

# 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.

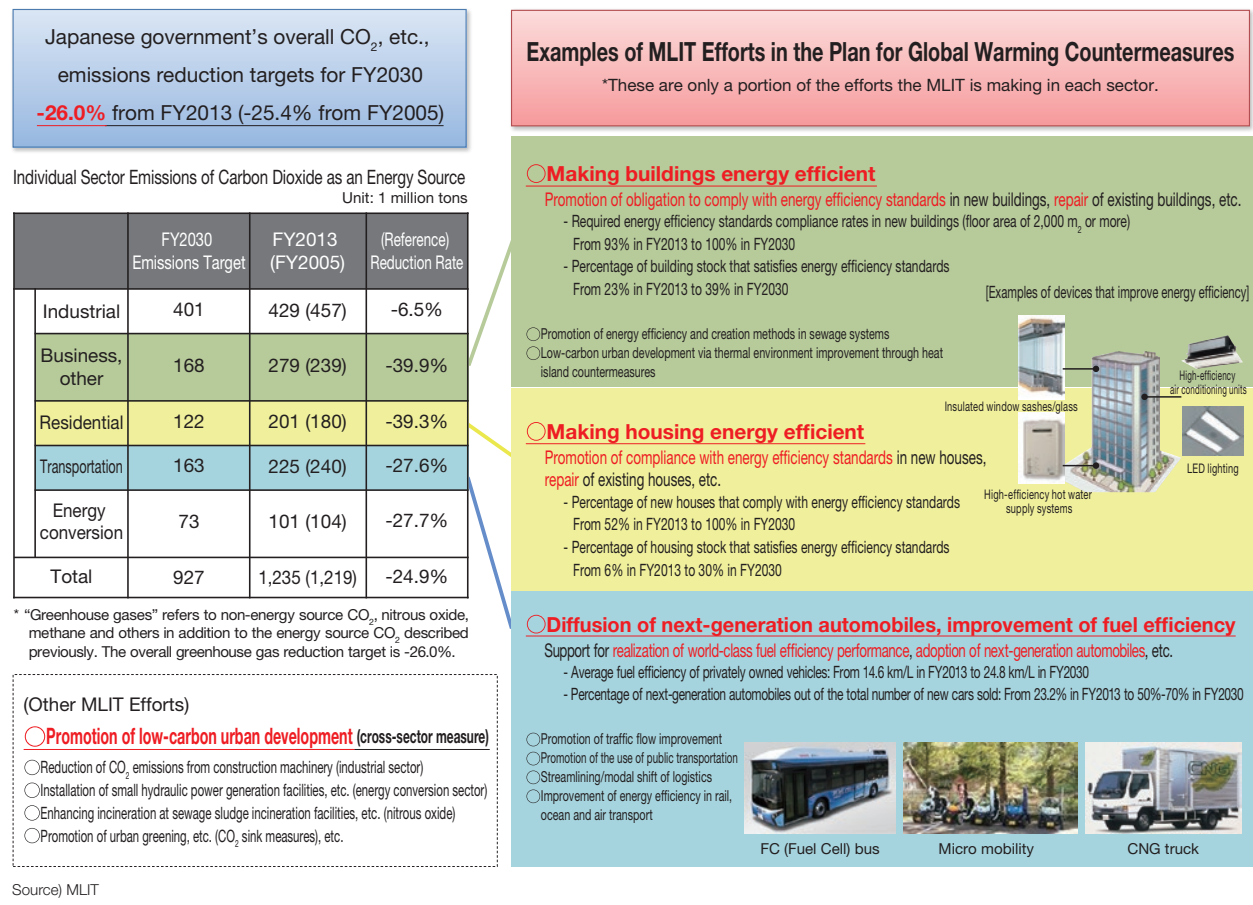
Based on the Paris Agreement, Japan adopted the Plan for Global Warming Countermeasures by a Cabinet decision in May 2016, and has committed to efforts toward the achievement of the mid-term objective to achieve a 26.0% decrease in the FY2013 level of greenhouse gases by FY2030, and as a long-term objective 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 March 2018, the Bill to Partially Amend the Act Concerning the Rational Use of Energy, which includes provisions for certifying energy-saving efforts through the collaboration of multiple transportation operators and allowing corporations to allocate energy-saving credits amongst one another and report regularly, was submitted to the National Diet.

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.

Figure II-8-1-1 Examples of MLIT Efforts in the Plan for Global Warming Countermeasures



## 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-four cities by the end of fiscal year 2017. "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 December 2017, 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.

#### (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 ef-

iciency, 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, in July 2017, the Automobile Fuel Efficiency Standards Subcommittee and others organized methods of publishing fuel economy information based on different driving situations—including driving in cities, in suburbs and on expressways—and amended relevant laws and regulations.

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 through tax reductions for eco-cars and the green tax system to promote the spread of automobiles that offer superior environmental performance.

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<sup>Note 1</sup>, hybrid vehicles, and advanced environmental diesel trucks.

#### (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)<sup>Note 2</sup>.

### (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 CO<sub>2</sub>, is a necessary facet of global warming countermeasures. Thus, we are helping to make public transportation more convenient by introducing an LRT/BRT system, promoting transitions to universally accessible stations, and promoting the introduction of public transit IC cards and other computerization initiatives. In addition, we have made efforts to provoke the diffusion of ecological commuting at the individual business level through a program to certify Eco-Commuting Excellence Office-

**Note 1** Compressed Natural Gas Vehicles (Natural Gas Automobiles)

**Note 2** Plan for the implementation of planned and continuous ecological driving of motor vehicles with the integration of evaluation and guidance

es. Furthermore, information analysis and validation results of past activities for the Environmentally Sustainable Transport (EST) Model Project are being provided.

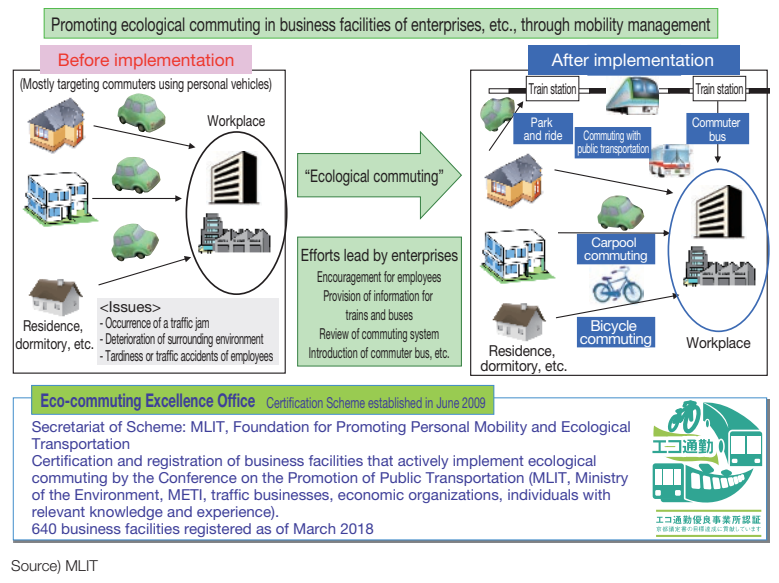
### (5) Optimizing Logistics

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 CO<sub>2</sub> emissions base unit<sup>Note 1</sup> of trucks is greater than that of mass transportation such as railroads and domestic shipping, and trucks account for 90% of the CO<sub>2</sub> emissions in logistics. In order to reduce CO<sub>2</sub> 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 efforts to promote the dissemination of freshness-preserving containers that leverage new technology and large CNG trucks and other environmental vehicles, and smaller carbon footprints generated by logistical sites, 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, we are providing support for promoting joint transportation and modal shifts and for introducing new container freight cars capable of high speeds and advanced transportation performance, as well as working to revitalize coastal shipping and ferries through such efforts as promoting the construction of energy-saving ships. We are also working to disseminate the Eco Rail Mark (188 products (213 items) and 85 cooperating enterprises certified as of the end of September 2017), and the Eco Ship Mark (127 consignors and 143 logistics businesses enterprises certified as of the end of March 2018). 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<sub>2</sub> absorption, and create seaweed beds and other such ecosystems. In addition, we will continue discussions regarding blue carbon<sup>Note 2</sup> 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.

Figure II-8-1-2

### Promotion of "Ecological Commuting" through Mobility Management



**Note 1** The amount of CO<sub>2</sub> emitted by shipping 1ton of cargo for a distance of 1km.

**Note 2** Carbon absorbed and fixed by sea algae, etc., in the ocean

Figure II-8-1-3

## Promotion of Activities through the Green Logistics Partnership Conference



## Green Logistics Partnership Conference (Manager: Takehiko Sugiyama, Promoter of Green Logistics Partnership Conference Express Highway Research Foundation of Japan)

- This conference was launched as a conference for promoting awareness of the importance of green logistics and stimulating interactions among cargo owners, logistics companies, and other concerned parties in order to advance CO<sub>2</sub> reductions in the logistics sector. Since FY2015, this conference has been promoting not just initiatives to reduce amounts of CO<sub>2</sub> emissions but also initiatives to reduce other burdens on the environment, improve the productivity of logistics, and otherwise contribute to the establishment of sustainable systems of logistics.
- Organized by: Ministry of Land, Infrastructure, Transport and Tourism; Ministry of Economy, Trade and Industry; Japan Federation of Freight Industries, Japan Institute of Logistics Systems Supported by: Japan Federation of Economic Organizations
- Established: April 2005
- Membership: 3,411 members (as of March 23, 2018) --- Logistics Companies, Cargo Owners, each of the industry associations, think tanks, research institutes, etc.
- Introduction and commendation of excellent businesses as well as holding discussions regarding Green Logistics aimed towards the expansion of voluntary efforts in the private sector aimed at reducing CO<sub>2</sub> emissions.

