

Chapter 8

Creating and Preserving a Beautiful and Healthy Environment

Section 1 Promoting Global Warming Countermeasures

1 Implementing Global Warming Countermeasures

At the 21st session of the Conference of the Parties to the Framework Convention on Climate Change (COP21) held in 2015, the Paris Agreement was adopted as a new international framework for reducing greenhouse gas emissions beginning in 2020, with participation by all countries. The agreement went into effect in November 2016, and Japan is a signatory nation.

Based on the Paris Agreement, Japan adopted the Plan for Global Warming Countermeasures by a Cabinet decision in May 2016, and has committed to efforts toward the achievement of the mid-term objective to achieve a 26.0% decrease in the FY2013 level of greenhouse gases by FY2030, and as a long-term objective aims to reduce emissions 80% by 2050.

The MLIT has committed to a wide array of policy development initiatives for achieving the mid-term objective based on this plan, including making housing and buildings more energy efficient, measures for individual vehicles, and the promotion of low-carbon urban development. In addition, we partially amended our Environmental Action Plan in March 2017, and set out long-term roles for the MLIT in mitigation policies and other environmental policies.

In addition, we are working toward the promotion of adaptation measures based on the Climate Change Adaptation Plan devised in 2015 to counter the effects of climate change.

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

Japanese government's overall CO₂, etc., emissions reduction targets for FY2030
-26.0% from FY2013 (-25.4% from FY2005)

Individual Sector Emissions of Carbon Dioxide as an Energy Source
 Unit: 1 million tons

| | FY2030 Emissions Target | FY2013 (FY2005) | (Reference) Reduction Rate |
|-------------------|-------------------------|----------------------|----------------------------|
| Industrial | 401 | 429 (457) | -6.5% |
| Business, other | 168 | 279 (239) | -39.9% |
| Residential | 122 | 201 (180) | -39.3% |
| Transportation | 163 | 225 (240) | -27.6% |
| Energy conversion | 73 | 101 (104) | -27.7% |
| Total | 927 | 1,235 (1,219) | -24.9% |

* "Greenhouse gases" refers to non-energy source CO₂, nitrous oxide, methane and others in addition to the energy source CO₂ described previously. The overall greenhouse gas reduction target is -26.0%.

- (Other MLIT Efforts)
- Promotion of low-carbon urban development (cross-sector measure)
 - Reduction of CO₂ emissions from construction machinery (industrial sector)
 - Installation of small hydraulic power generation facilities, etc. (energy conversion sector)
 - Enhancing incineration at sewage sludge incineration facilities, etc. (nitrous oxide)
 - Promotion of urban greening, etc. (CO₂ sink measures), etc.

Examples of MLIT Efforts in the Plan for Global Warming Countermeasures

*These are only a portion of the efforts the MLIT is making in each sector.

○ Making buildings energy efficient

Promotion of obligation to comply with energy efficiency standards in new buildings, repair of existing buildings, etc.

- Required energy efficiency standards compliance rates in new buildings (floor area of 2,000 m² or more) From 93% in FY2013 to 100% in FY2030
- Percentage of building stock that satisfies energy efficiency standards From 23% in FY2013 to 39% in FY2030

Examples of devices that improve energy efficiency

- Promotion of energy efficiency and creation methods in sewage systems
- Low-carbon urban development via thermal environment improvement through heat island countermeasures



○ Making housing energy efficient

Promotion of compliance with energy efficiency standards in new houses, repair of existing houses, etc.

- Percentage of new houses that comply with energy efficiency standards From 52% in FY2013 to 100% in FY2030
- Percentage of housing stock that satisfies energy efficiency standards From 6% in FY2013 to 30% in FY2030

○ Diffusion of next-generation automobiles, improvement of fuel efficiency

Support for realization of world-class fuel efficiency performance, adoption of next-generation automobiles, etc.

- Average fuel efficiency of privately owned vehicles: From 14.6 km/L in FY2013 to 24.8 km/L in FY2030
- Percentage of next-generation automobiles out of the total number of new cars sold: From 23.2% in FY2013 to 50%-70% in FY2030

- Promotion of traffic flow improvement
- Promotion of the use of public transportation
- Streamlining/modal shift of logistics
- Improvement of energy efficiency in rail, ocean and air transport



FC (Fuel Cell) bus Micro mobility CNG truck

Source) MLIT

2 Promoting Global Warming Countermeasures (Mitigation Measures)

(1) Promoting Low-carbon City Development

In urban areas with a considerable concentration of human residents and buildings, low-carbon urban development plans produced by municipalities according to “The Low-Carbon City Act,” which came into force from the standpoint of the desire to advance “low-carbon urban development” in accordance with the consolidation of urban functions, the promotion of the use of public transit in connection with this consolidation, and the promotion of green conservation and greening initiatives, came to be formulated by twenty-three cities by the end of fiscal year 2016. “Low-carbon urban development” will continue to be promoted for initiatives under these plans through statutory special measures, taxation systems, fiscal measures, and other means.

(2) Promoting the Development, Distribution and Optimal Utilization of Environment-friendly Vehicles

(i) Improving mileage of vehicles

Based on the Law Concerning the Rational Use of Energy (Energy Saving Act), we are formulating fuel efficiency standards and the like, and are striving to improve the fuel efficiency performance of automobiles. In October 2016, we introduced the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), a globally harmonized standard for testing the emissions and fuel efficiency of passenger vehicles and others. In addition, in December 2016, the Automobile Fuel Efficiency Standards Subcommittee (a subordinate committee operating under the Council of Transport Policy) and others began discussions regarding the formulation of next-generation fuel efficiency standards for heavy vehicles.

In April 2016, we established a task force to investigate Mitsubishi Motors’ and others’ manipulation of fuel efficiency and emissions gas testing for the review process for designating vehicle types, and based on the task force’s findings, we have improved and tightened up methods of review, including appearing unannounced to verify data measurements by manufacturers, and have amended the Road Transport Vehicle Act in order to intensify administrative discipline (revoking type designations, etc.) and penalties for violations.

(ii) Framework for promoting improvements in fuel efficiency

To make it easier for consumers to identify and select vehicles that offer exceptional performance in terms of fuel efficiency, we have obligated automobile manufacturers and others to publish fuel efficiency information in their catalogs, and a program for evaluating and publicizing performance in terms of the fuel efficiency of automobiles is being run.

To ensure that fuel efficiency information published in catalogs more closely applies to actual driving conditions, the Automobile Fuel Efficiency Standards Subcommittee and others have begun discussions regarding methods of publishing fuel efficiency information based on different driving situations, including driving in cities, in suburbs and on expressways.

Stickers are affixed to vehicles to enable fuel performance in terms of fuel efficiency to be outwardly discerned by consumers.

(iii) Promoting the dissemination of environment-friendly vehicles

We are implementing tax breaks to promote the spread of automobiles that offer superior environmental performance. Additionally, in the taxation system revision of FY2016, the greening exemption tied to the motor vehicle tax was extended for one year, with revisions made to its requirements, and the greening exemption tied to the light motor vehicle tax was extended for one year with the current system intact.

We are promoting urban development based on the use of environmental vehicles by providing subsidies for the acquisition of fuel-cell vehicles, electric vehicles, and micro-mobility vehicles from the standpoint of promoting global warming countermeasures. In addition, subsidies are being granted to truck and bus business operators for the acquisition of CNG automobiles^{Note}, hybrid vehicles, and advanced environmental diesel trucks.

Note Compressed Natural Gas Vehicles (Natural Gas Automobiles)

(iv) Development, application, and creating a usage environment for next generation heavy vehicles

Since FY2015, we have been pursuing scientific research to promote the development and commercialization of technologies related to high-efficiency next-generation diesel engines and next-generation large-sized vehicles known as large-sized liquefied natural gas automobiles, from the standpoint of reducing carbon footprints and emissions.

(v) Promoting and disseminating ecological driving

MLIT has promoted holding symposiums and events all over the country in cooperation with the relevant ministries and agencies of the government and the District Transport Bureaus. We also worked on promoting and spreading ecological driving based on the “10 Reasons for Driving Ecologically.” Furthermore, in order to promote and disseminate ecological driving by the Automobile Carrier businesses, MLIT supports the introduction of the Ecological-driving Management System (EMS)^{Note}.

(3) Promotion of Traffic Flow Improvement

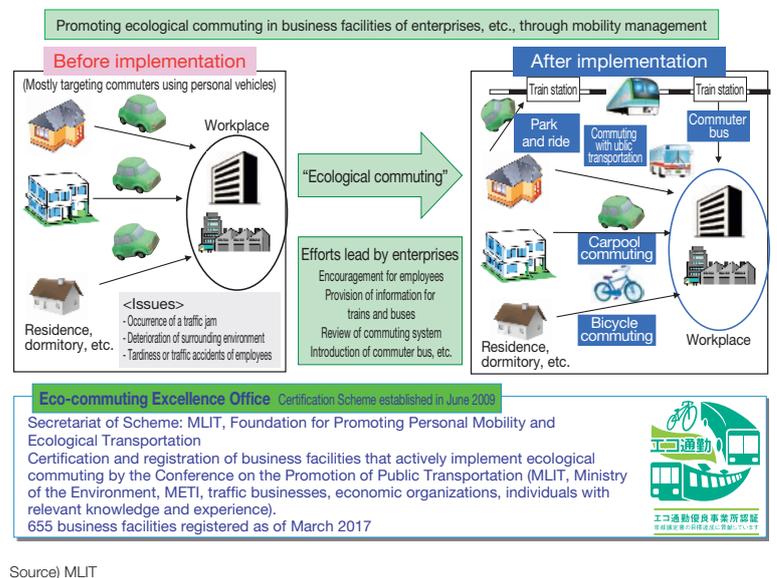
Various traffic flow measures are being tried, since improving the driving speed by smoothing the traffic flow will improve the actual as mileage rate and decrease the carbon dioxide emissions from automobiles. Specifically, we are developing ring roads and other arterial road networks that are effective in reducing through-traffic in the urban center by providing them with alternate routes, working on grade separation of intersections and promoting serial railroad grade-separation projects to eliminate unopened grade crossings. In order to realize smooth, safe transportation services, we are also promoting initiatives for the “smart use” of roads in which the functions of the entire road network are used optimally, such as improving the maintenance of and making small-scale improvements to existing roads. In addition, we are improving the road environment to encourage the use of bicycles, and introducing LED road lights in order to reduce carbon footprint of road facilities.

(4) Promoting the Use of Public Transportation

The shift from private vehicles to public transportation, which is more energy efficient and emits less CO₂, is a necessary facet of global warming countermeasures. Thus we have made efforts to make public transportation more convenient through the introduction of an LRT/BRT system, improvements to transfers, and the promotion of the introduction of public transit IC cards and other computerization initiatives. In addition, we have made efforts to promote the diffusion of ecological commuting at the individual business level through a program to certify the Eco-commuting Excellence Office. Furthermore, information analysis and validation results of past activities for the Environmentally Sustainable Transport (EST) Model Project are being provided.

