization (IMO)

IMO is a specialized agency of the United Nations that establishes international rules on safety and environmental measures of ships. Japan actively participates in the activities of this organization as a global leader in shipping and shipbuilding. In FY2016, Japan actively contributed to discussions promoting measures to reduce ships' greenhouse gas emissions and the enforcement of a convention for the control and management of ships' ballast water, the revision of passenger ship safety standards, the development of interim guidelines on maritime cyber risk management, and the development of interim recommendations for carriage of liquefied hydrogen in bulk.

(ii) International Civil Aviation Organization (ICAO)

ICAO is a specialized agency of the United Nations that has set forth certain rules and other stipulations for the safe and orderly development of international civil aviation and the sound and economic operations of international air transportation. Japan's financial contributions are second among member states FY2016 and Japan, as a Governing Council state under PART I (States of chief importance in air transport), actively participates in various ICAO activities and contributes to the development of international civil aviation.

In particular, regarding global greenhouse gas emissions reduction programs using market mechanisms that have been discussed to date, Japan has pledged to voluntarily participate since the inception of the programs and has made efforts to lead the discussion, which resulted in an agreement at the ICAO Assembly held in September and October 2016.

(iii) UN-Habitat

UN-HABITAT is a UN funding and planning agency specializing in human settlement issues. Japan has been an active council participant since the foundation of UN-HABITAT, and has taken advantage of its knowledge and record of accomplishment on improving land, regional, and residential environments to contribute to improving human settlement issues worldwide, with particular focus on the Asian population explosion and rapid urbanization.

The 3rd United Nations Conference on Housing and Sustainable Urban Development (Habitat III) was held in Ecuador in October 2016 in an effort to resolve issues involving human settlement, namely issues brought about by the rapid urbanization that is progressing throughout the world. At the conference, the New Urban Agenda was adopted. The agenda sets out indicators for global efforts toward the development of national land in balance with national land plans and quality infrastructure investment for sustainable urban development, both of which were emphasized by the Japanese government, as well as for resolving issues involving urbanization and human settlements over the next 20 years in terms of disaster prevention, national land resilience improvement and other factors.

(iv) UN efforts regarding water and disaster prevention

The secretary-general of the United Nations and the president of the World Bank convened and in 2016 the High-Level Panel on Water (HLPW) with the heads of state and government as a framework for discussing policy regarding future water issues in the global community. The Japanese government worked together with HLPW Special Advisor Dr. Han Seung-Soo, UN Secretary-General Special Envoy on Disaster Risk Reduction and Water, to contribute to the formulation of future action plans for the water-rerated and disaster management. In addition, MLIT participated in the seventh (May 2016) and eighth (November 2016) meetings of the High-level Experts and Leaders Panel on Water and Disasters (HELP), which aims to enhance the efforts of each country to combat water-related disasters, and have made policy recommendations regarding the importance of financing in the water and disaster management sectors, infrastructure maintenance by the public sector and various service provision by the private sector.

(v) Sustainable development goals (SDGs)

Given the adoption of sustainable development goals (SDGs) at the UN Summit in September 2015, the Japanese Sustainable Development Goals Promotion Headquarters, which is chaired by Prime Minister Abe, determined indicators for implementing SDGs in Japan (SDG implementation indicators) in December 2016. To realize sustainable development inside and outside Japan, the MLIT will also implement efforts toward the achievement of SDGs through related measures such as the promotion of Quality Infrastructure Investment.

(6) World Bank (WB)

The MLIT and WB jointly hosted an international conference on "Sustainable development through Quality Infrastructure Investments" in February 2017 in order to effectively share knowledge on Quality Infrastructure Investments with infrastructure officials in other countries. In addition, in May 2016 and February 2017, we introduced Japanese national land plans and our knowledge of urban development at invitational events held by the World Bank for key people involved in urban development in various countries.

(7) Conference on African Development (TICAD)

In August 2016 at TICAD VI, the first TICAD conference held in Africa, the Nairobi Declaration, which mentioned the importance of Quality Infrastructure Investment, was adopted. In light of this declaration and the Leaders' Statement for the Promotion of Quality Infrastructure Investment adopted by cabinet ministers from Japan and various African countries at the Japan-Africa Public-Private Infrastructure Conference held to coincide with TICAD VI, we will continue to promote efforts such as these public-private infrastructure conferences to promote Quality Infrastructure Investment in Africa.

3 Multilateral and Bilateral International Negotiations and Collaborative Initiatives in Different Sectors

(1) National Land Policy Sector

We regularly hold bilateral director-level conferences with South Korea at which we exchange information concerning similar issues affecting both countries regarding national land policy, regional policy and land policy. In light of the growing need for national plans in Asian countries dealing with rapid economic growth and urbanization, and international agreements from Habitat III regarding the strategic promotion of national land policy, we will proactively promote the overseas deployment of Japanese national land policy and regional policy.

(2) Urban Sector

In FY2016, we held the 17th Japan-China Conference on Urban Planning and Urban Development at which government officials and companies from both countries gave presentations.

In response to a request from the Myanmar Ministry of Construction, we provided support for the development of urban and regional development planning legislation and an enforcement ordinance for that legislation, and also implemented technical cooperation through the dispatch of JICA experts and the like.

(3) Water Sector

Based on the common understanding of water problems as global-scale problems, discussions toward the resolution of these problems are taking place at international conferences and other venues. We are participating in discussions at international conferences such as the ASEAN +3 Water Ministers' Forum held in Singapore in July 2016, and the IWA World Water Congress held in Australia in October of that year, and have disseminated messages regarding Japanese water resource management policy and the like.

In addition, Japan is coordinating efforts with the Network of Asian River Basin Organizations (NARBO) to contribute to the dissemination and promotion of Integrated Water Resources Management (IWRM).