## Summary of the awarded enterprises

[Purpose] To encourage enterprises to autonomously engage in initiatives and promote the dissemination and growth of the concept of green logistics by recognizing meritorious achievements in connection with initiatives carried out to successfully reduce burdens on the environment in the logistics sector, improve the productivity of logistics, or otherwise establish a sustainable system of logistics.

[Types of Awards] Ministers Award, Director-Generals Award, and a Special Award have been created.

Ministers Award --- Award from Minister of Land, Infrastructure, Transport and Tourism; Award from Ministry of Economy, Trade and Industry  
 Director-Generals Award --- Award from Ministry of Logistics Deputy from the Ministry of Land, Infrastructure, Transport and Tourism Secretariat;  
 Award from Ministry of Commerce and Distribution Safety Deputy from the Ministry of Economy, Trade and Industry Secretariat  
 Special Award --- Award on the level of the Ministers Award and the Director-General Awards for particularly superior initiatives (created in 2013)

## Examples of Cases Awarded by the MLIT (FY2017)

## ◆ Award from the Minister of the MLIT

Initiative Name: Expanding Cooperation Work in the Logistics Sector for Asahi Breweries and Kirin Brewery Company: Opening of the Kanazawa Distribution Center and Shared Use of Container Railway

Companies: Nippon Express Co., Ltd., Asahi Breweries, Ltd., Kirin Brewery Company, Ltd., Japan Freight Railway Company



Example recipient of the Award from the Minister of the MLIT: Shared use of container railway

## ◆ Award from the MLIT Minister's Secretariat Deputy Vice-Minister of Logistics

Initiative Name: Efforts toward Modal Shifts for Frozen Food Products

Companies: Logistics Network, Inc., Nichirei Foods Inc., Ocean Trans Co., Ltd., Nippon Express Co., Ltd.

## ◆ Special Award from the Green Logistics Partnership Conference

Initiative Name: Efforts toward Modal Shifts for Frozen Food Products

Companies/Organizations: Hitachiota Industrial Development Co., Ltd.; Michi-no-eki Hitachiota Association of Farmer's Market Shippers of Agricultural Products, etc.; Marusho New Foods Co., Ltd.; Ibaraki Kotsu Co., Ltd.; Nakano-ku, Hitachiota City



Award from the Minister of the MLIT

(Source) MLIT

## (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 a shift to energy-saving, low-carbon 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. In pursuit 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<sub>2</sub> emissions from vessels since FY2013 and spearheading international negotiations in IMO with proposing reduction targets and measures for realizing them to devise and adopt the Initial IMO Strategy on reduction of GHG emissions from ships.

(iii) Initiatives to reduce CO<sub>2</sub> 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) 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 promote the use of ground power units (GPU) for airplanes and ecological cars such as Ground Service Equipment (GSE) vehicles as a part of Eco Airport (eco friendly airport) activities. In addition, we are spearheading discussions on the creation of



global frameworks for reducing CO<sub>2</sub> emissions in aviation by participating in discussions regarding detailed rules for the implementation of the emissions trading system for the international aviation sector agreed upon at the ICAO Assembly held in October 2016, and in the Asia and Pacific Initiative to Reduce Emissions (ASPIRE), in which air traffic control authorities and airlines cooperate to attain efficiency in air transport. 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 and the regulatory measures went into effect in April 2017.

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<sub>2</sub> emissions reducing technology and energy-saving renovation, as well as efforts by small and medium-sized contractors to work together to build ZEH (net 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 CO<sub>2</sub> 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<sub>2</sub> sink measures by making cities more low carbon and green by mitigating the heat island phenomenon through improvement in the thermal environment 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, 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 ocean on all sides, Japan is blessed with abundant sources of marine renewable energy, chief among them offshore wind power. The occupation application system was used for the second time in Japan to hold an open application for offshore wind power generation companies for Kashima Port, and the winning operator was selected in July 2017. In addition, we worked together with the METI to establish an Exploratory Committee for Offshore Wind Power Generation Facilities in Ports and Harbors to hold discussions toward streamlining the process of reviewing offshore wind power generation facilities and easing the burden on business operators based on the Electricity Business Act and the Port and Harbor Act. In light of these discussions, we revised technical standards for offshore wind power generation facilities based on the Ports and Harbor Act, and devised Uniform Commentary on Technical Standards for Offshore Wind Power Generation Facilities, and Guidelines for Reviews Regarding Construction of Offshore Wind Power Generation Facilities in Ports and Harbors in March 2018.

For marine energy such as wave and tidal power, the MLIT developed safety guidelines for floating power generation facilities, and used them to conduct the world’s first tests on floating tidal power generation facilities. We have worked together with relevant ministries and agencies in this way in an effort to promote the realization of new marine renewable energy.

#### (2) Promoting Small Hydroelectric Generation

As initiatives toward an introduction promotion of renewable energy, 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.

#### (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. The MLIT also intends to continue its efforts in collaboration with relevant ministries and agencies on the Basic Hydrogen Plan determined at the Cabinet Meeting on Renewable Energy and Hydrogen in December 2017.

#### (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. Since FY2016, the MLIT has provided support for the full-scale introduction of the five fuel-cell buses firstly in Japan.

#### (ii) Initiatives for the commercialization of vessels powered by hydrogen fuel cells

In an effort to establish safe environments as part of the development of the foundation for the commercialization of hydrogen fuel cell ships, we have developed the guidelines for safety of hydrogen fuel cell-powered boats and "Guidelines for Hydrogen Bunkering."

#### (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)).

Therefore, in order for the MLIT to establish a highly efficient and safe method of loading and unloading liquefied hydrogen, energy carriers associated with the Strategic Innovation Promotion Program (SIP) have been engaging in research and development since FY2014 on loading systems for liquefied 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.



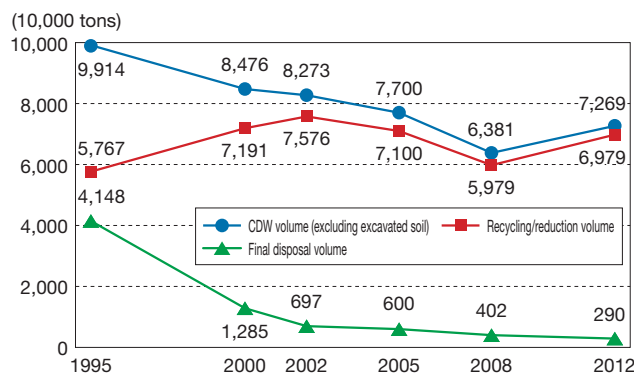
## Section 2 Promoting the Creation of a Recycling Society

## 1 Advancing Recycling in Construction

Construction and demolition waste (CDW) excluding excavated soil accounts for approximately 20% of all industrial waste, and therefore, suppressing its generation and promoting its reuse and recycling are major tasks. In FY2012, the amount of CDW excluding excavated soil generated was reduced to 72.69 million tons, and the recycling/reduction rate was high at 96.0%. The impending era of maintaining and updating of social infrastructure will likely result in changes to the quality and quantity of construction byproducts, and therefore, we must promote further CDW recycling in the future.

Sewage sludge also accounts for 20% of all industrial waste, reaching approximately 78.07 million tons in FY2015. We are working on recycling and reduction of sewage sludge.

Figure II-8-2-1 Trends in CDW Volume, Recycling/Reduction Volume and Final Disposal Volume, and Recycling Rates by Item



Source) MLIT

| Item                |                                      | FY2012 Actual | FY2018 Target |
|---------------------|--------------------------------------|---------------|---------------|
| Asphalt waste       | Recycling rate                       | 99.5%         | 99% or more   |
| Concrete waste      | Recycling rate                       | 99.3%         | 99% or more   |
| Wood waste          | Recycling/reduction rate             | 94.4%         | 95% or more   |
| Construction sludge | Recycling/reduction rate             | 85.0%         | 90% or more   |
| Mixed wastes        | Generation rate                      | 3.9%          | 3.5% or less  |
|                     | Recycling/reduction rate             | 58.2%         | 60% or more   |
| Overall CDW volume  | Recycling/reduction rate             | 96.0%         | 96% or more   |
| Excavated soil      | Efficient use rate of excavated soil | —             | 80% or more   |

Source) MLIT, Construction Recycling Promotion Plan 2014

## (1) Advancing Recycling in Construction

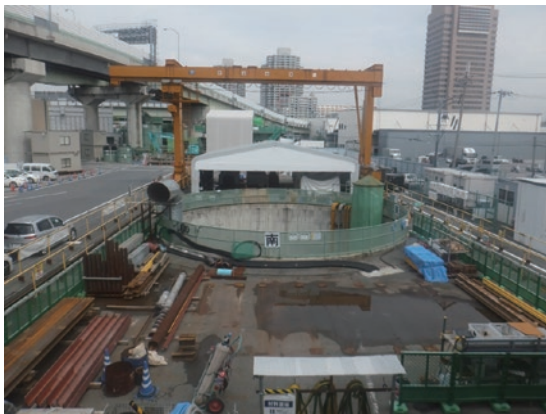
Based on the “Construction Material Recycling Act (Construction Material Recycling Law),” we are working to enforce proper measures through a simultaneous patrol throughout Japan. In September 2014, the MLIT developed the Construction Recycling Promotion Plan 2014, which sets out our basic approach, targets and specific policies for promoting CDW recycling. We have been working on various policies throughout the plan period, which ends in FY 2018.