Figure II-8-1-2

Promotion of “Ecological Commuting” through Mobility Management



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

(5) Optimizing Logistics

Exceeding 50% of the total domestic transportation modes in Japan, trucks account for the majority of the share ratio (ton kilometer basis in transportation). The CO₂ emissions base unit^{Note 1} of trucks is greater than that of mass transportation such as railroads and domestic shipping, and trucks account for 90% of the CO₂ emissions in logistics. In order to reduce CO₂ emissions while sustaining domestic logistics, we must strive to utilize energy efficient transportation modes such as railroads and domestic shipping in addition to improving energy efficiency and transportation efficiency of trucks. With a view to establishing an efficient system of logistics with a lower environmental impact, we are providing support for initiatives concerning joint transportation, modal shifts including the use of railways, efforts to promote the dissemination of large CNG trucks and other environmental vehicles, a smaller carbon footprint generated by logistical sites, and a smaller carbon footprint generated by ports and harbors. We are also promoting the dissemination of equipment containing natural coolants for use in warehouses for frozen and refrigerated goods. In addition to developing low-floor freight cars to accommodate the shipping of 40-ft. tall containers by rail, and providing subsidies for the acquisition of 31-ft. containers for railways that are equivalent in size to 10-ton trucks, we are promoting the construction of energy-saving vessels and otherwise invigorating the coastal shipping and ferry sector. We are also working to disseminate the Eco Rail Mark (172 products (201 items) and 88 cooperating enterprises certified as of the end of September 2016), and the Eco Ship Mark (105 consignors and 122 logistics businesses enterprises certified as of the end of August 2016). In ports and harbors that are a hub for maritime and overland transportation, we are endeavoring to reduce overland transportation distances for cargo by promoting the development of international maritime container terminals, international logistics terminals, and domestic logistics sites compatible with combined multimodal transportation. In ports and harbors, we are also engaged in efforts to support the introduction of energy-saving systems, promote modal shifts and transportation streamlining based on the use of marine transportation for reverse logistics, facilitate the introduction and promote the use of recyclable energy, develop green tracts to contribute to CO₂ absorption, and create seaweed beds and other such ecosystems. In addition, we will continue discussions regarding blue carbon^{Note 2} in conjunction with relevant ministries and agencies and others.

In addition, in cooperation with the relevant ministries and related organizations, we hold the Green Logistics Partnership Conference to give awards to the excellent operations through the collaboration of logistics operators and shipping companies and to raise public awareness.

Note 1 The amount of CO₂ 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, Vice-Director General of the Institution for Transport Policy Studies and Director-General of the Institute for Transport Policy Studies)

- 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 CO₂ reductions in the logistics sector. Since FY2015, this conference has been promoting not just initiatives to reduce amounts of CO₂ 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: 3,353 members (as of February 17, 2016) --- Logistics Companies, Cargo Owners, each of the industry associations, think tanks, research institutes
- 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 CO₂ 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; 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)

Example of a case awarded by the Ministry of Land, Infrastructure, Transport and Tourism (In 2014)

◆ Award from Minister of the MLIT

Initiative Name: Endeavoring to promote comprehensive green logistics accompanying a modal shift; aiming to standardize palletizing operations and establish a diversity-oriented logistics network in anticipation of a driver shortage.

Companies: Kobe Modal Shift Promotion Council, Nestle Japan, Ltd., Zenkoku Tsu-un Co., Ltd., and Japan Freight Railway Company

◆ Award from Ministry of Logistics Deputy of the Ministry of Land, Infrastructure, Transport and Tourism Minister's Secretariat

(i) Initiative Name: Reducing burdens on the environment by way of the efficient operations of transportation businesses and reduced amounts of CO₂ generated by these businesses through greater collaboration in the area of trunk-line shipping, the shared use of facilities, the joint administration of collection and delivery work, and the sharing of IT systems.

Companies: Tonami Transportation Co., Ltd., Daiichi Freight System, Inc., Kurume-Trans Co., Ltd.

(ii) Initiative Name: Supporting initiatives to reduce burdens on the environment through operations of Yamaya Shoryu's distilled spirits center and a next-generation modal shift.

Companies: Yamaya Shoryu Corporation, Senko Co., Ltd., Japan Freight Railway Company, Kokura Transportation Co., Ltd., Sendai Express Co., Ltd., SBS Logicom Co., Ltd., Japan Oil Transportation Co., Ltd.

◆ Special Award from Green Logistics Partnership Conference

Initiative Name: Project to implement measures to deal with shortages of long-haul drivers and reduce amounts of CO₂ emission through the use of marine and rail modes of transportation.

Companies: Nippon Express Co., Ltd., Fujifilm Logistics Co., Ltd., MOL Ferry Co., Ltd., Japan Freight Railway Company



Award granted by the Minister of Land, Infrastructure, Transport and Tourism: standardization of palletizing operations



Award granted by the Minister of Land, Infrastructure, Transport and Tourism

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 energy conservation for ships in the area of coastal shipping by advancing the construction of vessels that contribute to energy conservation and supporting the demonstration of innovative energy-saving technologies. From the standpoint of advancing the development of an international framework and disseminating and promoting the development of technologies on an integrated basis in the area of international shipping, we have been supporting the private-sector development of technologies for the purpose of further reducing CO₂ emissions from vessels since FY2013 and spearheading IMO discussions on progressively fortifying regulations governing CO₂ emissions (fuel-efficiency regulations) and on creating an international framework that includes a program for reporting fuel consumption results (by which fuel efficiency during actual operations can be visualized).

(iii) Initiatives to reduce CO₂ emissions in aviation

We are advancing the implementation of area navigation (RNAV), which enables shortening flight time and distance and the User Preferred Route (UPR)^{Note} method, which allows the flight to have the most efficient altitude desired by the pilot, as well as enhancing aerial traffic systems by implementing the Continuous Descent Operation (CDO) which sustains minimal engine output by continuously descending without leveling out at any point during descent. We also

Note User Preferred Route

promote the use of ground power units (GPU) for airplanes and ecological cars such as Ground Service Equipment (GSE)^{Note 1} vehicles as a part of Eco Airport (eco friendly airport) activities. In addition, we are leading discussions on the creation of global frameworks for reduction of CO₂ emissions in aviation, and are leading discussions in conjunction with key countries toward the finalization of the global market-based measure (GMBM), which is an emissions trading system, for the International aviation sector agreed upon at the ICAO Assembly held in October 2016. We are also participating in the Asia and South Pacific Initiative to Reduce Emissions (ASPIRE)^{Note 2}, in which air traffic control authorities and airlines cooperate to attain efficiency in flying. Furthermore, efforts to promote the use of alternative aviation fuels are being conducted in collaboration with the various stakeholders.

(7) Enhancing Energy-saving Capabilities in Housing and Buildings

The rise in the amount of energy consumed by the civilian sector is more prominent than in other sectors, which makes improving energy-saving capabilities in housing and buildings an urgent task.

In response to the fact that the basic energy plan will progressively mandate that new dwellings and buildings comply with energy-saving standards by 2020, the Act on the Improvement of Energy Consumption Performance of Buildings (Building Energy Efficiency Act), which sets forth regulatory measures such as measures for mandating compliance with energy-saving standards on the part of buildings above a certain size other than dwellings, and guidance measures such as measures with respect to a program for certifying buildings demonstrating excellent energy-saving performance and a program for indicating energy-saving performance, was promulgated in July 2015. The guidance measures went into effect in April 2016.

In order to communicate energy-saving performance to consumers in an easy-to-understand manner, efforts are underway to upgrade and disseminate a housing-performance indication system, CASBEE, the Building Energy-efficiency Labeling System (BELS), and other such programs.

Aside from this, the MLIT is supporting various efforts, such as the introduction of cutting-edge CO₂ emissions decreasing technology and energy conserving renovation, as well as efforts by small and medium-sized contractors in building zero energy housing and certified low-carbon buildings, while also lowering the interest rate by using the Japan Housing Finance Agency's securitization support business framework. In addition, it is working for the development and dissemination of things like the design and construction technology of energy-saving houses and buildings through holding workshops for design and construction professionals and providing support for the technological development of the leading private firms.

Furthermore, in order to stimulate energy-saving measures in pre-existing establishments, we are formulating supportive taxation measures for renovation work towards energy conservation in already existing residences and buildings.

(8) Promotion of Energy-saving Methods in Sewage

The reduction of carbon monoxide is being advanced by the implementation of energy-saving measures such as high efficiency equipment for sewage treatment, and with new energy measures such as the processing of raw sewage into solid fuel, and the high temperature incineration of raw sewage.

(9) Promotion of Environmental Measures for Construction Machinery

MLIT is implementing a system that gives type approval for construction machinery, such as hydraulic shovels and bulldozers, that meet the fuel consumption standards for major construction machinery.

(10) Implementation of CO₂ Sink Measures through Urban Greening

Urban greening is considered re-vegetation activities, which is subject to the greenhouse gas sink reports according to the Kyoto Protocol. Based on the basic plans for greening as formulated by the municipalities, we are promoting maintenance of city parks and the greening of communal facilities, such as roads and ports and private land.

MLIT is also working on public awareness regarding the meaning and effect of CO₂ sink measures by making cities more low carbon and green by mitigating the heat island phenomenon through improvement in the thermal environment

Note 1 Ground Service Equipment

Note 2 Asia and Pacific Initiative to Reduce Emissions

by things like improving ground covering.

3 Promotion of the Use of Renewable Energy

According to the “Energy Master Plan” which was approved by the Cabinet in April 2014 and based on the fact that the introduction of re-usable energy is being expedited as much as possible for three years starting in 2013, MLIT is promoting use of the re-usable energy potential in offshore wind-power generation facilities in ports, harbors, and other extensive infrastructure spaces like airport facilities, as well as rivers and streams, and the stable yet abundant sewage biomass.

(1) Promotion of the Use of Marine Renewable Energy

Surrounded by the sea on all sides, Japan is blessed with abundant sources of marine renewable energy. Ports and harbors in particular are garnering attention as sites for the installation of offshore wind-power generation facilities.

Under these circumstances, the amended Port and Harbor Act went into effect in July 2016, and an occupation application system was established by which the entities to occupy port and harbor areas and the like are determined through open applications. We used the system to develop operation guidelines that enable the smooth introduction of offshore wind-power generation in ports and harbors, and published those guidelines to coincide with the enforcement of the amended Port and Harbor Act. In September 2016, we began discussions in conjunction with METI to streamline the process of reviewing offshore wind-power generation facilities and ease the burden on business entities based on the Electricity Business Act and the Port and Harbor Act, and in February 2017, published a skeleton plan to describe the ideal state of structural review.