Furthermore, we have cooperated with the United States and South Korea to host bilateral meetings pertaining to rivers, sediment control facilities and water resource management at which we have shared information about the current circumstances in each country, pioneering efforts and the like.

In addition, the Water and Environmental Solution Hub, an alliance of local governments; the Japan Sewage Works Agency; the MLIT; and others has provided expertise on sewage works to developing countries through seminars, training, and other programs.

(4) Disaster Management Sector

To reduce the damage of water disasters around the world, MLIT disseminated Japan's experiences and technology, made efforts to establish international solidarity in order to build consensus that disaster prevention is the key to sustainable development. The International Centre for Water Hazard and Risk Management (ICHARM), which was founded in the Public Works Research Institute, has provided technical cooperation and international assistance for countries and regions vulnerable to water related disasters through various efforts such as developing the integrated flood analysis system (IFAS) and rainfall-runoff-inundation (RRI); researching the risk management; implementing human resource development programs; participating in UNESCO and Asian Development Bank projects; and handing the International Flood Initiative (IFI).

In accordance with a MOV exchanged in March 2013 between the European Civil Protection and Humanitarism Aid Operations (ECHO) and the MLIT, working level talks were held in December 2016 for the purpose of enhancing disaster management measures in place in both Japan and the EU. In addition, in the sediment control sector, we have hosted bilateral conferences regarding sediment control technology with Italy, South Korea, Switzerland and Austria, and have implemented technical cooperation through the dispatch of JICA experts and other efforts for warnings and evacuation from landslide disasters, land-use regulations and the like in Brazil and Sri Lanka.

(5) Road Sector

Japan has been proactively participating in various technical committees of the World Road Association (PIARC) and spearheading the formulation of a future policy. In addition, at the PIARC Annual Council Meeting held in Cape Town, South Africa, in September 2016, we introduced our traffic safety efforts focusing on how we provide sudden braking movement and acceleration data collected through ETC 2.0 for local governments to identify black spots in advance and implement effective measures through big data.

(6) Housing and Building Sector

We hosted the world conference of the Inter-Jurisdictional Regulatory Collaboration Committee (IRCC) in Tokyo, and made other efforts to exchange information with relevant countries concerning global trends in building codes and the like.

We hosted bilateral meetings with Germany, France, India, Indonesia and Myanmar at which we exchanged information about housing policy, energy-efficient construction, home financing and other matters.

Broad technical cooperation was provided to Myanmar and Cambodia through the dispatching of JICA experts and other measures based on the memorandums between both countries.

(7) Automotive Sector

Based on the ASEAN-Japan New Cooperative Program on Comprehensive Vehicle Safety and Environment Measures Including Development of Technical Regulations and Establishment of a Type Approval System for Vehicles endorsed at the 13th ASEAN-Japan Transport Ministers' Meeting in 2015, in October 2016, we hosted a Public-Private Joint Forum for the Asian region, at which we exchanged information about activities for the global harmonization and mutual recognition in the Asia region. In addition, continuing from last year and based on the program, we implemented and exchanged pertinent information and opinions regarding a program in Malaysia to improve their automobile transportation safety and environmental conservation policy formulation process.

(8) Maritime Sector

In the maritime sector, in addition to the IMO global agenda, Japan has undertaken bilateral talks to address international issues. In FY2016, Japan held Director-General-level conferences with the United States at which they shared information and exchanged opinions about the facilitation of the entry into force of the Hong Kong Convention on ship recycling, the problem of excess supply capacity in the shipbuilding market, measures for the reduction of greenhouse gas emissions, ballast water management, cybersecurity and other matters. In addition, the joint hydrography survey of the Strait of Malacca and the Singapore Strait was approved in July of that year as a Japan-ASEAN Integration Fund project, and we hosted a seminar targeting travel agencies in Singapore and Thailand based on the ASEAN-Japan Cruise Promotion Strategy approved at the ASEAN-Japan Transport Ministers' Meeting in 2014.

(9) Ports Sector

The latest information on the administration of ports and harbors is being exchanged and measures to promote cruise ship operations and the overseas deployment of Japanese technical standards are being carried out through various international conferences, such as the Northeast Asia Port Director-General Meeting, meetings of APEC's Transportation Working Group, and meetings of the World Association for Waterborne Transport Infrastructure (PIANC).

Based on the memorandum on cooperation in development of the national technical standards for port and harbor facilities of the Socialist Republic of Viet Nam, we held meetings with administrative officials and experts.

(10) Aviation Sector

In March 2016, the second meeting of the Japan-France Cooperative Working Group was held in Toulouse, France, in accordance with a memorandum of understanding concerning technical cooperation in the civil aviation sector that has been concluded with France, and it was decided to advance cooperation including regular meetings to be held in the future.

In addition, in August, Sri Lanka hosted the 53rd Conference of the Directors General of Civil Aviation in the Asia and Pacific Regions, on the theme of "Fostering safe, secure and effective aviation system in an eco-friendly environment with no country left behind," and where we exchanged opinions on various initiatives being undertaken by respective countries in the Asia and Pacific regions concerning aviation in general.

(11) Logistics Sector

Trilateral cooperation among Japan, China, and South Korea is being advanced in the logistics sector in accordance with an agreement reached at the sixth China-Japan-Korea Ministerial Conference on Transport and Logistics held in July 2016, such as by way of studies into the expansion of the mutual access of chassis, the expansion of covering ports in Japan, China, and South Korea that are subject to the Northeast Asia Logistics Information Service Network (NEAL-NET), and the expansion of such ties to ASEAN countries and other partners.

Discussions on enhancing the logistics environment are also being carried out in the context of bilateral logistics policy dialogue under the framework of the ASEAN-Japan Transport Partnership, sessions were held in Myanmar in October 2016 and Thailand in January 2017. In March 2017, Logistics Human Resource Development program was conducted in Lao PDR, to help secure exceptional human resources in the ASEAN region.