Specifically, we will work intensively on fortifying the monitoring of construction byproduct logistics, prevention before the start of construction, promoting recycling/reduction by thorough on-site sorting and carrying out to recycling facilities, promoting the use of recycled materials, and promoting the efficient use and appropriate disposal of excavated soil. For more efficient use of excavated soil in particular, we are working to bring the public and private sectors together to successfully match generators and users of excavated soil. Furthermore, in an effort to prevent misconduct from occurring or growing worse, in August 2017, we created Reference Materials for Entities Involved in Handling Excavated Soil.

Figure II-8-2-2 Efficient use case of Successful Matching for Excavated Soil

| Case No. | Date for usage coordination | Construction site of excavated soil                                   |   | Construction site to use excavated soil                               |   | Distance between construction sites (km) | Soil Volume (m³) |
|----------|-----------------------------|---|---|---|---|--|------------------|
|          |                             | Organization  | Construction site                                   | Organization  | Construction site                                   |  |                  |
| 1        | Aug. 2015                   | Corporate member of National General Contractors Association of Japan | Mitake Town, Kani District, Gifu Prefecture         | MLIT  | Mitake Town, Kani District, Gifu Prefecture         | 7  | 815              |
| 2        | Sep. 2015                   | Corporate member of Japan Federation of Construction Contractors      | Kurume City, Fukuoka Prefecture                     | MLIT  | Kurume City, Fukuoka Prefecture                     | 0  | 1,000            |
| 3        | Oct. 2015                   | Corporate member of Japan Federation of Construction Contractors      | Takayama City, Gifu Prefecture                      | MLIT  | Takayama City, Gifu Prefecture                      | 6  | 7,548            |
| 4        | Mar. 2016                   | Local government  | Gyoda City, Saitama Prefecture                      | Corporate member of National General Contractors Association of Japan | Hanyu City, Saitama Prefecture                      | 5  | 17,000           |
| 5        | Aug. 2016                   | Local government  | Osaka City, Osaka Prefecture                        | Corporate member of Japan Federation of Construction Contractors      | Osaka City, Osaka Prefecture                        | 9  | 7,115            |
| 6        | Aug. 2016                   | Local government  | Kyowa Town, Iwanai District, Hokkaido Prefecture    | Other private sector  | Kyowa Town, Iwanai District, Hokkaido Prefecture    | 1  | 450              |
| 7        | Sep. 2016                   | MLIT  | Kitami City, Hokkaido Prefecture                    | Other private sector  | Kitami City, Hokkaido Prefecture                    | 0.2                                      | 8,000            |
| 8        | Oct. 2016                   | MLIT  | Joetsu City, Niigata Prefecture                     | Other private sector  | Joetsu City, Niigata Prefecture                     | 5  | 23,000           |
|          | Aug. 2017                   |   |   |   |   |  | 4,600            |
|          | Aug. 2017                   |   |   |   |   |  | 7,000            |
| 9        | Oct. 2016                   | Other private sector  | Engaru Town, Monbetsu District, Hokkaido Prefecture | Other private entity  | Engaru Town, Monbetsu District, Hokkaido Prefecture | 5  | 4,000            |
| 10       | Jan. 2017                   | MLIT  | Ainan Town, Minamiuwa District, Ehime Prefecture    | Corporate member of National General Contractors Association of Japan | Uwajima City, Ehime Prefecture                      | 18                                       | 660              |
|          |                             |   | Uwajima City, Ehime Prefecture                      |   |   |  | 19               |
| 11       | Feb. 2017                   | MLIT  | Teshio Town, Teshio District, Hokkaido Prefecture   | Other private sector  | Teshio Town, Teshio District, Hokkaido Prefecture   | 6  | 7,700            |
| 12       | Mar. 2017                   | MLIT  | Muroran City, Hokkaido Prefecture                   | Corporate member of National General Contractors Association of Japan | Muroran City, Hokkaido Prefecture                   | 12                                       | 9,700            |
| 13       | Sep. 2017                   | MLIT  | Teshio Town, Teshio District, Hokkaido Prefecture   | Other private sector  | Teshio Town, Teshio District, Hokkaido Prefecture   | 10                                       | 25,000           |
|          |                             |   |   | Other private sector  | Horonobe Town, Teshio District, Hokkaido Prefecture | 10                                       | 25,000           |

**Construction site of excavated soil (Public Sector)**  
Sewer pipe construction work commissioned by a local government



[Registered Conditions]  
Registered Soil Volume: 24,664 m³  
Civil engineering work Period: February-July 2015\*  
Soil Quality Category: Type 2 Excavated Soil  
\*Excavation work period. Soil was subsequently retained in a temporary storage area.

Source) MLIT

**Construction site to use excavated soil (Public Sector)**  
For use as backfill for demolished underground spaces as part of demolition work



[Registered Conditions]  
Registered Soil Volume: 14,000 m³  
Civil engineering work Period: July-October 2016  
Soil Quality Category: Type 3 Excavated Soil

Volume used: Roughly 7,100 m³  
Date of use: August 2016



(2) Reducing Sewage Sludge and Promoting Recycling

MLIT is promoting the recycling of sewage sludge (FY2015 recycle rate 68%) 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 Logistics System for Recyclable Resources

(1) Forming a Logistics System for Recyclable Resources by Sea

In order to form the “loop” of recyclable resources for creating a sound material-cycle society, MLIT have specified

22 ports throughout Japan as Recycle Ports (Integrated Reverse Logistic Base Port) for wide-spread flows concerning recyclable resources. At the Recycle Ports, they undertake activities such as securing coastal facilities like wharfs, aiding in establishing recyclable resources handling support facilities, promoting the public-private partnership, and improvements in operations related to handling recyclable resources. MLIT have partnered with the Ministry of the Environment to engage in efforts to promote modal shifting and lower the carbon footprint and costs of reverse logistics through improvements in transportation efficiency through the “Project to Promote Low-Carbon Type Reverse Logistics by Model Shift / Transport Efficiency.”

Figure II-8-2-3 Specified Recycle Ports

Recyclable Resources Handling Support Facility

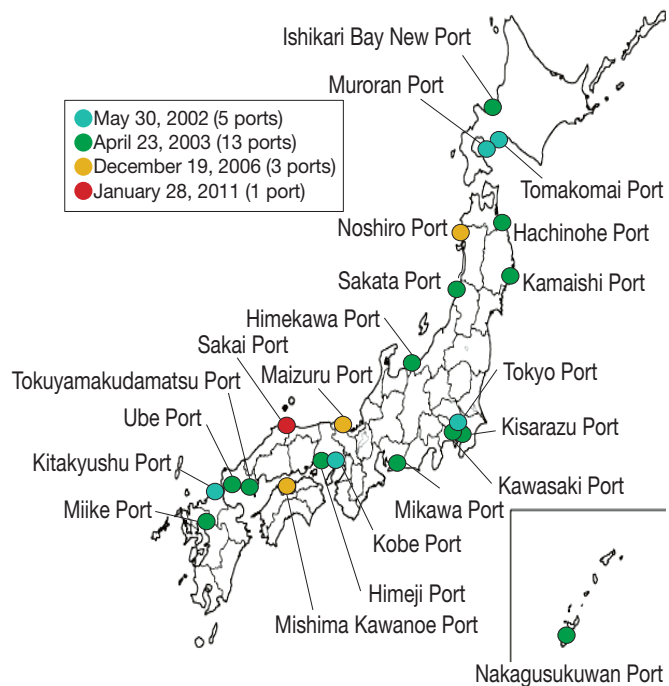


(Guard-fenced, tire-washing, and water-collecting facility)



(Storage facilities for contaminated soil, etc.)

Source) MLIT



## (2) Systematic Acquisition 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 final landfill sites. 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<sup>Note1</sup>. Construction-generated soil generated in the Tokyo Metropolitan Area is transported by sea and used widely for land-reclamation purposes in ports and harbors across the country in accordance with the Super Phoenix Plan<sup>Note2</sup>.

**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 coordinating excavated soil from the Greater Tokyo area on a national level toward effective use as a resource for port construction at ports that require 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 FY2016, vehicles confirmed to have been scrapped numbered 1,355,988.

#### (2) Recycling Marine Vessels

The recycling of large vessels (ship recycling)<sup>Note 1</sup> has generally been conducted in developing nations such as India, Bangladesh and Pakistan, where industrial accidents, environmental pollution and other problems at ship recycling 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.

The Japan-India Summit Meeting held in September 2017 was part of efforts to promote the soonest possible enforcement of the Ship Recycling Convention by promoting the soonest possible conclusion of the convention by India, a major recycling country. At the meeting, the decision was made to provide ODA for India’s ship recycling facility improvement project, and both country’s prime ministers reconfirmed their intent to conclude the convention as soon as possible. To enact a domestic law required for the conclusion of the convention, on March 9, 2018, the Cabinet approved and submitted to the National Diet the Bill Concerning the Proper Implementation of Ship Recycling and Dismantling.