For marine energy such as wave and tidal power, MLIT is working on guidelines to secure the safety/environmental aspects of floating power generating facilities and promoting the realization of new re-useable marine energy in cooperation with the concerned government ministries.

Column Introduction of Offshore Wind Power Systems in Ports and Harbors

The long-term, demand-supply outlook for energy (announced in July 2015 by METI) expects that renewable energy sources will account for 22% to 24% of Japan’s energy mix in 2030, and the government as a whole is implementing initiatives for introducing renewable energy sources in response to this outlook.

Among the different types of renewable energy sources, offshore wind power generation provides the advantage of high facility usage rates, as strong, stable winds are more available offshore than onshore. Additionally, larger wind turbines can be installed offshore as compared to onshore, because there are fewer constraints regarding their size. A 5-MW-class offshore wind power generation facility (annual power generation of approx. thirteen million kWh, corresponding to electricity for approx. 4,210 ordinary homes) would be an extremely large facility, with turbine blades reaching a maximum height of roughly 150 m, and spanning a diameter of 130 m. Ports and harbors are thus considered promising sites for introducing offshore wind power generation facilities, and various ports have begun to engage in initiatives for their introduction, as introduced below.

■ Initiatives from the Port of Kitakyushu

In August 2016, Kitakyushu City commenced a public invitation of proposals from offshore wind power generation businesses to install and operate a wind farm in waters within the Port of Kitakyushu (approx. 2,700 ha). This was the first implementation of the new public-offering system for the occupancy of ports and harbors under the revised Port and Harbor Act. In light of the Hibikinada area’s vast industrial-use land and the high potential of its port and harbor facilities, the city set its eyes on wind power generation, par-

ticularly on its wide industrial base and high job creation effect, and launched the Green Energy Port Hibiki project in fiscal 2010 with the aim of creating a comprehensive center that brings together all the functions of industries related to wind power generation. Based on reviews and evaluations by a

Image of an offshore wind farm in waters near Hibikinada in the Port of Kitakyushu (photo provided by Kitakyushu City)



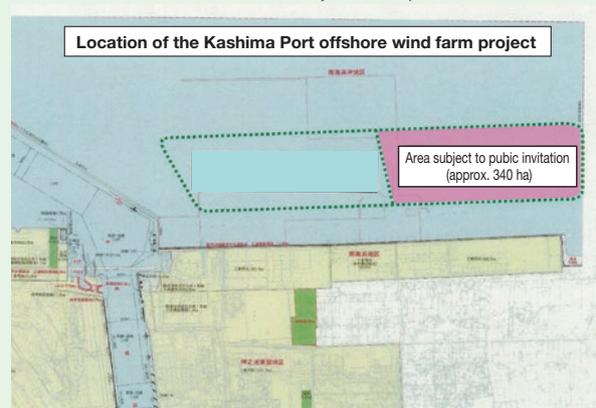
third-party evaluation committee, in February 2017 the city selected Hibiki Wind Energy as the planned developer of the offshore wind farm, from the perspective of the consortium's ability to implement the project and contribute to the port and region. According to the consortium's plan, the project will cost a total of approximately 175 billion yen, and a maximum of forty-four 5-megawatt-class wind turbines will be erected. Construction will start from fiscal 2022, and the turbines will be sequentially put into operation.

■ Initiatives from Kashima Port

Ibaraki Prefecture commenced a public invitation of proposals from offshore wind power generation businesses to develop and operate a wind farm in waters within Kashima Port (approx. 340 ha) in March 2017. Through reviews and evaluations by the prefecture, a developer is planned to be selected after late June.

Today, nine ports and harbors throughout Japan are engaging in initiatives to introduce offshore wind power generation, including the Port of Kitakyushu and Kashima Port. When all projects are completed, some two hundred wind turbines will have been constructed in nationwide ports and harbors. The MLIT will make continued efforts to promote such initiatives for the smooth introduction of offshore wind power generation in Japan.

Area within Kashima Port subject to the public invitation



(2) Promoting Small Hydroelectric Generation

As initiatives toward a low carbon society, the implementation of small hydroelectric generation by using rivers is being pushed forward. Specifically, MLIT is working on the thorough use of unused energy by the promotion of subsidiary power generating based on a registration system, providing project formation support by field contact points, and support for the introduction of small-scale hydropower facilities at sediment control dams, as well as the proactive introduction of power generation facilities for dam management at dams directly controlled by MLIT.

(3) Promotion of the Use of Sewage Biomass

The MLIT is promoting the use of energy derived from sewage sludge and the use of sewage heat.

In May 2015, the Sewerage Act was amended, thereby allowing heat exchangers to be attached to sewage conduits by private businesses and mandating efforts to be undertaken by sewage administrators to reutilize sewage sludge as a source of energy or fertilizer. Through the use of PPP/PFI, we will promote the energy utilization of sewage sludge by the use of bio-gas and solid fuel, as well as the use of sewage heat as renewable energy heat.

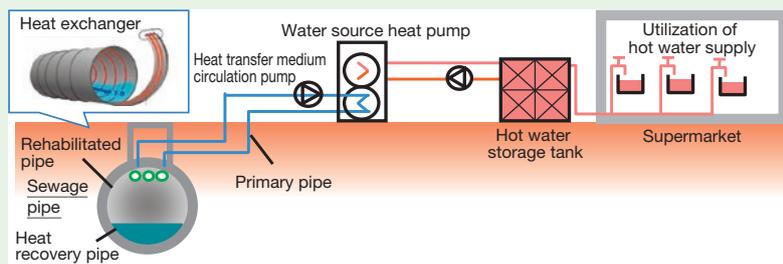
Column

First in Japan! Promotion of Low-carbon Urban Development by Providing Heat from Sewer Pipes at the Initiative of Private-Sector Businesses

Sewage that flows under the city has the characteristic of being cooler than ambient temperature in summer and warmer than ambient temperature in winter. This difference in temperature can be used to achieve energy conservation and reduce greenhouse gas emissions. People are seldom aware of the amount of sewage that is discharged, as it ordinarily flows underground, but as much as 14.5 billion tons/year are discharged nationwide. Even when narrowed down to commercial and industrial areas that have a high heat demand, this has the potential equal to the amount of heat needed to satisfy roughly 800,000 homes' worth of air-conditioning demand per year.

There are only sixteen case examples of sewage heat being utilized, as of the end of 2016, but because these cases use heat that is collected at a sewage treatment plant, the utilization of sewage heat does not measure up to the above-mentioned potential. Sewer culverts are buried underground, and installation had, up until now, only been allowed by sewerage administrators. However, the development of heat collection technology from sewage and active discussions by sewage heat utilization councils, etc. have raised awareness in recent years, concerning the importance of utilizing untapped sewage heat energy now more than ever before.

Against this background, the Sewerage Act was revised in May 2015, and regulations were eased to allow private businesses to install heat exchangers in sewer culverts to utilize sewage heat.



Source) MLIT

The first heat exchanger to be installed by a private business, after the deregulation, was in Komoro City, Nagano Prefecture in January 2016.

Komoro City pursues the concept of a “compact city,” and endeavors to develop into an efficient, environmentally friendly city by gathering public facilities and hospitals in the city center. The idea of utilizing sewage heat was adopted as part of the initiative to consolidate city functions and promote low-carbon, energy-efficient buildings, so it was incorporated into the project for the relocation and construction of Komoro Kosei General Hospital, built up on the old city hall site.



Source) Komoro City

The project was implemented as a joint undertaking by Komoro City, an energy service business, and a

manufacturer possessing sewage heat utilization technology; the utilization of sewage heat was decided at the proposal of the energy service business. To utilize sewage heat, a heat collecting pipe was set inside the sewer pipes bordering the site using lining material that is commonly used for pipe rehabilitation. The collected heat is recovered by a heat pump water heater and utilized to supply hot water to hospitals. This reduces the fuel consumption of hot water boilers that use city gas, and thereby also reduces CO₂ emissions and expenses.

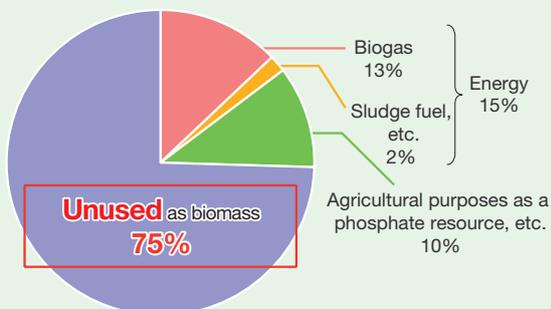
This initiative, coupled with city development efforts, promotes not only regional revitalization, but also carbon reduction and the utilization of untapped resources in the city, while being an advanced, pioneering case study of public-private cooperation that is expected to further expand the initiatives for sewage heat utilization in the future.

Column

Sewerage Innovation – Strategy for Creation of a “Resource Produced in Japan” (Productivity Revolution Project)

Sewage sludge has conventionally been treated as waste and disposed of as landfill, but owing to technological progress in recent years, it has come to be regarded as a “resource produced in Japan” that could be widely utilized as biogas, sludge fuel, or fertilizer. The thorough utilization of sewage sludge will contribute significantly to the local production, along with local consumption of energy, which is mostly dependent on imports at present, and to increasing agricultural productivity.

[Utilization of sewage sludge in Japan]



Source) MLIT

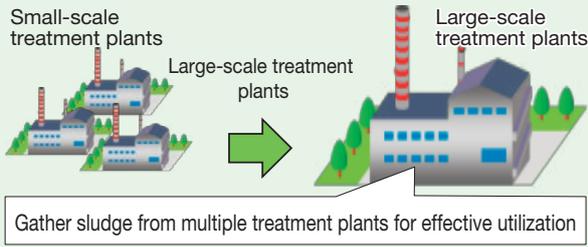
[The potential of sewage sludge]

- Sludge produced at nationwide sewage treatment plants contains enough energy to generate electricity for approximately 1.1 million homes.
- If the total amount of phosphate that flows into sewage treatment plants is used for agricultural purposes, imports of phosphate could be reduced by roughly 10% (approx. 12 billion yen/year).