(12) Geospatial Information Sector

In addition to dispatching staff members to the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) and contributing to implementation of UN General Assembly resolution on a Global Geodetic Reference Frame (GGRF), we have dispatched a staff member as President to the Regional Committee of UN-GGIM for Asia and the Pacific (UN-GGIM-AP) and made contributions to the development and utilization of geospatial information for the region.

Further, the MLIT is dispatching experts and making other efforts to implement technical assistance toward the establishment of an integrated GNSS Continuously Operating Reference Stations (CORS) network in Thailand based on the Japan-Thailand joint press statement from the Japan-Thailand Summit Meeting held in February 2015.

(13) Meteorological and Earthquake/Tsunami Sector

Under the framework of the World Meteorological Organization (WMO), Japan has provided the world meteorological community with various information including tropical cyclone forecasts taking advantage of its advanced technologies as well as exchanged meteorological data and technical information. Also, under the framework of the United Nations Educational, Scientific and Cultural Organization (UNESCO) Intergovernmental Oceanographic Commission (IOC), Japan has provided the Northwest Pacific Tsunami Advisory to 16 countries in the northwest Pacific region to contribute to tsunami disaster mitigation.

(14) Coast Guard Sector

Coordination and cooperation among coast guard organizations in various fields—including search and rescue as well as maritime security measures—are being actively promoted through partnership of the North Pacific Coast Guard Forum (formed by six countries consisting of Japan, Canada, China, South Korea, Russia, and the United States), the Heads of Asian Coast Guard Agencies Meeting (19 Asian countries and one region), and bilateral top-level meetings, as well as joint exercises.

The Japan Coast Guard is also proactively participating in various international organizations by formulating standards concerning the production of nautical charts through committees of the International Hydrographic Organization (IHO), coordinating for the Northwest Pacific Ocean region through the Cospas-Sarsat Programme, conducting investigations into VDES^{Note} development through committees of the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), and dispatching staff members from the Japan Coast Guard to the Information Sharing Center based on the Regional Cooperation Agreement on Combating Piracy and Armed Robbery against Ships in Asia (ReCAAP). In addition, international contributions are being made through different initiatives, such as those that help improve the capabilities of the coast guard sector in developing countries.

Section 3 Initiatives Towards International Standardization

(1) Efforts for International Standardization

To promote high safety and environmental performance automobiles early and cost efficiently, Japan is actively participating in activities of the World Forum for Harmonization of Vehicle Regulations (WP.29) to promote the international harmonization of safety and environmental regulations, and is also promoting the international spread of Japanese automobiles with superior safety, and environmental features, and new technology through participation in these activities. In order to promote such activities, the "Action Plan for the Internationalization of the Regulation and Certification System" with its four pillars of: 1) Strategic international standardization of Japanese technology and regulations, 2) Realization of international whole vehicle type approval system (IWVTA), 3) Promoting participation of Asian countries in international harmonization of regulations, and 4) Establishing a framework to handle globalization of regulations and certification, is being steadily realized to promote the internationalization of automobile regulation and certification systems.

(2) Internationalization and Other Initiatives in the Railway Sector

As Europe actively promotes the international standardization of European standards, the possibility of significant obstacles arising in the overseas expansion of railway systems is increased if Japan's superior technology is excluded from the scope of international standards. Because this will affect global competitiveness in the railway sector, it is important to actively promote international standards in railway technology. For this reason, the Railway Technical Research Institute's Railway International Standards Center, which is the centralized organization that handles railway-related international standards, works proactively to further advance railway safety and the expansion of the railway industry.

As a result, Japan has played a central role in contributing to the proposals of individual standards and committee activities in the Technical Committee for Railway Applications (TC269) of the International Organization for Standardization (ISO), and secured successful results. As this country's profile in various international conferences, including those organized by ISO/TC269 and the Technical Committee for the Railway Sector (TC9) of the International Electrotechnical Commission (IEC), has risen, efforts have been directed at promoting international standardization with respect to railway technology. The National Traffic Safety and Environment Laboratory of the National Agency for Automobile and Land Transport Technology (Independent Administrative Institution), the first domestic certification body of international standards in the railway sector, has acquired solid certification experience following the establishment of the Railways Certification Office, and contributed to the international expansion of Japan's railway systems.

(3) International Standards Regarding Ships and Mariners

In order to aim to mitigate the environmental impact and increase the safety of shipping and help disseminate superior Japanese energy-saving technologies, Japan has spearheaded discussions in the context of the formulation of standards under the SOLAS Convention^{Note 1}, MARPOL Treaty^{Note 2}, and STCW Convention^{Note 3}, all of which have been adopted under the auspices of the International Maritime Organization (IMO).

Moreover, the Japan Coast Guard has participated in discussions on international standards applicable to nautical charts, nautical publications, and navigational warnings as hosted by a working group operating under the auspices of the International Hydrographic Organization (IHO). In order to ensure the safety of vessel traffic and increase the operating efficiency of vessels, we are leading the discussion in the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) e-Navigation Committee regarding the international standardization of VDES, a new maritime data communication system.

(4) International Harmonization of Standards and Certification Systems in the Civil Engineering and Building Sectors

In the civil engineering, building, and housing sectors, we are working to promote the international harmonization of standards and certification systems by operating programs for certifying imported building materials in terms of performance and for approving rating agencies, obtaining technical cooperation from organizations like JICA, and participating in the establishment of ISO standards for design and construction technology. Likewise, as part of the efforts to incorporate Japan's accumulated technology in international standards, discussions are in progress to develop and revise domestic technical standards by taking into account trends in the creation of international standards.

Note 2 International Convention for the Prevention of Pollution from Ships.