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. Since 2005, the Japan Marine Industry Association has led the nationwide operation of the FRP Boat Recycling System that employs a wide-area certification system based on the Waste Management Law. As a result, approximately 510 FRP vessels have been properly recycled yearly

### 4 Efforts in Green Procurement<sup>Note2</sup>

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.

**Note 1** Vessels that have reached the end of their operational use are dismantled, and the majority of the parts are reused as steel.

**Note 2** Here, “Green Procurement” refers to procuring eco-friendly goods as defined in Article 2 of the Green Purchasing Law.



## 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 standards 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.

Figure II-8-2-4

Example of the Construction of Wood Material Use



Source) MLIT

## Section 3 National Land Development That Revives and Preserves the Natural Environment

### 1 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. A draft of the Urban Biodiversity Index, a metric for evaluating the state of biodiversity and policy progress in local governments, was formulated in May 2013, and a simplified version of the index that enhances its ability to illuminate and evaluate the state of efforts more simply was formulated in November 2016. In FY2017, the MLIT made efforts to raise awareness of the simplified version of the Urban Biodiversity Index to promote its use, and provided technical support to help formulate basic green plans that ensure urban biodiversity. 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 comprehensively and effectively, and then conservation and sustainable-use of in rich biodiversity in Japan.



## Column

## MLIT Measures Against Red Imported Fire Ants

Since a sighting of red imported fire ants was confirmed in Amagasaki City, Hyogo Prefecture in June 2017, 26 cases have been confirmed in 12 prefectures (as of January 2018).

Red imported fire ants have small (2.5-6 mm long), reddish-brown bodies, and their sting is known to cause severe pain and anaphylactic symptoms. Although it is said that red imported fire ants originated in South America, their distribution has spread to the USA, Australia, Malaysia, China, Taiwan and elsewhere in the Pacific Rim. As of now, they have not established habitats in Japan, so early detection and control are critical for preventing them from invading and doing so.

Thus, with a belief in the importance of countermeasures and national borders, the MLIT has implemented countermeasures at ports, harbors and airports and called attention to the matter in the shipping, storage, trucking and railway industries among others.

As a measure to prevent the establishment of red imported fire ants at ports and harbors, we performed emergency work to fill in gaps in the pavement of container yards, which could become habitats for the ants, at 68 ports and harbors throughout Japan that engage in regular container shipping with countries and regions where the ants are currently established. We also established a support system to enable port and harbor administrators to improve the pavement of container yards to prevent the establishment of the ants.

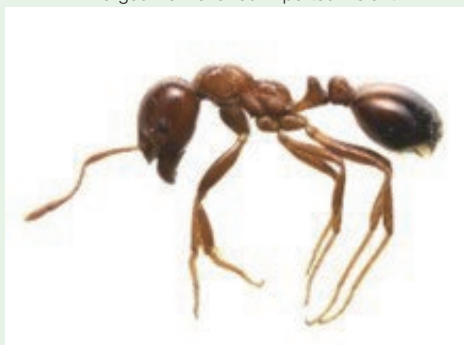
Also, in light of the fact that the ants have been found in containers as well as in container yards, we are intensifying searches for the ants when cargo is removed from containers and in empty containers.

We are also cooperating with the Ministry of the Environment in its implementation of investigations of areas within a roughly 2-km radius of the locations of confirmed red imported fire ant sightings, and investigations and extermination of the ants at the 68 ports and harbors mentioned previously.

As for countermeasures at airports, we conducted emergency inspections at airports that handle international cargo in July 2017 and from October to November 2017; however, none of the inspections resulted in sightings of the Fire ants.

The MLIT intends to continue cooperating with relevant ministries and agencies in efforts toward measures to prevent red imported fire ants from invading and establishing habitats in Japan.

Enlarged view of a red imported fire ant



Source) Ministry of the Environment

MLIT Minister Ishii observes emergency work



Source) MLIT

## 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<sup>Note</sup> 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.

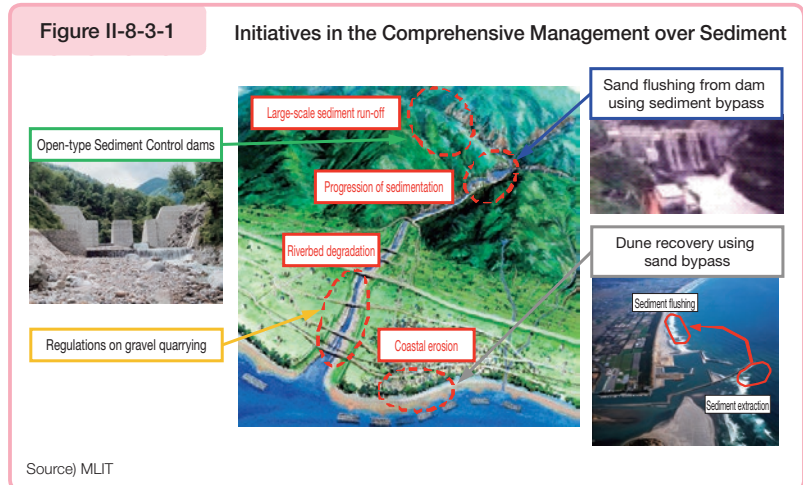
### (2) Initiatives to Recover the Water Supply in Rivers

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 eighteen dams in total in FY2017, fifteen 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 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.

**Note** Using districts that have excellent natural conditions as core areas and connecting them organically to ensure the appropriate placement and connections between habitat spaces



#### (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 2017.

##### ○ 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 2017.

##### ○ National Aquatic Organism Study

Conducted with the goal to increase interest in rivers through a survey of life forms found in nearby rivers. In FY2016, 57,242 people participated. 62% of the inspection points (2 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 Beached Coastal Waste Contributing to the Preservation of Coastal Scenery and Conservation of the Environment (Coastal Waste Disposal Promotion Act), we are working in close cooperation with relevant organizations to promote effective measures against beached waste and the like.

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.

Also, to dispose of this waste more rapidly, we made enhancements to enable the soonest possible launching of these projects, even at points in time when adopted standards have not been reached.

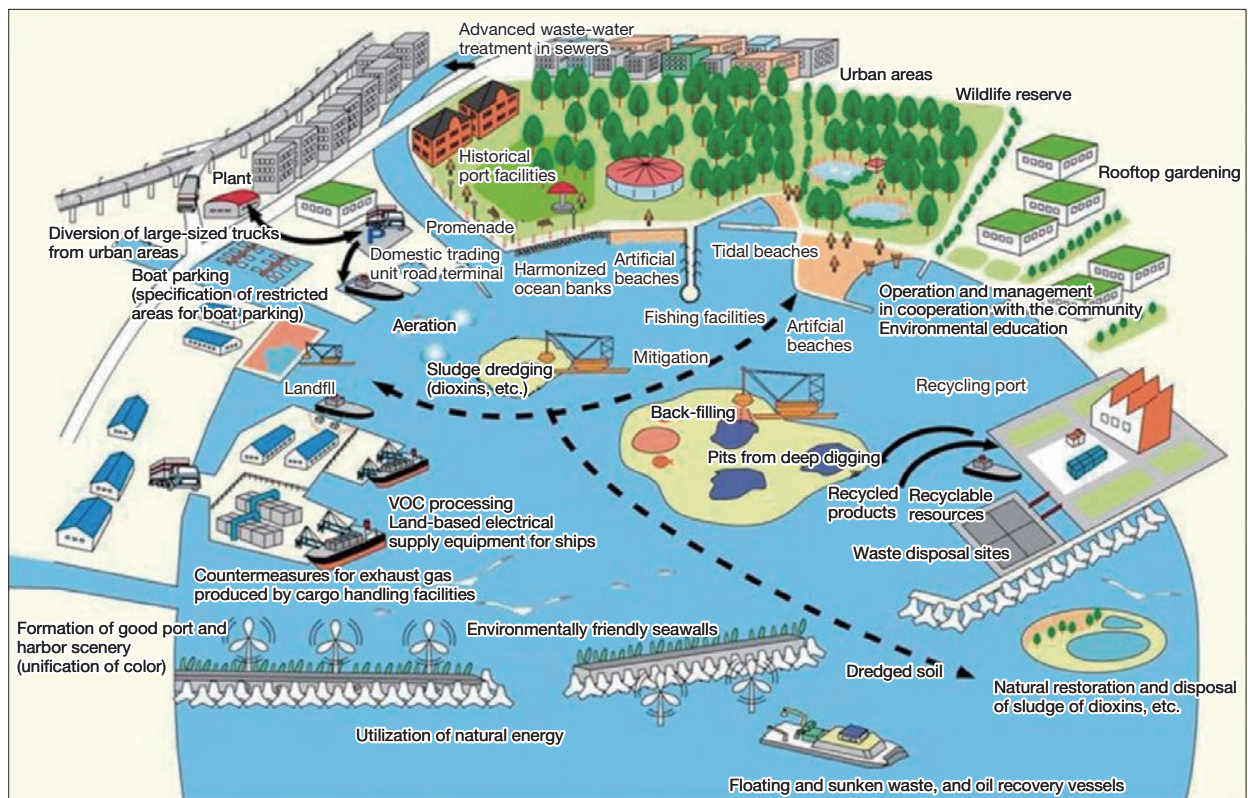
We are also providing support for the processing of neglected and stranded vessels and the removal of slime that abnormally accumulates in sea areas in order to secure the functions of coastal protection facilities, conserve the coastal environment, and facilitate the proper use of coastal areas.