[Targets]

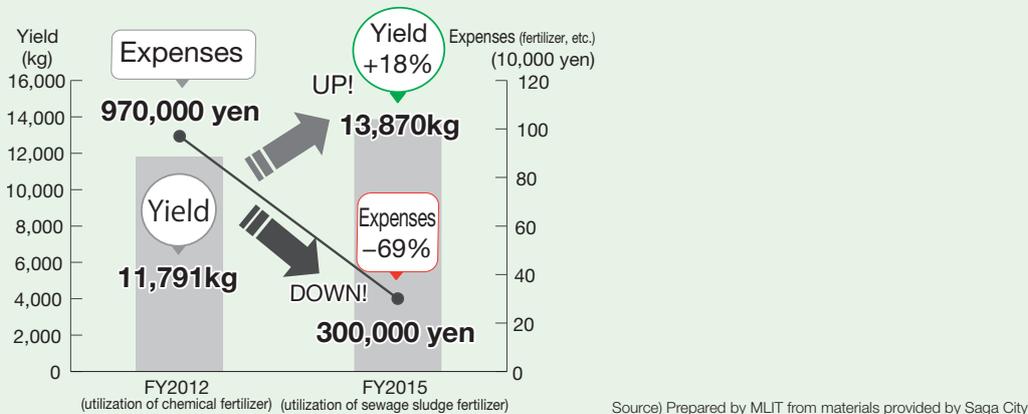
- (1) Promote the thorough utilization of sewage sludge, and increase its usage ratio for energy and agricultural purposes from approx. 25% (at present) to approx. 40% (by 2020).
 - (2) Use sewage sludge to produce energy worth approx. 20 billion yen/year in place of fossil fuels.
- Strategy for thorough utilization of sewage sludge in the energy creation sector
 - Promote biogas power generation at the initiative of the private sector.
 - Consolidate regional biomass to produce economy of scale.

[Image of biomass consolidation and utilization]



- Agricultural use of phosphate resources, etc. (BISTRO sewerage system)
- Increase agricultural productivity (increased yield, reduced fertilizer expenses) by dramatically changing the image of sewage sludge fertilizers at the initiative of the sewerage system.

[Utilization effects of sewage sludge fertilizer (case study of a farmer in Saga City)]



(4) Promotion of Solar Power Generation Using Infrastructure Space

Based on the changes in energy supply and demand triggered by the Great Eastern Japanese Earthquake, and in addition to the effective utilization of the vast spaces of sewage treatment plants, ports and harbors, and airport facilities, steps have been taken to insure the installation and placement of solar power generation facilities by public entities in public infrastructure spaces, such as government buildings, and for private businesses that can install such facilities in roads and urban parks.

(5) Promotion of Contribution Towards the Hydrogen Society

With the need for hydrogen energy expected to expand in the future, such as fuel cells for residential use (introduced to the market in 2009) and fuel-cell cars (introduced to the market in 2014), MLIT is working on realizing a hydrogen energy fueled society by preparing a conducive environment for the manufacturing, storage/transportation and usage of hydrogen.

(i) Promotion of dissemination of fuel-cell cars

The MLIT will support the fuel-cell vehicle introduction projects of private businesses and others in an effort to work toward the world's fastest diffusion of fuel-cell vehicles, and with the understanding that the diffusion of fuel-cell buses and other vehicles that are expected to create a relatively consistent demand for hydrogen is particularly important in the development of hydrogen supply infrastructure. In FY2016, the MLIT provided support for the full-scale introduction of the first two fuel-cell buses in Japan.

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

We are developing a foundation for enabling private-sector companies to participate in efforts to promote the use of hydrogen in the maritime sector, such as by conducting studies on the commercialization of hydrogen fuel cell ships with exceptional environmental capabilities and formulating safety guidelines.

(iii) Setting up a marine transportation system for liquefied hydrogen

Since FY2015, Kawasaki Heavy Industries and other companies have been producing hydrogen through the use of brown coal, an unutilized energy source in Australia, and implementing a project to establish a supply chain for transporting liquid hydrogen to Japan (METI Project to Demonstrate the Establishment of a Supply Chain for Hydrogen Derived from Unutilized Energy Sources (MLIT partnership project)).

The MLIT has spearheaded efforts to set global safety standards needed for the safe marine transportation of liquid hydrogen on a multilateral basis through the IMO (International Maritime Organization). In order to establish a highly efficient and safe method of loading and unloading liquid hydrogen, energy carriers associated with the Strategic Innovation Promotion Program (SIP) have been engaging in research and development since FY2014 on loading systems for liquid hydrogen in collaboration with the Cabinet Office.

(iv) Promotion of the manufacture, use and application of hydrogen derived from sewage sludge

Sewage sludge is stable in terms of both quantity and quality, and is consolidated at sewage treatment plants. The proximity to urban areas and other characteristics of sewage treatment plants create promise for the realization of an efficient, stable hydrogen supply. Toward that end, we support the development and experimentation of hydrogen production technology at sewage treatment facilities to promote the manufacture, use and application of hydrogen derived from sewage sludge, which is a form of renewable energy.

4 Promotion of Global Warming Countermeasures (Adaptation Measures)

We are comprehensively and systematically promoting initiatives to address the various consequences of climate change based on the National Plan for Adaptation to the Impacts of Climate Change, which was adopted by a Cabinet decision in November 2015. As part of this plan, the MLIT—which oversees various sectors, namely the conservation of national land, and is tasked with creating safe, secure national land and communities—formulated the MLIT Climate Change Adaptation Plan in November 2015, and is promoting adaptation measures.

Based on the MLIT Climate Change Adaptation Plan, we are engaged in efforts to discuss and develop comprehensive adaptation measures regarding both structural and non-structural aspects in the fields of natural disasters (floods, landslides, storm surges, tidal waves, etc.) and water resources and aquatic environments, as well as efforts regarding measures based on the Outline of the Policy Framework to Reduce Urban Heat Island Effects, which contribute to the continuous monitoring of climate change and the delivery of forecast data and other information, and to adaptation measures in the fields of national and urban lifestyles.

Section 2 Promoting the Creation of a Recycling Society

1 Advancing Recycling in Construction

Construction and demolition waste (CDW) accounts for approximately 20% of all industrial waste, and 20% of final disposed amount. Suppression of the generation of CDW, and recycling and reuse of those waste are major tasks. In FY2012, approximately 73 million tons of CDW was generated nationwide. The recycling/reduction rate improved gradually to 96.0%, but the impending maintenance and updating of social infrastructure and other factors will likely generate an increased amount of construction byproduct, and further efforts are required to prevention, recycle and reduce those amounts in order to promote the use of recycled materials and to effectively use of excavated soil.

Sewage sludge also accounts for 20% of all industrial waste, reaching approximately 77.7 million tons in FY2014. We

are working on recycling and reduction of sewage sludge.

(1) Advancing Recycling in Construction

Based on the “Construction Material Recycling Act (Construction Recycling Law),” we are working to enforce proper measures through a simultaneous patrol throughout Japan.

In the “Construction Recycling Promotion Measures Subcommittee” that have been formed in both the Environment Committee of the Panel of Infrastructure Development and the Environment Committee of the Transport System Section of the Council for Transport Policy, the relevant parties involved in construction recycling put together the “Measures related to the Promotion of Construction Recycling,” a recommendation to promote mid-term objectives for the recycling and appropriate disposal of construction by-products for the future, and MLIT formulated the fourth action plan, the “2014 Construction Recycling Promotion Plan” in September 2014.

According to this plan, the MLIT will be promoting construction recycling by working on fortifying the monitoring of construction by-products logistics, prevention before the start of construction, promoting recycling/reduction by thorough on-site sorting and delivery to recycling facilities, promoting use of recycled materials, and promoting the efficient use and appropriate disposal of excavated soil.

Figure II-8-2-1

Amount of Industrial Waste by Industry Sector and Recycle Rate of Construction By-products

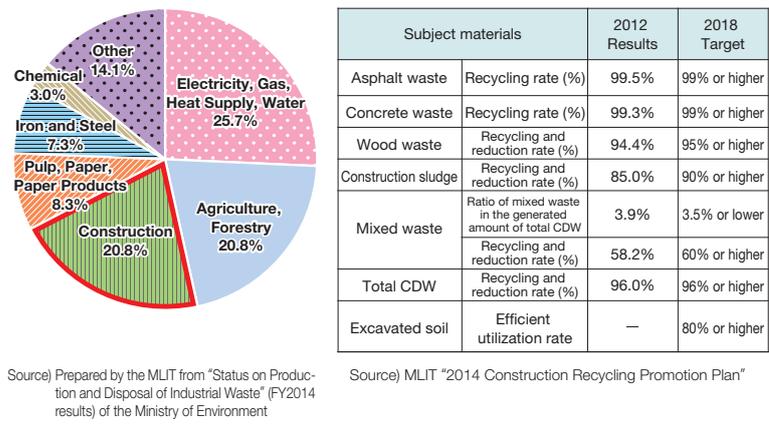
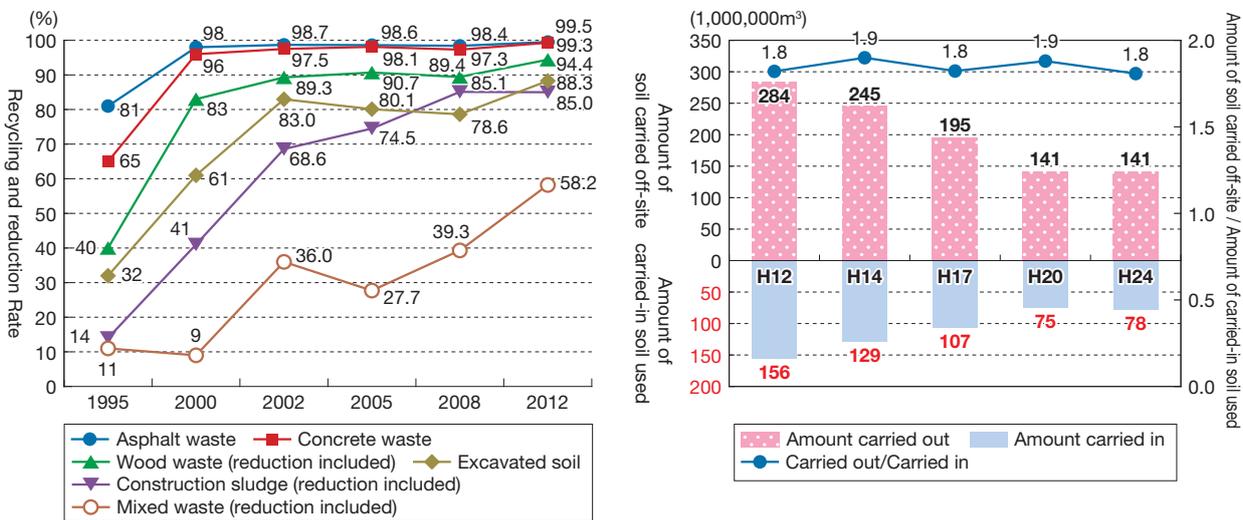