Note 1 International Convention for the Safety of Life at Sea.

Note 3 International Convention on Standards of Training, Certification and Watchkeeping for Seafarers.

(5) International Standardization of Intelligent Transportation Systems (ITS)

In order to promote the development of efficient applications, international contributions, and the development of related industries in Japan, the international standardization of ITS technology is progressing within international standardization bodies, including ISO and the International Telecommunication Union (ITU).

In particular, we are participating in the Technical Committee on International Standardization of the ITS (ISO/TC204) and have been engaged in standardization activities concerning the use of probe data gathered with the ETC2.0 service. Japan has spearheaded the formulation of international regulations governing automatic driving, such as by co-chairing the Intelligent Transport Systems and Automobile Driving Informal Working Group and Automatically Commanded Steering Function Informal Working Group, which were established under the United Nations' World Forum for Harmonization of Vehicle Regulations (WP.29) and proposing regulations for automatic steering to enable automatic driving on expressways.

(6) Standardization of Geographic Information

For the purpose of ensuring compatibility for the interoperability between different Geographic Information Systems (GIS) dealing with geospatial information, Japan is actively participating in the formulation of international standards by the ISO Technical Committee for Geographic information/Geomatics (ISO/TC 211). Likewise, we are working on standardizing domestic geographic information.

(7) Mutual Recognition of International Technical Qualifications

Within the APEC Architect Project and the APEC Engineer Project, we have conferred mutual designations on people qualified to produce architectural designs and qualified engineers within APEC who have satisfied certain requirements. Within the APEC Architect Project, we are promoting the mobility of persons qualified to produce architectural designs through our signing of bilateral memorandums of understanding for mutual acceptance with Australia and New Zealand, and efforts such as our participation in the APEC Architect Central Council.

(8) Sewage Sector

Presently, our proactive and leading participation in the Technical Committee on the Water-reuse (ISO/TC282), Technical Committee on Sludge Recovery, Recycling, Treatment, and Disposal (ISO/TC275), and Working Group on Stormwater Management (ISO/TC224/WG11) represents efforts to promote the deployment of high-quality Japanese sewage technology overseas.

(9) Promotion of the International Standardization of Logistics Systems

We are promoting the standardization and international standardization of Japanese logistics systems, thereby contributing to improved logistics environments in Asian distribution networks and strengthening the international competitiveness of Japanese logistics companies, based on the services and know-how those companies have, which is of the world's highest level, including cold chain and delivery services.

Chapter 10 Utilizing ICT and Promoting Technology Research and Development

Section 1

Promoting Innovation in the Fields of Land, Infrastructure, Transport, and Tourism Through the Use of ICT

Information technology initiatives in the fields of land, infrastructure, transport and tourism within the Declaration to be the World's Most Advanced IT Nation (revised on May 20, 2016) are being promoted in coordination with the IT Strategic Headquarters (Strategic Headquarters for the Promotion of an Advanced Information and Telecommunications Network Society) as headed by the Prime Minister.

Promoting ITS

Intelligent Transport Systems (ITS), a system created through the integration of people, roads, and vehicles using the latest Information and Communications Technology (ICT), enables advanced road use, the safety of drivers and pedestrians, the dramatic improvement of transport efficiency and comfort, solves various social problems such as traffic accidents and congestion, environmental and energy problems, and is leading to the creation of new markets in the related fields of the automotive industry, information technology industry, and others.

We are also proactively promoting initiatives pertaining to the collection and distribution of road traffic information which will work effectively for safety measures, congestion measures, and disaster countermeasures in accordance with our aim to realize the world's safest, environmentally friendly, economical road traffic society based on our Declaration to be the World's Most Advanced IT Nation, which was endorsed by the Cabinet in June 2013 and revised in June 2014, June 2015, and May 2016, and on our Public-Private Partnership-Based ITS Concept and Roadmap, which was endorsed by IT Strategic Headquarters in June 2014 and revised in June 2015 and May 2016.

(i) The spread of ITS in society and its effect

a. Promotion of ETC and its effects

Electronic Toll Collection (ETC) is now available on all national expressways, as well as most of the toll roads in Japan. The total number of new setup onboard units is roughly 56.09 million as of November 2016 and its usage rate on all national expressways is roughly 91.0%. Congestion at tollgates, which used to account for roughly 30% of the cause for expressway congestion, has been mostly alleviated and has contributed to reductions in CO_2 emissions and environmental burdens. Additionally, measures utilizing ETC are being implemented, such as the introduction of Smart IC dedicated to ETC interchange and discounts for ETC vehicles. In addition to such toll road uses, it is also possible to use ETC for parking payments and boarding procedures for ferries, showing the spread and diversification of services utilizing ETC.

b. Improvement of providing road traffic information and its effects

Vehicle Information and Communication System (VICS)-compatible onboard units aim to advance travel route guidance and, as of September, 2016, roughly 52.31 million units have been shipped. By providing road traffic information such as travel time, congestion conditions, and traffic restrictions in real-time through VICS, drivers' convenience is improved. This ultimately contributes to better mileage and reduces environmental burdens, including the reduction of CO, emissions.

(ii) Technological development and the popularization of new ITS services

a. Popularization and utilizing ETC 2.0

ETC 2.0 onboard units came onto the market in full force in August 2015, and as of November 2016, roughly 1.2 million units had been released. Using ETC 2.0, we are committed to promoting several "smart use of roads" measures. These include provision of support for safe driving through information such as alerts about locations where accidents occur frequently and about objects that have fallen onto the road, introduction of flexible toll rates to reduce congestion and accidents and promotion of highly productive logistics man-



agement system, through the use of vehicle speed data, travelled route and travel time data, and other various big data carefully collected from the ETC 2.0 onboard units.

b. Promotion of the Advanced Safety Vehicle (ASV) Project

Based on the Advanced Safety Vehicles (ASV) promotion plan, efforts are underway for the development, commercialization, and widespread adoption of Advanced Safety Vehicles (ASV) that assist drivers to drive safely using advanced technology. In FY2016, discussions were held regarding the development of practical ASV technology and other technologies, namely advanced systems that pull vehicles over to the shoulder and take other emergency measures when the driver is driving abnormally.