## 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.

Figure II-8-3-2 Greening Port and Harbor Administration



資料) 国土交通省

### (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 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 recommendations provided in October 2016 by the Commission for Athlete-/Spectator-Friendly Road Development, whose membership included 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

Example of Greening Roads (Chiyoda-ku, Tokyo)



Source) MLIT

## Section 4 Maintenance and Restoration of Sound Water Cycles

### 1 Aiming to Maintain a Society in which the Benefits of Water Can Be Savored for a Long Time to Come

In recent years, water resources in Japan have been exposed to substantial risks that threaten the water supply, including major accidents due to earthquakes and other large-scale disasters and the aging of water infrastructure, and serious water shortages due to climate change.

In light of these circumstances, we have promoted a transition in water resource policy, from the demand-driven promotion of water resource development to the risk management-oriented stable water supply.

Based on the May 2017 report of the National Land Development Council, we decided to drastically revise the Basic Plans for Water Resource Development for the seven major river systems which cover roughly half of the Japanese population, and have begun changing plans first for the Yoshino River System, which is in particular need of a swift transition to risk management-oriented policy due to facing the most frequent water shortages of the seven river systems.

These revisions are expected to ensure the minimum required water quantity during crises through the integrated promotion of necessary non-structural measures and structural measures involving the rigorous utilization of existing water infrastructure.



## Column

## Response to Water Shortage in the Arakawa River System in 2017

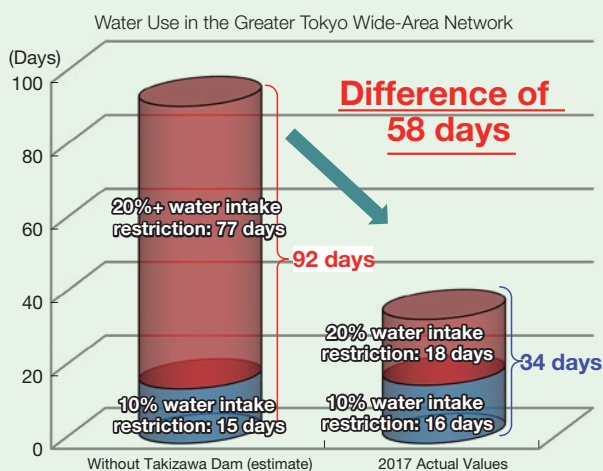
In late April and May 2017, western Japan and the Pacific side of eastern Japan experienced low precipitation and many days under high pressure systems. In addition, little rain fell on these regions because the Baiu front trended southward in June and northward in July. As a result, 14 rivers in 12 water systems nationwide—roughly 10% of rivers under national government management—experienced water shortages that triggered restrictions on water intake. The restrictions were the third most stringent in the last decade, after 2013 and 2008. The restrictions were the first in two decades for the Arakawa River in the Kanto region, which last experienced restrictions in March 1997. Restrictions for the Yoshino River in the Shikoku region lasted 95 days, the second-longest period in the last 10 years, after 2008.

The March 2011 completion of improvements to the Takizawa Dam—one of the four dams\* on the Arakawa River, a major water source for Greater Tokyo—was presumed to have shortened the restriction period by 58 days. It is also estimated that, without the Urayama and Takizawa Dams, the stored water supply would have been depleted, which would have caused a water crisis involving water supply restrictions and suspensions.

The dams in the Tone and Arakawa River systems, the Musashi Channel, the Kitachiba Headrace Channel and other infrastructure form a wide-area network that underlies the agricultural water and municipal water supply (drinking water and industrial water) for the Greater Tokyo area. Roughly 70% of the municipal water taken from the Arakawa River is supplied by eight dams in the upper reaches of the Tone River, and during the water shortage of 2017, roughly 500 million m<sup>3</sup> of water was diverted from the Musashi Channel from January to August of that year to meet demand for water in the Arakawa watershed. The amount of water diverted is equivalent to roughly 83 days of household water use by the 20 million people in Tokyo Metropolitan and Saitama Prefecture to whom water is supplied.

This water shortage is not severe enough for measures as extreme as suspending the water supply. Nonetheless, water shortages that trigger water intake restrictions still seem to occur each year throughout Japan.

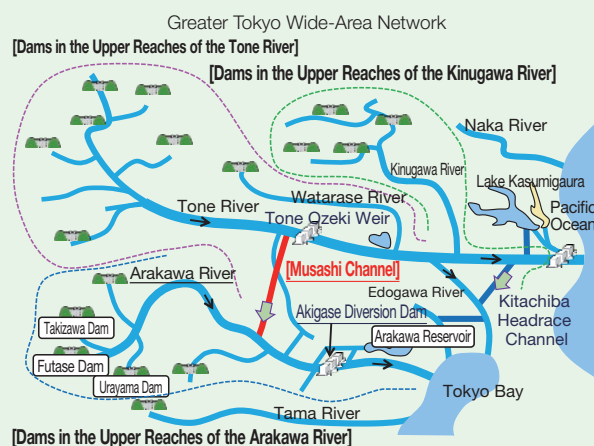
In order to create regions resistant to future climate change and water shortage crises, we must investigate water shortage countermeasures, and we intend to steadily promote wide-ranging efforts in terms of both structural measures such as steadily promoting facility improvements and fully using existing facilities, and non-structural measures such as promoting the formulation of drought response timelines (time-series action plans).



- With Takizawa Dam: 34 days starting July 5 (\*excluding temporary relief period)
- Without Takizawa Dam: 92 days starting May 26

**Note 1** Futase Dam, Urayama Dam, Takizawa Dam, Arakawa Reservoir

Source) MLIT

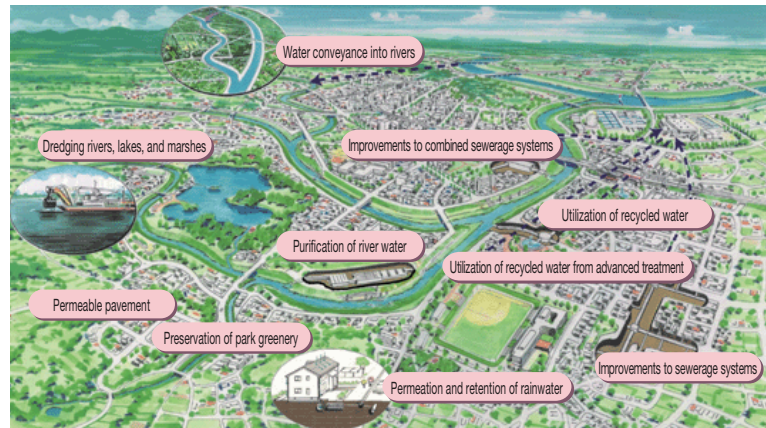


## 2 Initiatives in Improving the Water Environment

### (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).

Figure II-8-4-1 Clear Stream Renaissance II



(Source) MLIT

### (2) Water Quality Survey and Water Quality Accident Response

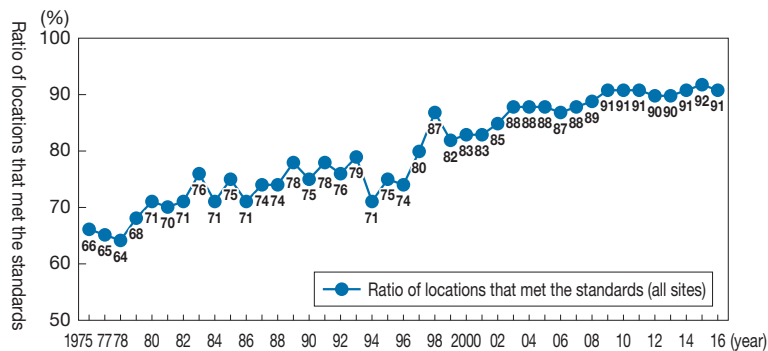
Water quality surveys are vital in conserving and maintaining a favorable water environment. In 2016, surveys were done at 1,096 locations on 109 water systems of Class A rivers.

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 2016 approximately 24% (58 locations/295 locations) were judged to be “rivers that look clean enough for swimming.”

In 2016, there were 969 water quality accidents in Class A rivers due to spillage of oil and chemical substances, a decline of 151 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 approximately 91% in 2016.
- 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.

Figure II-8-4-2 Ratio of Survey Locations on Class A Rivers (Including Lakes and Coastal Areas) where BOD (or COD) Value Met Environmental Standards



\*Ratio of locations on each river and lake that met the environmental standards have been used since 1996 (Including coastal areas since 2014)  
(Source) MLIT

### (3) Improving the Water Environment of Enclosed Coastal Seas

Although the pollution load from land has decreased in the enclosed coastal seas of Tokyo Bay, Ise Bay, Osaka Bay, and the Seto Inland Sea, the fishing industry continues to suffer damage from the occurrence of red and blue tides because the loss of tidal flats and seaweed forests and other problems have caused purification capacity in ocean areas to decline. In addition to this, there have been occurrences of environmental deterioration, as well as navigational obstacles to vessels, due to drifting debris and oil.

Therefore, we advance activities to revive clean, abundant 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 by improving sewage treatment facilities, and (5) developing a system to get diverse entities to improve the environment in collaboration with one another.