Figure II-8-2-2 Data on Construction By-products



(2) Reducing Sewage Sludge and Promoting Recycling

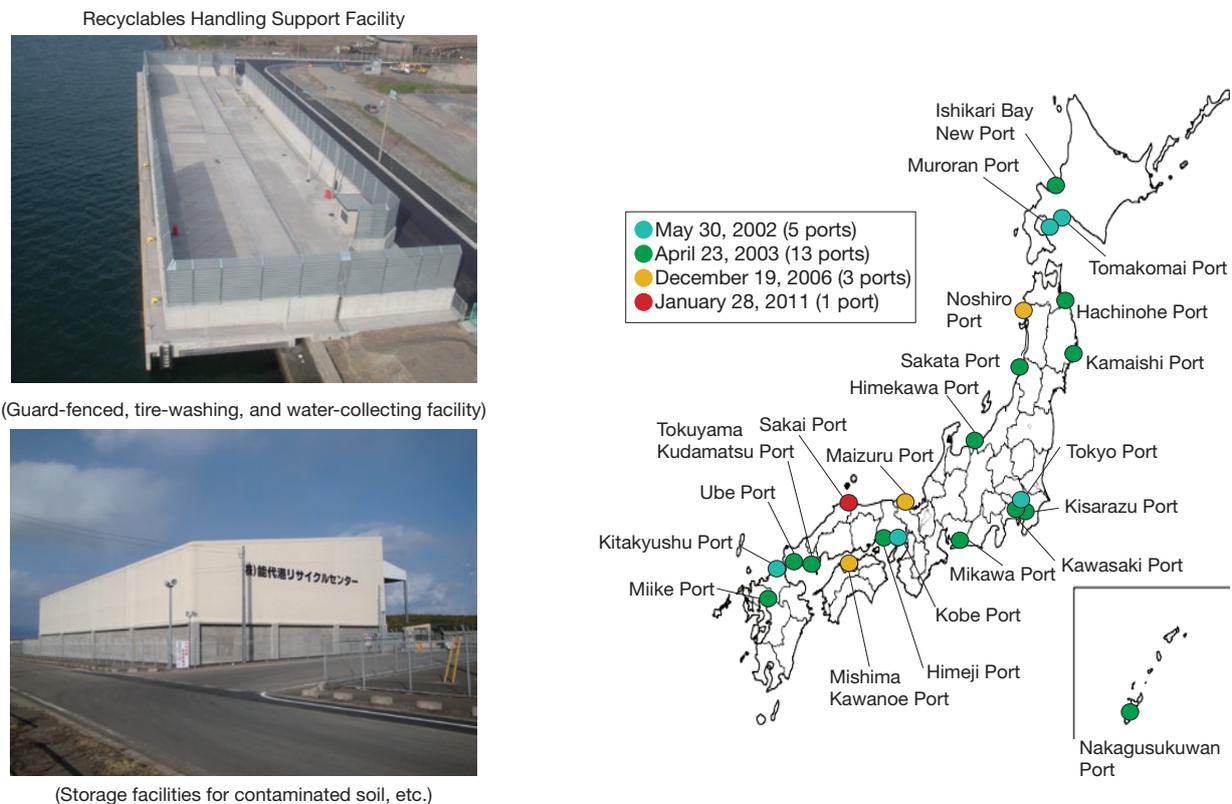
MLIT is promoting the recycling of sewage sludge (FY2014 recycle rate 63%) and moving forward with the use of sewage sludge made into solid fuel for energy. Furthermore, we are proceeding with the Breakthrough by Dynamic Approach in Sewage High Technology Project (B-DASH Project) for proving innovative technology and systems for the effective use of sewage based resources.

2 Constructing a Resource Recycling Logistics System

(1) Forming a Resource Recycling Logistics System by Utilizing Shipping

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

Figure II-8-2-3 Specified Recycle Ports



Source) MLIT

(2) Well-planned 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 landfill sites in inland areas. In the Osaka Bay area in particular, regional waste disposal sites are being developed to receive waste generated around the Osaka Bay area through the Osaka Bay Phoenix Project^{Note 1}. Construction waste soil generated in the Tokyo Metropolitan Area is transported by sea and used widely for land-reclamation in ports and harbors of the whole country in accordance with the Super Phoenix Plan^{Note 2}.

Note 1 Business to promote the orderly development of the port by properly disposing in the sea landfill the waste generated from the 6 prefectures and 168 municipalities of the Kinki region.

Note 2 A mechanism for adjusting at the national level, the effective use of the soil from construction in metropolitan areas as resources for port construction in ports that need landfill materials.

3 Recycling Vehicles and Marine Vessels

(1) Recycling Vehicles

In accordance with the Act on Recycling, etc., of End-of-Life Vehicles (Act for Automobile Recycling), a system for confirming that end-of-life vehicles are properly recycled is being implemented. When a vehicle registration is deleted, as provided for in the Road Transport Vehicle Act, the vehicle weight tax will be subject to a refund program. We are endeavoring to promote the proper disposition of used vehicles and prevent illegal dumping. In FY2015, vehicles confirmed to have been scrapped numbered 1,404,939.

(2) Recycling Marine Vessels

The recycling of large vessels (ship recycle)^{Note 1} has generally been conducted in developing nations such as Bangladesh and India, where the frequent occurrence of human casualty accidents and marine pollution in the facilities continue to raise concern. In order to solve these issues, Japan lead discussions with the International Maritime Organization (IMO), which resulted in the adoption of the “2009 Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships (tentative name) (Ship Recycling Convention).” This convention mandates the inspection and retention of proof documents for marine vessels and ship recycling facilities respectively, and also bans the use of asbestos or polychlorinated biphenyl (PCB) in newly built vessels.

In Japan, studies are being carried out on enacting domestic laws required for conclusion of the Ship Recycling Convention with the aim of enforcing this convention as soon as possible. Conclusion by key recycling countries is also needed to put this convention into effect; thus the MLIT is holding intergovernmental discussions toward improving facilities for recycling ships in India, the world’s largest recycler, and India’s conclusion of the convention. At a meeting between Prime Minister Abe and Prime Minister Narendra Modi in November 2016, Prime Minister Abe indicated Japan’s intent to support the improvement of facilities in India, and the two prime ministers pledged their intent to conclude the convention as soon as possible.

On other fronts, because pleasure boats are mostly made of fiber reinforced plastic (FRP), which is difficult to dispose, there has been a demand for a waste processing route for proper disposal. In response, we undertook activities in building a processing route, as well as developing recycling technologies for FRP boats. As a result, approximately 550 FRP vessels have been properly recycled yearly under the leadership of the Japan Marine Industry Association throughout Japan since 2005. This is undertaken using the National Permit System based on the Waste Management Law.

4 Efforts in Green Procurement ^{Note 2}

In light of partial revisions to the basic government policies, based on the “Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on Promoting Green Purchasing),” the “Policy for promoting the procurement of ecologically friendly goods, etc.” was adopted. Based on this policy, we are actively advancing the procurement of ecology-friendly goods for building materials, construction machinery, method of construction, and objectives in public construction work.

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

Note 2 Procuring eco-friendly goods that are defined under Article 2 in the “Green Purchasing Law” is called Green Procurement here.

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
Expansion/Renovation of Sendai No. 1 Regional Government Building, B Building



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. Furthermore, a draft of “Urban Biodiversity Index” was formulated in May 2013, which aims at encouraging local governments’ efforts toward urban biodiversity conservation by measuring its habitat potential and progress in implementing policies. In March 2015, MLIT, together with Ministry of the Environment and Ministry of Agriculture, Forestry and Fisheries, formulated the “Action Plan for protection from Alien Species” which aims for promoting management of Alien Species comprehensively and effectively, and then conservation and sustainable-use of in rich biodiversity in Japan.

2 Creating Rich and Beautiful River Environments

(1) Creating and Conserving a Healthy River Environment

(i) Creating a rich river environment and stimulating revival

In river development, based on the “Basic Guideline for Rich River Development (established in October 2006),” we work for the conservation and restoration of animal habitats and diverse river scenery, while concurrently sustaining safety over flood control.

While promoting the restoration of marshland by nature restoration projects and the improvement of the upstream and downstream migration environment for fish by fixing the fish passage ways, we are also promoting the protection and restoration of the watershed ecosystem with the goal of forming an ecosystem network^{Note} by cooperating with various entities, as demonstrated in the project of rehabilitating storks to the wilds in Maruyama River (Toyooka City, Hyogo Prefecture).

Moreover, to effectively proceed with these activities, we are joining efforts with educated experts and various institutions, as well as utilizing research findings of government inspections of river areas and the Aqua Restoration Research Center, which has the largest experimental waterway in the world.

(ii) Countermeasures for non-native species in the waterways

Non-native species, which are one of the threats against biodiversity, have been expanding their habitat in the waterways all over Japan. As a countermeasure, we have circulated information such as the “Guideline for Countermeasures for Nonnative Plants in Rivers” and “Examples of Countermeasures for Non-native Fishes (December 2013)” and are implementing measures against foreign species in various locations.

(2) Initiatives to Recover the Water Supply in Rivers

In order to preserve a healthy river environment, it is essential to sustain a rich supply of water. For this reason, we have specified the required amount of water in the basic policies for river improvement, based on the habitat of plants and animals, scenery, and water quality. In addition to working to sustain the supply, we are proceeding with activities for clean river recovery in recession areas downstream from dams of hydroelectric power plants. Meanwhile, in order to preserve the river environment downstream of dams, flowing water is being retained in flood-control reservoirs to the extent that flood-control functions are not impeded and usable discharge dams are subject to elastic management practices and elastic management testing. (Water was retained using twenty-one dams in total in FY2016, nineteen of which were subject to the usable discharge of water.) Initiatives concerning medium-sized flash discharging to cause changes in river formations are also being undertaken. Furthermore, we are working to restore the water supply of rivers in urban areas, where the average amount of naturally flowing water has diminished, by pumping treated water from sewage plants.

(3) Promoting Activities in the Comprehensive Management of Sediment from Mountains to Coastal Areas

Concerned that water systems will accelerate problems such as variation in river environments caused by changes in sedimentary transport, diminishing sand supplies to the coast, and coastal erosion caused by changes in littoral drift, relevant institutions are working in cooperation to comprehensively control sediment transport from mountains to coastal areas. Specifically, in order to deal with the problem

Figure II-8-3-1

Initiatives in the Comprehensive Management over Sediment



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

caused by the sediment transport in mountain streams, dams, waterways and the coasts, in cooperation with the relevant organizations, MLIT is working on projects for formulating comprehensive sediment management plans for effective sediment management and building sediment control dams, building open-type sediment control dams so that sediment can be effectively washed downstream, improving existing sediment control dams, creating an effective flow of sediment by sediment bypasses for dams, and recovering of sandy beaches by such methods as appropriate sand and gravel extraction of the waterways, sand bypass and littoral nourishment.

(4) Environmental Education on Rivers

As natural environments close to communities, recently, rivers host a variety of activities such as environmental studies and natural experience activities. In addition, we are promoting projects and disseminating of information so children can safely learn and play by riversides. Because there are hidden dangers and proper knowledge is essential for safe activity, we cooperate with the NPO River Activities Council (RAC), a citizens' groups which played a central role in establishment, to promote the cultivation of river administrators.