2 Realizing Automatic Driving

Japan has been appointed to jointly chair the Intelligent Transport System and Automatic Driving Informal Working Group (established in November 2014) and the Automatically Commanded Steering Function Informal Working Group (established in February 2015), which were established under the UN World Forum for Harmonization of Vehicle Regulations (WP.29), and is spearheading studies of international safety regulations applicable to automatic driving.

Domestically as well, in the sixth phase of the ASV promotion plan that started in FY2016, we began discussions about specific technical requirements, paying special attention to setting out indicators for development and viability regarding the advanced safety technology required to make autonomous driving a reality. In addition, we engaged in studies on demonstration experiments for the commercialization of communications-based driving support systems in the context of the Cross-ministerial Strategic Innovation Promotion Program (SIP), a collaborative measure undertaken by relevant ministries and agencies, and held a meeting to review the automatic-driving business jointly with the Ministry of Economy, Trade and Industry. We also sorted out the direction that automatic driving should take as we focus on a point 15 years down the road and the issues that must be addressed for the realization of this direction.

Furthermore, in December 2016, we established the MLIT Autonomous Driving Strategy Headquarters, headed by the Minister of the MLIT, and held discussions on the MLIT's policies regarding important matters surrounding autonomous driving, such as motor vehicle technology standards, infrastructure development, and action strategies for logistics and public transportation in hilly and mountainous areas and other regions.

3 Realizing a Society that Utilizes Geospatial Information in an Advanced Manner

We are promoting efforts toward advancing the use and application of geospatial information^{Note 1} using ICT and other technologies based on the Basic Plan for the Advancement of the Utilizing of Geospatial Information, which was adopted by a Cabinet decision in March 2017, in pursuit of the realization of a G-Spatial Society (an Advanced Geospatial Information Utilization Society) where anyone can utilize the geospatial information they need anywhere and anytime.

(1) Developing and Updating Geospatial Information as the Foundation of Society

We are coordinating with relevant administrative organizations to promote the rapid development and updating of Fundamental Geospatial Data^{Note 2}, which can serve as the common basis for positioning on digital maps, and the Digital Japan Basic Map^{Note 3}, which is a basic map of Japan that includes information required for national land management and other efforts. Various types of information regarding national land are being developed, such as aerial photographs, geographical name information, National Land Numerical Information, continuous monitoring of crustal movements with GNSS-based control stations, and preparation of guidelines for using data obtained from city planning basic surveys to Geographic Information System (GIS). In addition, a system is being constructed that enables prompt assessment and provision of information on national infrastructure, such as development of information on the topographical classification used as the basic material for developing hazard maps prepared for future disasters, and taking aerial photographs urgently during disasters.

(2) Initiatives to Promote the Utilization of Geospatial Information

We are driving forward with efforts to further promote the sharing and mutual use of geospatial information throughout society; our efforts include the launch of G-Spatial Information Center, at which people can uniformly search, obtain and use geospatial information developed by various entities, and the improvement of GSI Maps^{Note 4} that facilitate overlaying various geospatial information on the web. In addition, we are promoting the development of a verification project working toward further diffusion to the general public, human resource development, and the realization of a G-Spatial Society, and we collaborated with industry, academia and government to host the Geospatial EXPO 2016 in November 2016.

4 Realizing an Electronic Government

Following the "Declaration to be the World's Most Advanced IT Nation," various initiatives are being carried out to realize an electronic government. In particular, regarding the online usage, initiatives are being taken to improve convenience for citizens as well as making administrative operations simple and efficient, based on the reform policies to improve the convenience of online procedures.

Regarding automobile ownership procedures, a "One-Stop Service (OSS)" that allows for the execution of various procedures, such as inspection, registration, automobile parking space certification, and payment of various vehicle taxes online and at the same time, is being promoted through the cooperation of various ministries. Before this year, the OSS had only been introduced for the new car registration process in 11 prefectures, but in April 2017, we dramatically expanded the target processes and regions. Specifically, nearly all processes required for continuous inspections (vehicle inspections known as "shaken"), registration of moves and other changes, and registration of used cars purchased by a new owner are

- Note 1 Information that represents the position of a specific point or area in geospace (including temporal information pertaining to said information) as well as any information associated with this information. Also called G-spatial information (Geospatial Information).
- Note 2 Serves as the basis for the position determined for geospatial information on the digital map such as positional information for the geodetic control points, coastlines, boundaries of public facilities, and administrative boundaries. Criteria and standards are defined by ministerial ordinances of MLIT. The Geospatial Information Authority of Japan completed the preliminary development in FY2011, and it is currently being updated along with the Digital Japan Basic Map.
- **Note 3** Electronically compiled maps that serve as our nation's basic maps instead of the traditional paper maps including the 1:25,000 scale topographic maps. In addition to depicting our national territory appropriately, it serves as the most fundamental information of our national land's conditions with geospatial information developed by the Geospatial Information Authority of Japan.

Note 4 Web maps operated by the Geospatial Information Authority of Japan (https://maps.gsi.go.jp/). More than 1,800 layers of geospatial information have been distributed. now eligible for OSS, and we are committed to progressively implementing OSS to reduce the burden on prefectural governments by continuing development to integrate national and prefectural systems. In light of government policies such as the Japan Revitalization Strategy and the Declaration to be the World's Most Advanced IT Nation, we intend to continue discussions regarding matters such as measures to further improve convenience using My Number cards.