### (4) Stimulating Sewage Maintenance to Improve the Water Environment

We appropriately formulate and review comprehensive basin-wide planning of sewage systems, and promote advanced treatment including incremental initiatives through such efforts as improving portions of facilities as a measure against the eutrophication of enclosed water systems. We also promote active water environment management and water systems where the goal is to revive abundant oceans through such efforts as implementing seasonal operation management of nitrogen and phosphates at sewage treatment plants.

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.

Furthermore, there is concern that climate change will lead to more frequent, severe water shortages 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 1.4% 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 3,370 facilities utilizing treated water as of the end of FY2016, and they use over 10.89 million m<sup>3</sup> 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, we are promoting and encouraging the installation of infiltration facilities for storage of rainwater that contribute to the establishment of sound water cycles by recharging groundwater, reviving springs and more.

**(5) Advancing the Conservation and Use of Sustainable Groundwater**

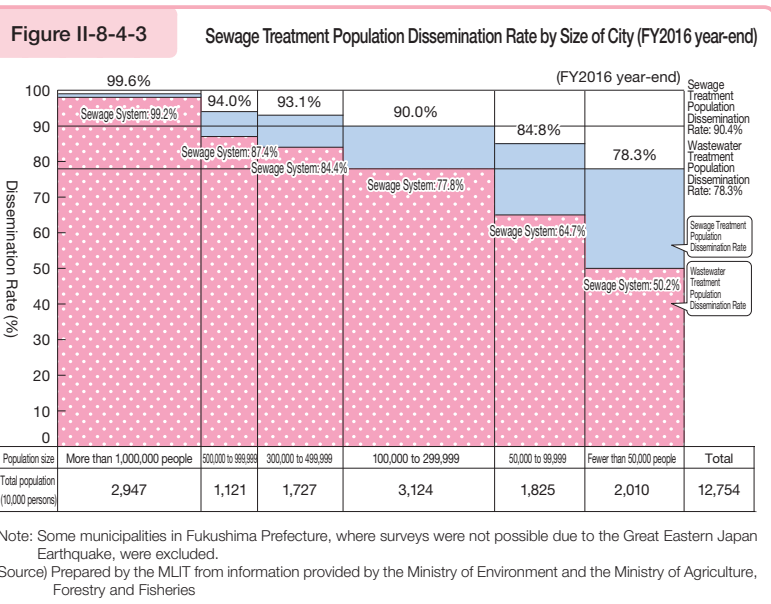
It takes an extremely long time to recover from damage caused to groundwater, such as in the form of groundwater pollution or saline contamination. In particular, ground subsidence is an irreversible phenomenon. For this reason, we will engage in groundwater management in accordance with local conditions 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 90.4% (with the dissemination of sewage systems at around 78.3%) of Japan as of the end of FY2016 (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. Dissemination exceeded 90% for the first time since the study began in 1996, but large discrepancies between regions remain. 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 78.3%

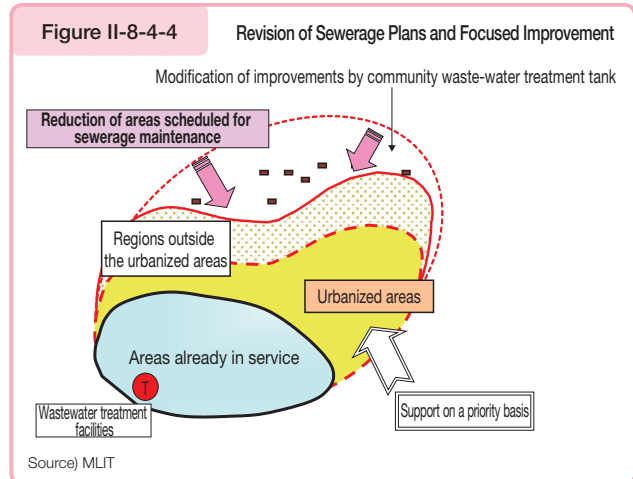




(dissemination rate of sewage systems approximately 50.2%). Focusing on improvement in areas with high population density, the advancement of efficient development in accordance to condition of communities and the rectification of the gap between communities are seen as being of the utmost importance 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, the MLIT is promoting an immediate reexamination of prefectural programs, and has selected appropriate methods of sewage treatment and created mid-term (action plan)/long-term development plans. We are also proactively promoting efforts to expand and merge through the merging of elimination, consolidation and maintenance at sewage treatment facilities.



#### (ii) Sewage quick project

Taking into account the population decline and the difficult fiscal situation, this project seeks to widely introduce—with 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 FY2016, 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 FY2016).

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 mainly small scale issues were arising, road collapses have occurred in approximately 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 introduc-



tion 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

For the sustainable management of sewage systems, we have established a goal to develop expansion/merging plans in all prefectures by FY2022, and have asked each prefectural government to develop these plans by FY2022 and establish systems for the soonest possible investigation of them by FY2018. We also intend to continue providing both financial and technical support; we created a General Project for Promoting Sewage System Expansion in the FY2018 budget, and provide support for examining as model cases those prefectural governments that have worked on devising plans ahead of others, and apply the results of those examinations throughout the country.

## Column Steps Toward the Sustainable Management of Sewer Systems

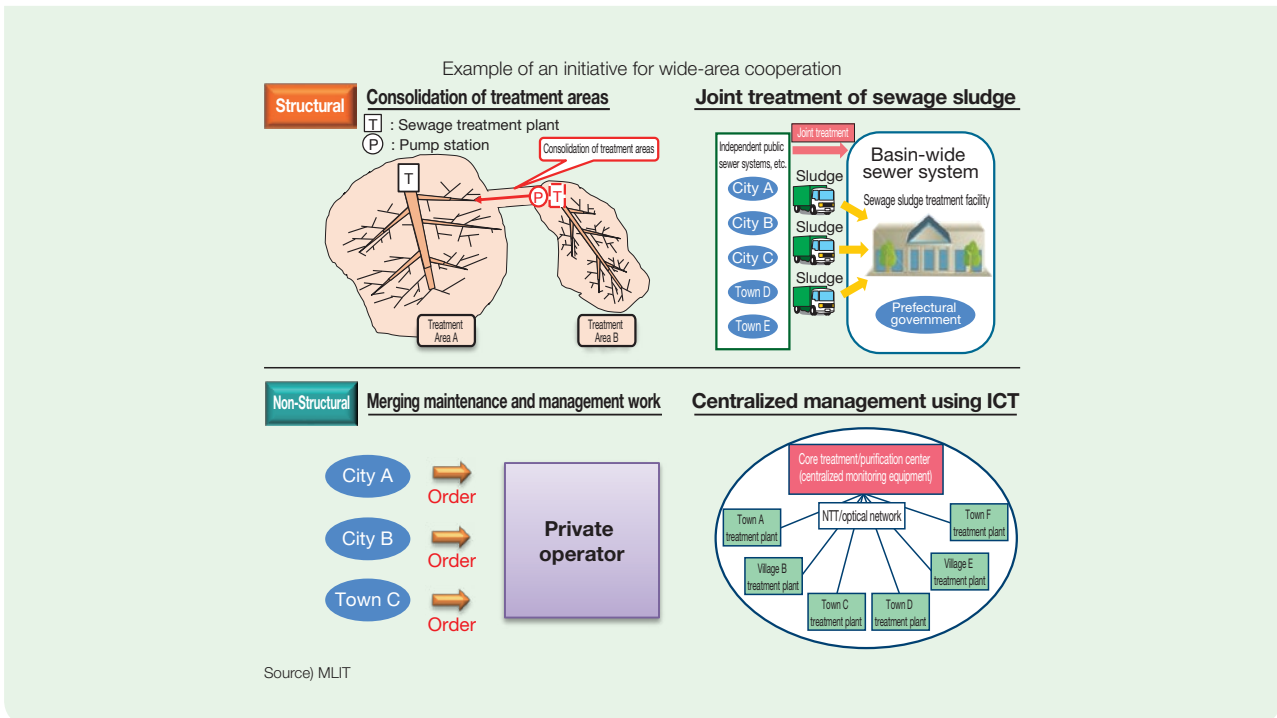
The sewer system management environment has become even more challenging due to factors such as the deterioration of facilities ushering in a period of massive updates, and depopulation causing user fees and the size of the workforce to decrease; in such an environment, more efficient business management is needed.

In order to make sewer system management sustainable, and based on the Basic Policy on Economic and Physical Management and Reform 2017, we established two objectives to promote expansion by FY2022: the number of districts making efforts toward elimination and consolidation at sewage treatment facilities, and the formulation of plans to expand and merge in all prefectures. With the joint signatures of four relevant ministries (the Ministry of Internal Affairs and Communications, the Ministry of Agriculture, Forestry and Fisheries, the MLIT and the Ministry of the Environment), we have asked each prefectural government to establish a plan by FY2022 and create an investigation system as soon as possible in FY2018.

In order to provide financial support for expansion efforts, the MLIT will create a General Project for Promoting Sewage System Expansion in the FY2018 budget to provide comprehensive support for all aspects from formulation to implementation of plans involving expansion.

In addition, to provide technical support, we will support detailed examinations as model cases those prefectural governments that work on devising plans for expansion and merging ahead of others, and apply the results of those examinations throughout the country in the future.

We also intend to continue providing both financial and technical support to enable local governments to more efficiently improve and manage sewer system facilities.



### (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 sewerage 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.