Also, in order to widely disseminate environmental education on rivers in the schools, MLIT is providing information to textbook publishers to introduce environmental education projects.

○ Children's Riverside Rediscovery Project

With the cooperation of citizens' groups, educators, and river administrators, rivers are registered as Children's Riversides and receive various means of support from the Center for Supporting Children's Riverside Activities. 302 locations are registered as of the end of March 2016.

○ Riverside Fun School Project

Utilization is encouraged for riversides that are registered as Children's Riversides and undergo riverside improvements required for enhancing experiential activities. 287 locations are registered as of the end of March 2016.

○ National Aquatic Organism Study

Conducted with the goal to increase interest in rivers through a survey of life forms found in nearby rivers. In FY2015, 58,143 people participated. 62% of the inspection points (2,227 points) were judged to have "clean water."

3 Preserving and Improving Coastal Environments

Because we must preserve animal habitats, care for scenery, and sustain appropriate usage of beaches, while protecting the coast from storm surges, tsunamis, and high waves, we are proceeding with maintenance and conservation that balances between "defense," "environment," and "usage."

In addition, based on the "Law for Protecting Beautiful and Rich Nature through the Promotion of Disposing of Beached Coastal Waste and Contributing to the Preservation of Coastal Scenery and Conservation of the Environment (Coastal Waste Disposal Promotion Act)," we will implement effective measures for beached waste in close cooperation with relevant institutions in the future.

We are also providing support to administrative agencies for coasts under the "Project for Emergency Measures to Dispose of Large-Scale Driftwood and Other Debris Items that have Washed Ashore in Connection with Disasters" when large quantities of driftwood and other debris are washed ashore and impede the functions of coastal protection facilities.

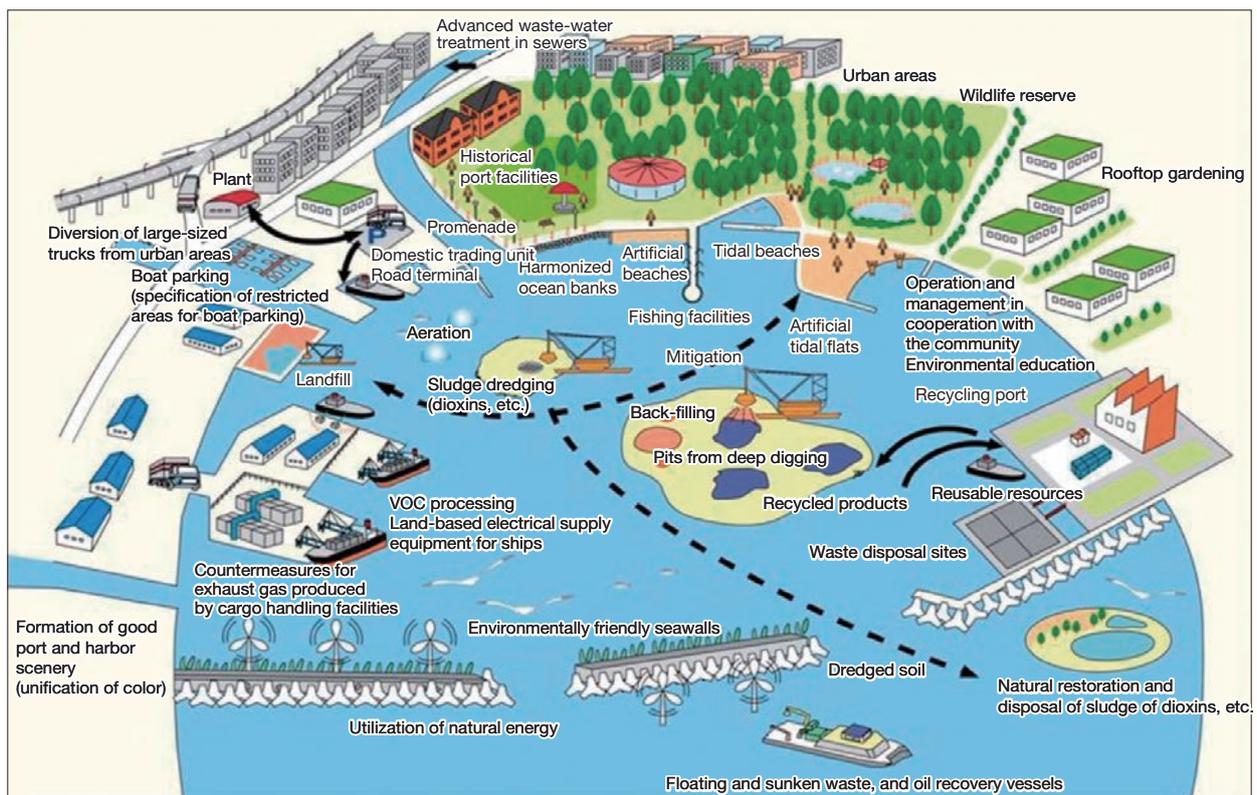
We are also providing support for the processing of neglected and stranded vessels and the removal of slime that abnormally accumulates in sea areas in order to secure the functions of coastal protection facilities, conserve the coastal environment, and facilitate the proper use of coastal areas.

4 Greening Port and Harbor Administration

(1) Basic Direction of Future Port and Harbor Environment Policies

In order for ports and harbors in Japan to uphold their position as grounds for logistics, industry and living, and sustain continual growth, they must recover as much degraded or lost nature as they can, and incorporate environmental conservation in various port functions. For this reason, we are working towards greening port administration, which involves the two parts of port and harbor development and utilization, and conservation, revival, and creation of environments in to one consolidated subject.

Figure II-8-3-2 Greening Port Administration



Source) MLIT

(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 the recommendations provided in October 2016 by the Commission for Athlete-/Spectator-Friendly Road Development consisting scholars and experts in athletic competition, we are also endeavoring to green roads and initiatives for comprehensive measures to keep road surface temperature from rising in preparation for the Tokyo Olympic and Paralympic games in 2020.

Figure II-8-3-3

Example of Greening Roads (Chiyo-da-ku, Tokyo)



Source) MLIT

Section 4 Maintenance or Restoration of Sound Water Cycle

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

In recent years, many issues and risks have threatened water resources in Japan, including the risk of widespread, long-term suspension of the water supply due to the vulnerability of the water infrastructure to large-scale-disasters and the like, and because of accidents due to aging water-related infrastructure, as well as the risk of water shortages due to climate change caused by global warming.

Given these circumstances, in March 2015, the Water Resource Development Subcommittee of the National Land Development Council recommended efforts toward shifting the focus of water resource policy from demand-driven water resource development to a stable supply of water based on risk management.

The Kumamoto Earthquake that struck in April 2016 caused substantial damage to water infrastructure, and water shortages from June to September resulted in widespread restrictions on intaking water. This reminded us of the problems and risks that stand in the way of a stable water supply.

In light of these circumstances and our renewed understanding, the six Basic Plans for Water Resource Development for seven river systems are required to review. In December 2016, the Minister of the MLIT requested opinions about the way of reviewing the Plans concerning the stable supply of water based on risk management, from the National Land Development Council. The Investigation Planning Committee of the Water Resource Development Subcommittee of has been discussing the matter since January 2017.

Column Dry Spells along the Tonegawa River System in 2016 and Countermeasures to the Water Shortage

In 2016, droughts in extensive areas throughout Japan caused water restrictions to be imposed in a variety of regions, including Kanto and Shikoku. The Tonegawa River system, in particular, began to see a decline in the flow of its rivers from after May, due to the smallest amount of snowfall ever recorded in its upper reaches, the melting of snow a month earlier than in usual years, and a decline in the amount of rainfall to roughly 48% (total rainfall 56 mm) of an average year.

In response to this situation, the eight dams upstream of the Tonegawa River (the Yagisawa, Naramata, Fujiwara, Aimata, Sonohara, Kusaki, and Shimokubo dams, along with the Watarase reservoir) managed by MLIT's Kanto Regional Development Bureau and the Japan Water Agency, acting as important water reserves for the Tokyo Metropolitan area, were replenished daily of the amount of water they lacked, so as to prevent disruption of the water supply or other adverse circumstances.

However, as there was no concentrated rainfall during this time, the water supply at each of the dams soon dropped to the lowest level in the twenty-five years since all eight dams were put into operation. Out of concern that the water shortage may have serious impacts on the Tokyo metropolitan area, the MLIT Drought Countermeasure Headquarters (headed by: Keiichi Ishii, Minister of MLIT) was established on June 14, and held a conference.

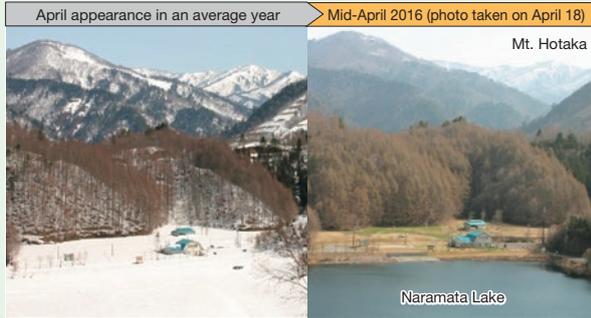
Minister Ishii issued instructions to "ensure smooth coordination among water consumers through a council for addressing the water shortage along the Tonegawa River system," "share and disseminate information on the water shortage situation and call on people's cooperation in saving water, to ensure effective utilization of limited water resources," and "make preparations so that relevant departments and bureaus can take the necessary measures in case the impacts of the water shortage expand further."

On June 16, the MLIT decided to impose a water restriction (10%) that would be the first restriction since 1987 to be imposed on the Tonegawa River during the month of June. In response to this, a call for water conservation was put out along the Tonegawa watershed by disseminating information via various media. Additionally, the monitoring and control system of the Tone-ozeki Dam was strengthened, and fine-tuned operational adjustments were made day and night, all days of the week, in an effort to save as much water as possible. Furthermore, in preparation for the worst-case scenario, in which all eight dams would have run dry, preliminary discussions were held with the electric company that owns the dam's water capacity exclusively for power generation, looking to obtain its cooperation in discharging water from the power generation capacity in case of emergency.

Additionally, in anticipation of a water shortage in summer due to the small snowfall and warm winter trend, water was intermittently conveyed from the Tonegawa River to the Edogawa River at the Kitachiba headrace channel located downstream of the Tonegawa River, while closely monitoring the flow of the river since February, as a measure to minimize water supply from the eight dams and preserve their reserves of water. It is thought the necessity of imposing a water restriction was able to be delayed by eight days, and that a 20% water restriction was averted, compared to if the water conveyance measure had not been taken.