5 Development and Opening of Optical Fiber for the Management of Public Facilities and Its Housing Space

The development and opening of optical fiber for the public facilities management and its housing space is being promoted in rivers, roads, ports, and sewage, as a response to the "e-Japan Priority Policy Program." As of April 2016, the total extent of the optical fiber controlled by the government for river and road management was about 38,000 km, and of this a portion of core cable roughly 18,000 km that does not interfere with the facilities management was opened to private sector business, and in 2017 there were new applications for additional use of about 800 km.

6 Sophisticated Water Management and Water Disaster Prevention Utilizing ICT

In light of the new developments in information technology of recent years, new technology is being applied in the field to further the sophistication of water management and water disaster prevention.

Regarding the monitoring of rivers and their basins, XRAIN (MLIT Functional Radar Rain Gauge Network), a high-resolution, high-frequency system used to accurately and fully understand concentrated heavy rainfall and localized heavy rainfall, is being harnessed for rainfall observations. For the observation of flow amounts and water levels, the introduction and practical application of new technology, such as ADCP (Acoustic Doppler Current Profiler) and image analysis based on the utilization of CCTVs and other types of images, are being promoted. In ascertaining the extent of flooding during a disaster, emergency observations were made (Figure II-10-1-3) with a satellite-based SAR system (Daichi No. 2) during the heavy rains that fell in the Kanto and Tohoku regions in September 2015. The use of big data, including SNS posts and various types of locational data, is being studied.

In addition, in pursuit of advancing river management and disaster response, we are promoting efforts to acquire drones equipped with green lasers that can take measurements below water surfaces and to install small, passive water gauges that do not require long-term maintenance.

Also, for sediment-related disasters caused by heavy rains and other factors, unusual conditions are always monitored through such means as a radar rain gauge that can observe the rainfall situation over a large area with a high degree of accuracy, volcano monitoring cameras, and landslide monitoring systems. Additionally, in preparation for the occurrence of a deep-seated catastrophic landslide, the



measures that detect the location and scale of such an occurrence at an early stage are being promoted for rapid emergency restoration measures as well as the prevention and mitigation of damage through appropriate warnings and evacuations.

As for the sewage sector, in an effort to reduce flood damage from localized heavy rainfall and the like, we are driving forward with the verification of technology to support the promotion of self-help and mutual aid among regional residents,

and efficient operation through the optimal use of the capacity of existing facilities through the use of water levels inside pipes, rainfall, inundation and other observational data provided by sensors, radars and the like.

The Use of Big Data

(1) Support for Formulation of Transportation Plans, etc., Using Big Data

Thanks to a declining population, a dwindling birthrate, and an aging population, the business conditions of route bus businesses, particularly in local regions, are worsening and giving rise to concerns that public transportation networks will shrink and service levels will suffer further. The stabilization of the management of route bus businesses and the restructuring of sustainable local public transportation networks are pressing issues, and management improvements by operators and plans for the reorganization of public transportation by local governments are being studied in many localities.

In light of the circumstances, in FY2016, we used big data and other information derived from the Survey to Support Innovations Benefiting Local Route Bus Businesses with the Use of Big Data, which we implemented in FY2015, to analyze the way that bus companies are managed, and created plans to restructure bus routes and schedules and improve management. In addition, we are providing the Local Route Bus Innovation Business Model Implementation Manual and Data Collection/Analysis Tools, which we developed as measures to support innovations, to the general public and discussing the use of new big data (population flow statistics) toward developing and advancing these tools.

In FY2017, we will implement efforts to develop and advance these Data Collection/Analysis Tools based on the results of these discussions.

(2) Utilization of Automobile Related Information

In order to promote the diffusion of insurance services using telematics based on the Future Vision on the Utilization of Automobile-related Information, which we formulated in January 2015, we hosted seminars for motor carrier businesses at which we shared information about the mechanisms of telematics (installation of onboard equipment, special agreements for insurance premiums, etc.). In addition, we held discussions about specific needs in the selection of information to collect regarding historical information about motor vehicles, and issues surrounding the Act on the Protection of Personal Information toward the realization of traceability services and the like that collect and use historical information about motor vehicles. To continue to strive for the realization of new services, we will discuss the design of systems involving the evaluation of the feasibility of introducing new services and implementation systems for collecting and providing historical information about motor vehicles, and otherwise advance the development of an environment for promoting the utilizing of automobile-related information.

(3) Promotion of Economic Strategies for Local Roads Using IT/Big Data

In an effort to support growth and flexibility and robustly tackle with involving regional economies and societies, we are promoting a new road policy using IT technology and a wide array of big data to the fullest.

Due to the full-scale introduction of ETC 2.0 in August 2015, and the establishment of systems for collecting big data on road transportation speeds and the like, the amount of other transportation, economic and other big data and other information distributed has increased nine-fold over the past nine years. In light of these circumstances, and to resolve regional transportation issues, in December 2015, academic and government entities collaborated to establish institutes in 10 locations in Japan for researching economic strategies for local roads, and have been discussing the implementation of road policies and pilot programs using a wide array of big data, including ETC 2.0, that account for issues in each region.

For example, the local institute in Okinawa, which sees a rapid increase in accidents among foreign rental car drivers, the local institute is planning to use big data from rental cars to identify blackspots for foreigners, and discuss initiatives such as providing alerts through multilingual pamphlets and the like, colored pavement and installing intuitive directional signs that feature pictograms.

(4) New Town Development Using Transportation-related Big Data

In an effort to implement town development that optimizes entire urban areas through the joint efforts of the public and private sectors, we are engaging in development of smart planning, in which we use transportation-related big data to analyze and fully understand behavior data for elderly people, families raising children and other demographics, conduct simulations to explore how pedestrian behavior changes in relation to changes in the locations of facilities for elderly people, child care and the like, and evaluating the effects of facility location and establishment.