### (iv) Consigning facility management to private sectors and acquiring technical capabilities

In the sewerage sector, we are introducing and examining concession systems and other methods of PPP/PFI, and working toward the increased use of comprehensive private sector consignment<sup>Note</sup> for the maintenance of sewage treatment plants and elsewhere. As for concession systems in the sewerage sector, in Hamamatsu City, a project for the total and long-term consignment of maintenance, mechanical and electrical facility refurbishment and updating, and other work at Seien Treatment Area treatment plants and pump stations to the holder of operation rights is scheduled to begin in April 2018. The proposal from the operation rights holder included goals to work toward cooperation with the community and new technology in addition to a 14.4% cost reduction (VFM); the project is expected to streamline business through private-sector ingenuity and introduce private-sector vitality. Regarding the securement of technical capacity, 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

Sewage systems contribute to regional revitalization in a variety of ways: the proper treatment of wastewater through improvements in sewage systems preserves and creates healthy water environments and stimulates industry and tourism,

**Note** A method of ordering in pursuit of streamlined operations that reflects the original ideas of private contractors by entrusting operation methods and other details to them, while the ordering entity sets out conditions to ensure a level of performance in terms of facility management, such as observance of effluent quality standards.

and sewage system resources can be used effectively by creating waterfront areas using recycled water from advanced wastewater treatment, stimulating regional activities through the operation and management of harmonized water spaces by citizens and others, utilizing space above wastewater treatment facilities, using sewage heat for heating, cooling, melting snow and as biogas energy throughout communities, and using sewage sludge as fertilizer.

#### (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<sup>Note1</sup>.” Additionally, subsidies are granted by Sewer Systems: the Path of Circulation Environmental Education Assistance Council Meeting Program to each elementary and middle school for supporting environmental education on sewage.

Figure II-8-4-6

#### Environmental Education regarding the Sewerage Sector

Project for Sewage Environmental Education for Elementary Schools in Hamamatsu City, Shizuoka



(Source) MLIT

## 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), in which IMO audit teams ensure 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. In addition, we have formulated the Plan for Preventing and Controlling Discharge Oil, etc., and have established prevention and control regulations and the like for dealing with large-scale oil spillages that occur in domestic waters as well as measures for promptly and reliably responding through the utilization of large trailing suction hopper dredgers.

The MARPOL Convention<sup>Note2</sup> 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.

**Note 1** The Path of Recycling Sewerage Environmental Education Portal Site: <http://www.jswa.jp/kankyo-kyoiku/index.html>

**Note 2** International Convention for the Prevention of Pollution from Ships

### (2) Control Measures on Air Pollution from Ships

Sulfur oxide (SOx) in the exhaust gas from 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 (emission control areas) and a maximum concentration of 3.5% in all other sea areas, which will be 0.5% from January 1, 2020.

To enable shipping operators and others to smoothly deal with the regulations starting in 2020, the MLIT established the committee including entities in the shipping industry and others and the committee including relevant ministries and entities in the petroleum industry. These groups convened 10 times in the year starting February 2017, and through these meetings, the MLIT has promoted exchanges of information, investigation of countermeasure policy and other discussions. In addition, at the fifth meeting of the IMO Subcommittee on Pollution Prevention and Response (PPR5) held in February 2018, Japan proposed measures such as the formulation of guidelines for preventing the unauthorized use of non-compliant fuel oil in pursuit of ensuring conditions for fair competition in international shipping. In response, the committee agreed to formulate guidelines for the consistent implementation of SOx regulations by the summer of 2019.

In addition, to encourage the diffusion of ships fueled by liquid natural gas (LNG) with no sulfur content, in April 2017, the Marine Transportation Act was amended and a plan certification system for promoting the introduction of LNG-fueled ships was established.

### (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<sup>Note</sup> and ships' biofouling would threaten 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 "2011 Guidelines for the Control and Management of Ships' biofouling to minimize the transfer of invasive aquatic species" were adopted at the IMO. The convention went into effect on September 8, 2017. It is worth noting that the convention defines the initial period of effectiveness as an experience building phase (EBP) for gathering and analyzing data toward future revisions of the convention. Japan is proactively contributing to the gathering and analyzing of data during EBP while also faithfully fulfilling the duties set out in the convention.

## Column

### Marine Environment Conservation Promotion Activities

The slogan of the Japan Coast Guard ("Preserving Blue Seas for the Future") is the basis for its efforts to provide instruction and education about marine environment conservation through efforts such as holding seminars on the topic aimed at raising awareness among key people in the marine and fishing industries of compliance with laws and ordinances, and hosting coastal clean-up activities and lessons about the environment for the general public. Here, we introduce two of their main activities.

**Note** Seawater and other matter loaded as weight to balance the ship, mainly when it carries no cargo.



### (1) “Preserving Blue Seas for the Future/Japan Coast Guard Drawing Contest”

The Japan Coast Guard hosts the annual “Preserving Blue Seas for the Future/Japan Coast Guard Drawing Contest” with the aim of spreading the concept of marine environmental conservation to children.

For the 18th annual contest in 2017, 30,839 entries were submitted by elementary and junior high school students throughout Japan.

The entries were strictly judged to determine prize winners—among them one special prize (the MLIT Minister’s Award) and three Japan Coast Guard Commandant’s Awards—and an award ceremony for the MLIT Minister’s Award was held at the MLIT Minister’s office on December 22, 2017. At the ceremony, MLIT Minister Ishii presented the award certificate and other items to the winner, Ayumi Nishizato, a fifth grader from Higashi Elementary School in Miyakojima City, Okinawa Prefecture.

The works are displayed in various places, and are also used in various public relations in an effort to spread the concept of marine environmental conservation far and wide.

### (2) Beach clean-up activities, etc. in collaboration with the “Umi-to-Nippon Project (Ocean and Japan Project)”

The Japan Coast Guard designates June as Marine Environmental Conservation Promotion Month and promotes marine environmental conservation activities. The Japan Coast Guard also continues to participate in the “Umi-to-Nippon Project (Ocean and Japan Project)” which has been implemented since 2015.

Part of the effort includes beach clean-up activities where standard-design garbage bags are used throughout Japan. To date, 28,198 people in 93 locations throughout the nation have collected and sorted roughly 11,000 bags of waste. Through this project, the Japan Coast Guard has promoted understanding of the impact of every day waste on the marine environment.

The Japan Coast Guard intends to promote activities and intensify collaboration with this project to increase opportunities for people to participate and further spread the concept of marine environmental conservation.

Award presented by MLIT Minister Ishii



Source) MLIT

Winning entry of the special award (MLIT Minister’s Award)



Source) MLIT

Marine conservation program for the general public



Source) MLIT

## Section 6 Improving Living Environments by Preventing Atmospheric and Noise Pollution

## 1 Policies for Environmental Issues Related to Road Traffic

## (1) Measures for Individual Vehicles

## (i) Exhaust gas reduction measures

Regarding measures for emissions of new passenger vehicles, trucks, buses and two-wheeled motor vehicles, we have introduced and begun to sequentially apply the Worldwide Harmonized Heavy-Duty Certification, which is the world's leading emissions regulation system.

We convened an expert review meeting in April 2017 in response to the Volkswagen emissions scandal that came to light in September 2015. In light of the experts' findings centered around the introduction of on-road driving tests, we amended laws and regulations in March 2018. The sequential application of amendments pertaining to on-road driving tests will begin in 2022.

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 are being implemented in Tokyo, Nagoya, Osaka and other major cities. One example is countermeasures based on the Act Concerning Special Measures for Total Emission Reduction of Nitrogen Oxides and Particulate Matter from Automobiles in Specified Areas (Automobile NOx/PM Law).

## (ii) Reinforcing noise regulations

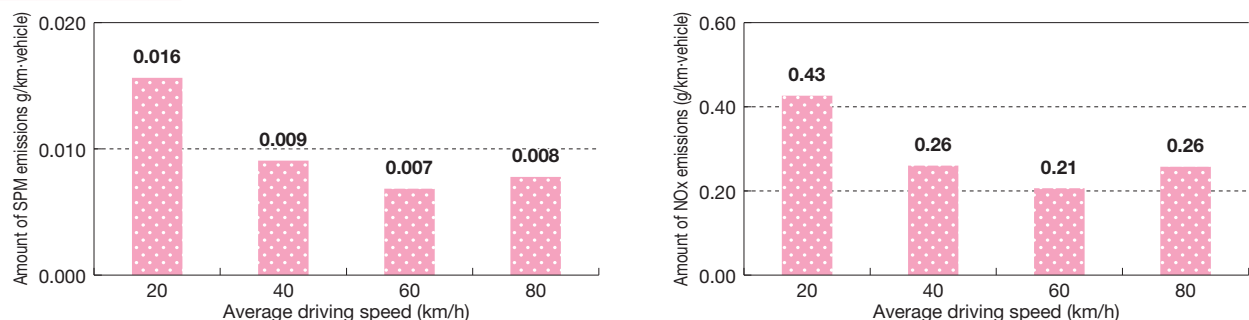
Regarding measures for automobile noise, we have introduced international standards for evaluating the levels of noise generated by acceleration in actual urban driving conditions to regulate the noise generated by four-wheeled vehicles, and began applying the measures progressively in October 2016.

## (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.

Figure II-8-6-1 The Correlation Between Driving Speed and the Emission of Particulate Matter and Nitrogen Oxides (NOx) from Vehicles



\*Amount of emissions per mileage for 2015, estimated by the MLIT  
Source) MLIT

**(ii) Countermeasures for noise pollution**

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.