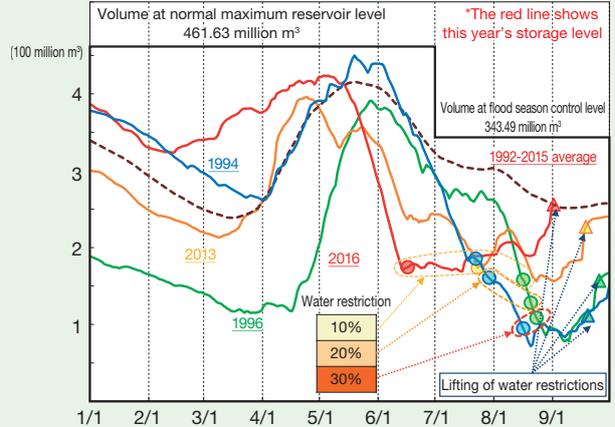
While employing these initiatives against water shortage, there was fortunately a concentrated amount of rainfall, so the water restriction was fully lifted on September 2, and the water shortage was resolved. In the end, this 2016 water shortage did not develop into a serious situation that called for water supplies to be cut off, but it provided a renewed awareness of the importance of our limited water resources, and the need to make continued efforts ensuring effective utilization.

Melting of snow in the upper reaches of the Tonegawa River system is earlier than usual years (near Naramata Dam)



Source) Japan Water Agency

Water storage level at the eight dams upstream of the Tonegawa River in years of major water shortage



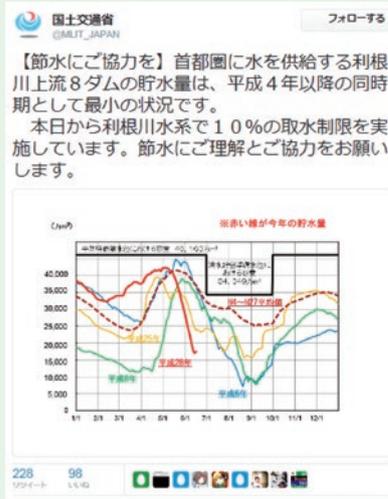
Source) MLIT

Minister Ishii issuing instructions at the MLIT Drought Countermeasure Headquarters



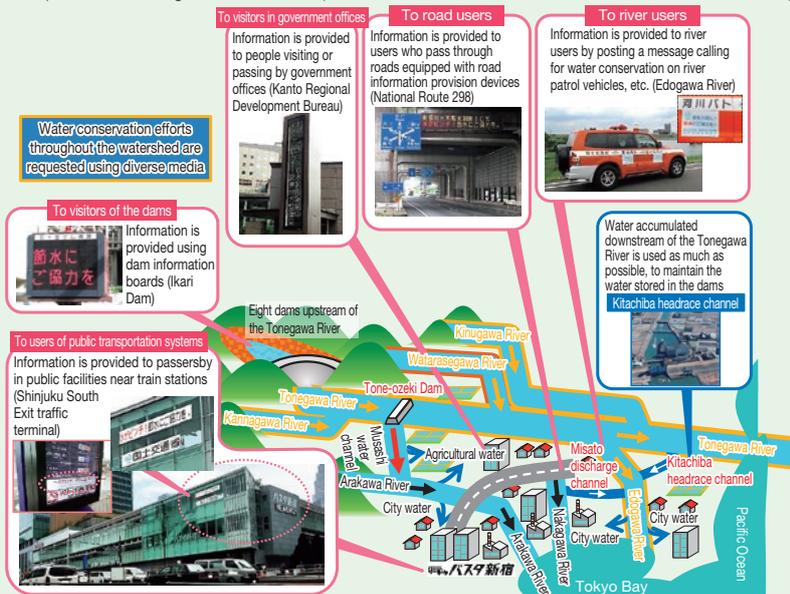
Source) MLIT

Notice of imposing a 10% water restriction along the Tonegawa River system (twitter)



Source) MLIT

Examples of MLIT's drought countermeasures (information transmission, utilization of the Kitachiba headrace channel)



Source) MLIT

Poster calling for water-saving efforts put up in subway stations, etc.



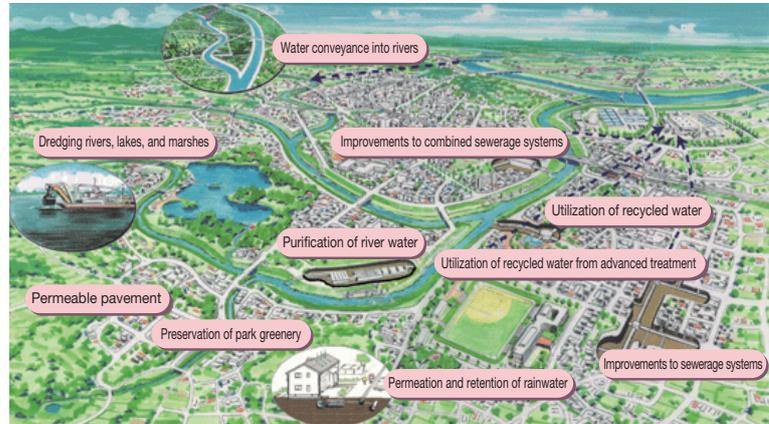
Source) MLIT

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

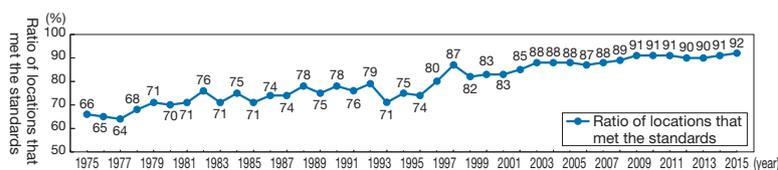
Water quality surveys are vital in conserving and maintaining a favorable water environment. In 2015, surveys were done at 1,079 locations on 109 water systems of Class A rivers.

The MLIT is creating water quality survey maps and conducting surveys of aquatic organisms in cooperation with citizens. As a result of surveys being conducted on Class A rivers in cooperation with the local residents—which were based on indices such as the amount of garbage and on odor—in 2015 approximately 24% (73 locations/303 locations) were judged to be “rivers that look clean enough for swimming.”

In 2015, there were 1,120 water quality accidents in Class A rivers due to spillage of oil and chemical substances, a decline of 118 from the previous year. In terms of water pollution prevention, Water Pollution Prevention Liaison Councils composed of river administrators and related institutions have been put in place for all 109 waterways, and they are working on prompt information communication for incidents of water quality accidents as well as damage prevention by building oil fences.

- For Class A Rivers (including lakes and coastal areas), the proportion of survey sites that met the environmental standards for BOD (biochemical oxygen demand) or COD (chemical oxygen demand) value was 92% in 2015.
- For environmental standard items relating to the protection of human health (27 items such as arsenic), the proportion of survey sites that met the environmental standards was approximately 99%, with most sites meeting the standards.

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



Source) MLIT

(3) Improving the Water Environment of Enclosed Coastal Seas

Regarding the enclosed coastal seas of the Tokyo Bay, Ise Bay, Osaka Bay, and the Seto Inland Sea, because of the polluting load draining from land and deterioration of purification capacity in ocean areas due to the loss of tidal flats and

seaweed forests, the fishing industry has suffered damages from the occurrence of red and blue tides. In addition to this, there have been occurrences of environmental deterioration, as well as navigational obstacles to vessels, due to drifting debris and oil.

To resolve the current state, we advance activities to revive beautiful oceans by (1) sediment dredging, sand capping, and back-filling pits from mining to improve the substratum, (2) creating habitats for organisms by reviving tidal flats and seaweed forests and disseminating buildings that can coexist with nature, (3) removing floating waste and oils by using sea environment maintenance ships, (4) reducing the amount of pollutants released into the ocean by improving sewage treatment facilities, and (5) developing a system to get various entities to improve the environment in collaboration with one another.

(4) Stimulating Sewage Maintenance to Improve the Water Environment

We will appropriately formulate and review the comprehensive basin-wide planning of sewage systems, and promote advanced treatment to remove nitrogen and phosphates that contribute to the eutrophication of enclosed bodies of water. In addition, we are working for early advancement in improving water quality and stratified advanced water treatment by partially renovating equipment and facilities in treatment plants that have not yet reached their scheduled renewal period.

As for the combined sewerage system, we plan to complete implementation of measures by the end of FY2023 through controlling the amount of water and the frequency at which untreated water is released in to streams during heavy rains.

3 Cultivating Water and Using It Efficiently

(1) Stable Supply of Water Resources

In order to secure stability in the utilization of water, there must be a variety of policies to meet the differing situations in communities, from the standpoints of both supply and demand. Specifically, in the case of demand, we are promoting measures to strengthen the recovery and reuse of water and increase awareness about conserving water. For supply, we are promoting measures to build and maintain facilities to supply water, including water resource development facilities such as dams, implementing countermeasures for aging facilities, and developing crisis management measures, etc. In addition to promoting sustainable conservation and use of groundwater, as well as the use of rainwater and recycled water, based on the “Special Measures for Water Source Area Act,” work is being done to develop the living environment of water source areas and industrial infrastructures, along with prevention of water pollution of the dam reservoirs.

There is concern that climate change caused by global warming will lead to more frequent, severe droughts that last longer and give rise to more drought-related damage. For this reason, the MLIT will promote measures to prevent/mitigate the damage caused by drought, such as strategies to minimize damage at the time of critical droughts.

(2) Efficient Use of Water Resources

(i) Initiatives towards expanding the utilization of recycled water derived from sewage

Stable amounts of recycled water can be secured and is a valuable water resource in urban areas. Of all the treated sewage, approximately 1.3% undergoes treatment according to purpose, and recycled water is used in streams, sustaining water levels of rivers and the sanitation of toilets. We aim to further expand the utilization of recycled water.

(ii) Promoting the utilization of rain water

In order to efficiently utilize water resources, initiatives are being promoted to treat and use rainwater and wastewater from facilities for sanitation of toilets and sprinklers. There are approximately 2,100 facilities utilizing treated water as of the end of FY2015, and they use over 8.3 million m³ a year. The “Law for Promoting the Use of Rainwater (2014 Laws, Issue 17)” was enacted on May 1, 2014, and in March 2015 the “Basic Policy for the Promotion of Rainwater Use” and the “Goal for Establishing a Facility for the Use of One’s Own Rainwater in Cases Where the Building is Equipped by the National Government or an Independent Administrative Agency” were established in order to promote the use of rainwater and thereby facilitate the effective use of water resources. Additionally, the government will formulate and enact comprehensive measures for the purpose of contributing to the containment of concentrated drain of rainwater to the sewers and waterways.

(3) Securing Safe and High Quality Water

In an effort to provide safe and high-quality tap water, we have worked to preserve water quality in public water areas, which serve as our source for tap water, by ensuring river flow rates required for river environments and for water use by relevant river users, by enhancing monitoring systems through coordination of river administrators, waterworks operators and other relevant organizations to prepare for unforeseeable incidents such as water quality degradation, and by implementing household wastewater measures based on the appropriate division of burdens between sewage systems, community wastewater facilities and septic tanks.