In FY2016, we created models to explain methods of analysis, simulation and other processes based on specific examples, and in the future we will continue to work toward the establishment of open systems that enable all entities, public and private, to use smart planning methods.

Section 2 Promoting the Research and Development of Technology

1 The Position of Technological Research and Development in Technology Policies and Comprehensive Promotion

The Basic Policy on Economic and Fiscal Management and Reform 2016, which was adopted by a Cabinet decision in June 2016, mentions the acceleration of growth strategies as the way toward a 600-trillion-yen economy, and clearly states the need for innovations and other efforts to create a productivity revolution and reimagine the way we work.

The MLIT took into account the government's overall policy, including the Science and Technology Basic Plan, to develop a new MLIT Technology Basic Plan in March 2017 and, adding the perspective of realizing a virtuous cycle in which new technology is autonomously created, to further improve the framework for coordination between industry, academia, and government, as well as the comprehensive promotion of cross-sectoral technological research and development, and is actively adopting the resulting outcomes in public works, the construction and transport industries, and elsewhere.

(1) Initiatives in facilities and Other Organs, Extraordinary Organs, External Bureaus, and National Research and Development Agencies

Key initiatives undertaken by facilities and other organs, extraordinary organs, external bureaus, and national research and development agencies under the jurisdiction of MLIT are as outlined in the figure. National research and development agencies selectively and efficiently conduct research according to social and administrative needs for the purpose of securing maximum results from research and development for the sound growth of our national economy through improvements in the level of science and technology in Japan and other benefits.

Figure II-10-2-1 Major Initiatives for FY2016 by Facility Organizations, Special Organizations, and External Bureaus	
Organizations, etc.	Summary
Geospatial Information Authority of Japan	Operating under the auspices of the Geography and Crustal Dynamics Research Center, the Geospatial Information Authority of Japan engages in research and development activities in order to realize a society that utilizes geospatial information in an advanced manner and to contribute to disaster-prevention and environmental objectives by development of a system to monitor slip deficit rate and forward slip on plate boundaries based on wide-area crustal movement data, improvement of orthoimage productivity using full-automated aerial triangulation, technology development for improving time resolution in estimation of crustal deformation using GNSS, and research on aerial detection of temporal development of atalional land ground deformation through InSAR time series analyses.
Policy Research Institute for Land, Infrastructure, Transport and Tourism	The Policy Research Institute for Land, Infrastructure, Transport and Tourism carries out surveys and research activities: simplified methods of surveying the present state of vacant houses; measures for promoting the employment of high school graduates in the construction industry; analysis of macroeconomic effects of public investment using DSGE models; profitability and efficiency in local public transportation opera- tions; the distribution and selection of visit destinations in Japan by foreign tourists; and organizational safety management methods of transportation companies.
National Institute for Lan- and Infrastructure Manag- ment (NILIM)	The National Institute for Land and Infrastructure Management engages in research on disaster prevention, disaster reduction and risk management that will lead to more efficient evacuations, including a flood danger visualization project, accurate landslide disaster projection using real-time observation and monitoring data, and assurance of safety against storm surge disasters in port and harbor zones; Engages in research on infrastructure maintenance, including methods of diagnosing the health of road structures and designing repairs and reinforcement for them, and technology for conducting maintenance inspections and diagnosing the deterioration of sewage systems; Engages in research and development, including the use of ETC 2.0 to create technology for using roads more effectively, the use of i-Construction to improve construction productivity, and the streamlining of fire prevention and evacuation regulations and the like to promote the use of existing buildings.
Meteorological Research Institute	Conducted research on understanding the phenomena of weather, climate, earthquake volcanoes, and the ocean as well as predictions to contribute to "strengthening measures for typhoons and torrential rains," "strengthening measures for earthquake, volcano, and tsunami disasters," and "strengthening of measures related to climate change and global environment."
Japan Coast Guard	Conducted testing and research for equipment and materials used for Coast Guard duties, testing and research for forensic science at sea, and advancing observation technology for seafloor crustal movements.


(2) Initiatives of Regional Development Bureaus

Technical and Engineering Offices as well as Port and Airport Technology Investigation Offices coordinate with relevant offices in their jurisdiction for tests and research of civil works material and water quality, hydraulic tests and design for the effective and efficient development of facilities, development of environmental monitoring systems, and other matters for technology development, as well as the utilization and promotion of new technology tailored to the region.

(3) Promoting Research and Development Technologies of Construction, Traffic and Transportation Fields

Of the important research issues concerning construction technology, issues that are especially urgent and involve a wide range of fields are taken up with the governmental departments taking the lead with the coordination of industry, academia and government to comprehensively and organizationally implement research for the "comprehensive technology development projects" where in FY2016, research and development was conducted for a total of five issues including the "Development of function continuity technology for the disaster site buildings."

Also, for the traffic and transportation fields, technological research and development that contributes to ensuring safety, improving convenience, and protecting the environment are being promoted efficiently and effectively with the coordination of industry, academia and government. In FY2016, we engaged in the development of technology that could be used for upgrading public transportation systems utilizing high-precision positioning technology.

(4) Supporting Private Sector Technological Research and Development

To promote private sector investments in research and development, support is given through preferential tax measures for experimental and research expenses.

(5) Promoting Open-Type Research and Development

In order to promote technological innovation in the construction sector, an open call for the development of technologies to solve policy issues (targeted commercialization in two to three years) was made through the Construction Technology Research and Development Subsidy Program, which invites proposals concerning technological research and development to help upgrade and enhance the international competitiveness of construction technology under the purview of MLIT and further promote research and development carried out by MLIT. In FY2015, four new issues and eight ongoing issues were adopted.