**2 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.

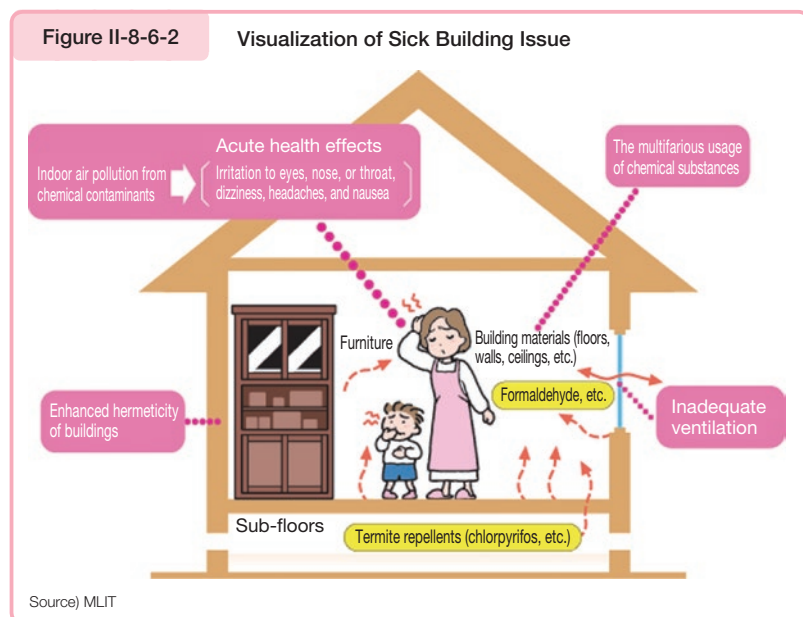
In order to advance comprehensive and effective measures for dealing with the urban heat island effect, we are engaged in various initiatives according to the Outline of Measures for Dealing with the Heat Island Effect (formulated in 2004, revised in 2013), which systematically summarizes specific measures 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 Issue and Soil Contamination

### (1) Countermeasures for Sick Building Issue

Sick building issue describes a situation where materials used in the interior of a building disperse 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 FY2016, the sediment of all locations and the water quality of 97% (205 locations out of 211) 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 FY2013.

Also, based on the “Building Standards Law,” the removal of sprayed asbestos when renovating a building is required, and subsidy 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 (NO<sub>x</sub>, 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.

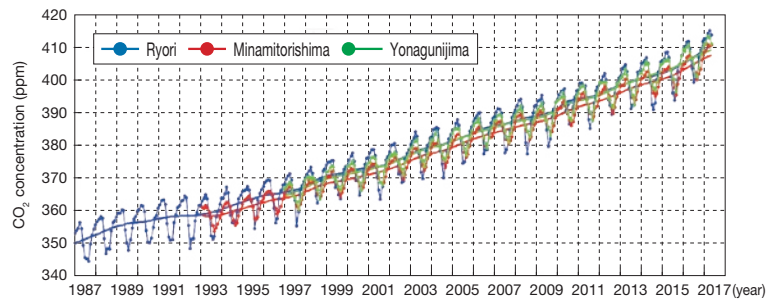
## Section 7 Observing, Monitoring, and Forecasting Changes in the Global Environment

### 1 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<sub>2</sub> 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.

Figure II-8-7-1 Time-series of CO<sub>2</sub> Concentration in Japan



Source) Japan Meteorological Agency

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.

JMA also produced the Japanese 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), JMA also archives and provides observation data on greenhouse gases around the world.

#### (2) Observing and Monitoring Extreme Weather Events

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/low temperatures and precipitation, 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 Centre 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

JMA continues to operate the geostationary meteorological satellites Himawari-8 and Himawari-9. The two-satellite system was established to ensure consistent observation over the long term, and provides constant, 24-hour observation of wide areas of East Asia and the Western Pacific region. 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 CO<sub>2</sub> discharged by human economic activity. In order to monitor global warming, an accurate grasp of oceanic conditions is essential.

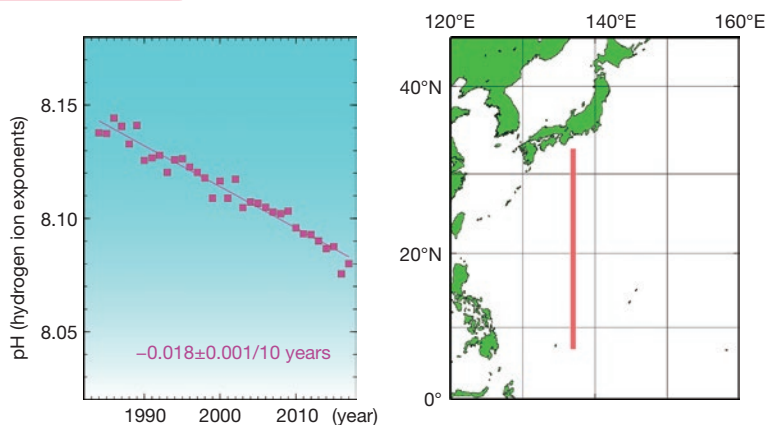
The Japan Meteorological Agency (JMA), under the international cooperative structure, monitors oceanic conditions by carrying out ocean observation with high accuracy from research vessels in the western North Pacific along with using data from satellites and Argo floats, or profiling floats to automatically observe the ocean interior.

JMA website "Marine Diagnosis Report" provides general information on the ocean such as sea surface temperatures, ocean currents, sea level, sea ice, as well as the present status and 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.

Figure II-8-7-2

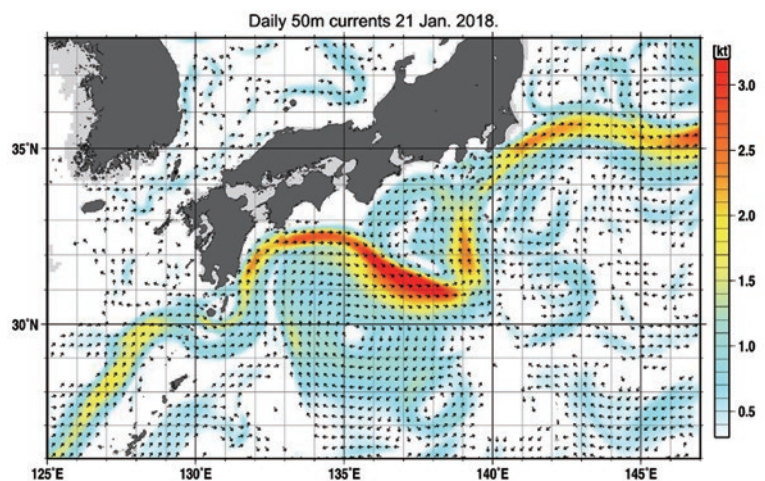
Monitoring the Global Environment Using Research Vessels



This diagram shows long-term changes in the hydrogen ion exponents on the surface of the ocean during the winter along 137°E (average from 7°N to 33°N). The -0.018 decrease in pH over the last decade indicates that the acidification of the oceans is progressing. (Source) Japan Meteorological Agency

Figure II-8-7-3

Example of a "Marine Diagnosis Report" Published on the Japan Meteorological Agency Website



- Ocean Current Charts: Comprehensive analysis (data assimilation) of the results of ocean general circulation model (MRI.COM) and observation data from satellites, ships, buoys, profiling floats and the like enables us to calculate water temperatures and currents anywhere from the ocean surface to areas near the seafloor.

- The speed of ocean current is color-coded according to the scale on the right-hand side of the chart. Here, red indicates strong currents. Ocean Current Chart from January 21, 2018:

The strong currents to the south of Japan depicted here in red and yellow correspond to the large meandering path of the Kuroshio Current, which veers offshore of Japan between the Kii Peninsula and area offshore of Tokai, turning southward near 31°N, 137.5°E.

(Source) Japan Meteorological Agency

### (5) Observing and Monitoring the Ozone Layer

The Japan Meteorological Agency (JMA) annually publishes the outcome of observations on ozone and ultraviolet radiation. According to these studies, the global amount of ozone has increased slightly since 2000, but continues to be lower than it was in the 1970s. JMA also provides hourly updates of the current intensity of ultraviolet rays (UV analytical values) and daily updates of the projected intensity of ultraviolet rays for the current and following day (UV projected values) on its website to contribute to Japanese residents' measures against harmful ultraviolet rays<sup>Note</sup>. To describe the intensity of ultraviolet rays, the agency uses the UV index, a metric that indicates the effects of harmful ultraviolet rays on the human body.

### (6) Promoting Routine Operational Observation in the Antarctic

The Geospatial Information Authority of Japan facilitates 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 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, 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, 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 in terms of flood control, water utilization, and the environment in the Report on Research into Climate Change Adaptation (2017) and other documents. These results have been incorporated into various materials, including a report issued in August 2015 by the Social Development Council entitled Adapting to Climate Change in the Area of Water Disasters, and a plan for adapting to climate change drafted by the MLIT in November 2015.

## 3 Promoting Global Geodetic Observation

Japan contributes to the determination of the shape and variation 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 continuous GNSS observations using GNSS continuously operating reference stations, and is promoting the establishment of a Global Geodetic Reference Frame (GGRF).

**Note** JMA UV Information website: <http://www.jma.go.jp/jp/uv/>