In addition, in FY2016, three new projects and five ongoing projects were adopted under the Transportation Technology Development Promotion Competitive Funding Program, in which researches and developments were conducted toward the realization of a safe, secure, and comfortable transportation society, the reduction of environmental burdens, and the resolution of other policy issues in the traffic and transportation sectors. And "The first Traffic and Transportation Technology Forum" was held on November 29, 2016, to introduce the current state of researches and developments and present outcomes under the program, and to elicit a wide range of opinions.

2 Promoting the Utilization and Adoption of New Technology for Public Works

(1) New Technology Utilization System for Public Works

In order to actively utilize promising new technology developed by private sector businesses, a "new technology utilization system for public works" that utilizes the New Technology Information System (NETIS) is under operation. Up to now, there were 27 recommended technologies and 60 runner-up recommended technologies chosen as innovative new technologies that will further raise the level of technology concerning public works. Also, to promote efficiency of maintenance and management in the field, for the adoption of new technology in the field and the promotion of further technological development, NETIS is leveraged to set technical themes to use and evaluate the submitted technologies in the field.

(2) Supporting the Utilization of New Technology

In order to promote the utilization of new technology in public works and other areas, utilization is evaluated at every design stage, and technology that provides great utilization benefits are designated by the ordering party when construction is contracted. In addition, we prepare technology comparison charts for every type of construction and theme to serve as references for both orderers and builders in the process of selecting new technologies.

Section 3 Improving Construction Management Technology

1 Improving Costing Technology for Public Works

For the purpose of ensuring the transparency of public works, various price data standards are made public. In FY2015, i-Construction, a method of improving productivity by incorporating ICT into studies, surveys, design functions, construction work, inspections, maintenance functions, and updating processes, was promoted and new estimation standards for ICT construction were enacted.

In addition to the promotion of i-Construction, estimation standards have been revised to facilitate the realization of attractive construction sites made possible by increasing the productivity of all construction site processes through the reinforcement of standards based on the cultivation of the maintenance sector, to be achieved in part by reviewing new bridge preservation work and methods of estimating maintenance work costs, and on amendments to laws on the verification of quality, to be achieved in part by reviewing enhancements to major metropolitan correction functions and the approach to the posting of accounts taken by transportation guidance and security personnel.

In addition, in FY2016, we amended laws and ordinances, revised design standards and made other changes regarding the standard percentages for civil engineering work based on the latest construction conditions.

For construction machinery depreciation costs, field studies were carried out for the construction machinery owned by the contractors.

2 CIM and BIM Initiatives

Construction Information Modeling/Management (CIM) endeavors to seamlessly connect processes at all stages by linking and developing three-dimensional models from the survey, planning, and design stages to the construction and maintenance management stages and promoting the sharing of information among concerned parties involved in the entire project. With trial operations having begun in FY2012, studies on adopting and promoting CIM were carried out in FY2015 in both systemic and technical terms through collaborative efforts on the part of industrial, academic, and governmental players.

Since FY2010, the adoption of Building Information Modeling (BIM) to help visualize design content and integrate and consolidate building information has been subject to trial operations to verify the effect of the adoption of BIM and any issues that might consequently arise. In addition, Guidelines for the BIM models to Create and Use in Government Building Projects, which outline the basic principles and considerations to be taken into account when using BIM for government building projects, were compiled in March 2014. Since FY2014, a track record of cases involving BIM introduction to which the guidelines were applied has been maintained.

Section 4 Technology Development for Construction Machinery and Mechanical Equipment

(1) Development and Supply of Construction Machinery

In order to carry out the appropriate maintenance and management of rivers and roads managed by the national government and respond quickly to disaster recovery, initiatives are being carried out across the nation to implement machinery for maintenance and management, as well as machinery for disaster measures. In FY2016, an extra thirty-eight machines were added and 247 aging machines were updated.

Furthermore, in order to improve efficiency, conservation of labor, and safety of construction associated flood control projects and road development projects, studies as well as research and development for construction machinery and construction processes are being undertaken.

(2) Streamlining and Improving the Reliability of the Maintenance and Management of Machinery

For the protection of citizens' lives and properties from disasters, the construction of floodgate facilities, storage and drainage pump facilities, and road drainage facilities were furthered, starting around late 1965, and many of the facilities are becoming decrepit. As such mechanical equipment is required to function reliably during floods, we are proactively promoting the application of condition-based preventive maintenance in an effort to realize efficient, effective maintenance while ensuring the reliability of facilities.

(3) Utilizing the Accomplishments of Construction Technology Development

In order to safely and swiftly carry out restoration activity at disaster sites where the danger of secondary disasters such as large-scale floods, sediment-related disasters, and slope collapses are high, a hydraulic shovel that can be remotely controlled, dismantled, and airlifted was developed. It is worth noting that we deployed 11 units in FY2014, and have used them in disaster reconstruction activities, for example sending them to the site of the large-scale slope failure at Aso Ohashi Bridge in Aso Village in the aftermath of the Kumamoto Earthquake in 2016.

(4) Promotion of Development and Introduction of Next Generation Robots for Social Infrastructure

The social infrastructure of Japan is facing problems such as progression of aging, risks of earthquake, storm and flood damage. Therefore, for the "5 important fields" (Maintenance and management: Bridge, Tunnel, and Water; Disaster Response: Investigation and Emergency Restoration) that require the development and introduction of robots, initiatives are underway for the maintenance and management of the social infrastructure and improvement of effect and efficiency during disaster, by planning for the development and introduction of highly practical robots. In FY2014 and FY2015, we made a public appeal to private companies, universities and others for robots capable of addressing our five priority fields, and conducted testing and evaluations at actual sites. Over two years of on-site verifications, we confirmed which technol-

ogies have a specified level of capabilities in the maintenance and management, and since FY2016, have been verifying their practical utility by testing them in environments identical to those in which they will actually be used for inspection.