(4) Promoting Measures Concerning the Permeation of Rainwater

Due to the spread of impervious areas in recent years by urban development in basins, more rainwater flows into rivers in short periods of time instead of being absorbed into the ground. In addition to reducing flood damage from heavy rains by absorbing as much rainwater as possible into the ground, the improvement of rainwater storage infiltration facilities are being promoted through tax measures, for cultivating groundwater, contributing to the revival of springs, and building a sound water cycle system.

(5) Advancing the Conservation and Use of Sustainable Groundwater

It takes an extremely long time to recover from damage caused to groundwater, such as in the form of groundwater pollution or saline contamination. In particular, ground subsidence is an irreversible phenomenon. For this reason, we will engage in groundwater management in accordance with local conditions in order to prevent groundwater damage, conserve the ecosystem, protect local groundwater sources, and advance the conservation and use of sustainable groundwater to be used as a water resource.

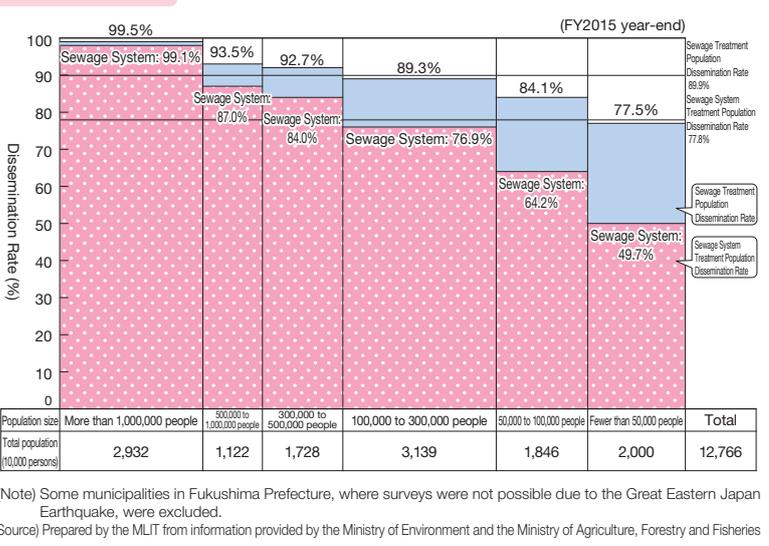
4 Realizing Amenity by Promoting Improvements to Sanitary Drainage

Sewage is the indispensable social infrastructure for the development of healthy cities, treating waste, and preventing floods. In recent years, sewage systems have been asked to take on new roles in helping to form a low-carbon, recycling-oriented society and in maintaining or restoring a healthy water cycle.

(1) Dissemination of Sewage Processing with Sanitary Drainage

Although the dissemination of sewage treatment plants reached around 90% (with the dissemination of sewage systems at around 78%) of Japan as of the end of FY2014 (total of 46 prefectures, excluding some municipalities in Fukushima due to the effects from the Great Eastern Japan Earthquake), there is a large gap between regions. In particular, the dissemination rate of sewage treatment plants in small to medium communities with populations of less than 50,000 people remain low, only reaching a ratio of approximately 78% (dissemination rate of sewage systems approximately 50%). Focusing on improvement in areas with high population density, the advancement of efficient development in accordance with 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.

Figure II-8-4-3 Sewage Treatment Population Dissemination Rate by Size of City (FY2015 year-end)



(i) Initiatives towards the septic system overview in roughly 10 years

In regards to the maintenance of sewage treatment facilities, individual disposal by using septic tanks are economical in areas where households are widely distributed throughout a region, while the collective disposal with sewerage systems and drainage facilities for agricultural communities become more economical as the population density rises. For this reason, each prefecture has established a “Prefectural Plan,” a compiled maintenance plan over sewerage treatment which reflects considerations over regional characteristics such as the economic efficiency and importance of protecting water quality. Currently, in light of the population decline of recent years, MLIT is promoting an immediate reexamination of prefectural schemes and the creation of mid-term (action plan)/long-term equipping plans, in order to work towards a septic system overview in roughly 10 years. In addition, efficient means of maintenance are also being actively promoted through the implementation of cooperative schemes between other waste water treatment facilities such as cross-jurisdictional wastewater treatment.

In addition, efficient means of maintenance are also being actively promoted through the implementation of cooperative schemes between other waste water treatment facilities such as cross-jurisdictional wastewater treatment.

(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 FY2015, a social experiment was conducted in 14 municipalities, and 6 technologies—such as the “Small-Scale Waste-Water Treatment Facility (contact oxidation method)” —were determined to be effective, leading to a user’s guide being put together for the use of these technologies. The verification/evaluation of the other technologies is in progress to make nationwide usage possible.

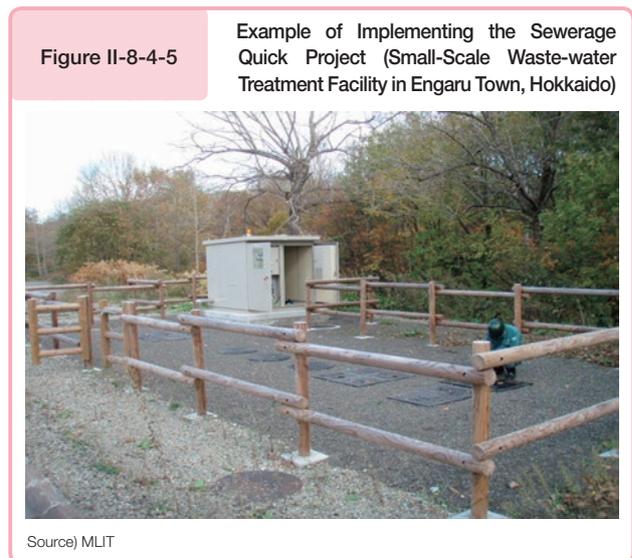
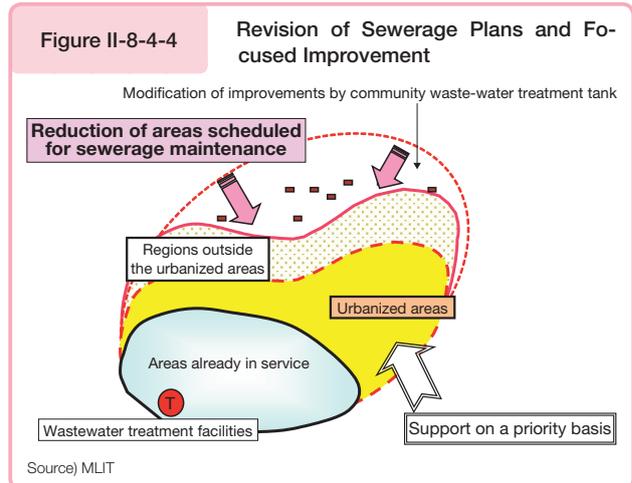
(2) Attaining Durability in Sewage Projects

(i) Proper stock management

Sewage systems possess enormous amounts of stock consisting of approximately 470,000 kilometers of pipes and conduits and approximately 2,200 terminal treatment stations (as of the end of FY2015).

As these systems were rapidly developed during and after the period of high economic growth, aging facilities are expected to rapidly increase in number in the future. Although in FY2015, mainly small scale issues were arising, road collapses have occurred in 3,300 places due to corrosion caused by hydrogen sulfide and aging of the conduit facilities. Because the sewage system is an important social infrastructure which supports the safe and secure social and economic activities of urban living and provides a lifeline that is difficult to replace with alternative means, there is a necessity to sustain the required functions by conducting efficient, planned measures to deal with aging facilities through the introduction of stock management that practices preventative maintenance, while at the same time considering the introduction of comprehensive private consignment and efficient pipe inspection methods.

In May 2015, the Sewerage Act was amended and standards for maintaining and repairing sewage systems were established. In response, it was decided that drainage facilities at significant risk of corrosion would be inspected at an



appropriate frequency of at least once every five years and initiatives to ensure sustainable sewage functions are being undertaken. Under these amendments, a council meeting program for engaging in necessary discussions on widening the geographic scope of sewage works and forming partnerships among the administrators of sewage works shall be established and the provision of support to local governments will otherwise be reinforced to ensure the durability of sewerage projects.

(ii) Efforts to expand sewage systems

Amid concern over the vulnerability of sewage system management systems due to factors such as the decrease of skilled workers in municipalities throughout Japan, we are promoting various efforts to contribute to efficient business practices, such as merging treatment areas from multiple municipalities and treating sewage sludge together with liquid effluent. To further promote widespread cooperation between multiple sewage system administrators, we established a council meeting program in the Sewerage Act, which was amended in May 2015, and have undertaken other efforts to ensure the sustainability of sewage operations.

(iii) Promoting financial health

In the operation of sewerage projects, it is a fundamental rule to cover costs (excluding portions covered by public expense) for treating waste water with money acquired from usage fees, and although financial health has been improving overall in recent years, the business environment is expected to grow more stringent in the future due to the impending decrease in income from user fees due to the reduced population and other factors, the increase of repair and update expenses due to deterioration of facilities, and other factors. To address these issues, we are pushing initiatives for the restoration of financial health in sewage business management by collaborating with the Japan Sewerage Works Association to organize ideas for the future state of user fees for collecting the portion of expenses required for asset maintenance in advance, to prepare for future increases in repair and update expenses.

Column Initiatives for Widening the Scope of the Sewerage System under a Council System

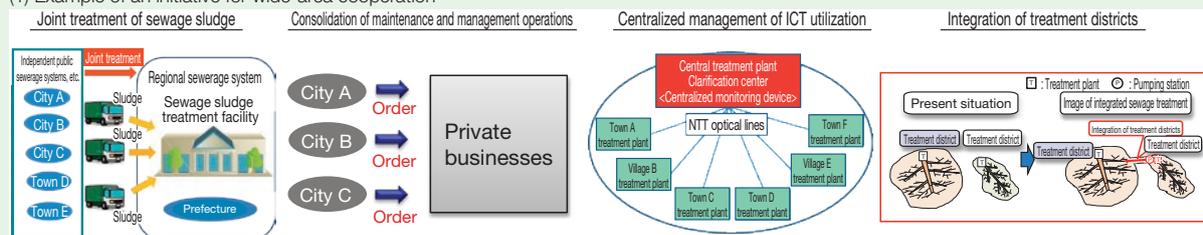
Under the Sewerage Act that was amended in May 2015 (Article 31-4), a council system was established to provide a forum for discussions toward wide-area cooperation by multiple sewerage administrators.

In August 2016, sewerage administrators of Tondabayashi City, Taishi Town, Kanan Town, and Chihaya-akasaka Village in Osaka Prefecture established, for the first time in Japan, a legal council based on the amended Sewerage Act and are currently discussing measures for widening the scope of their clerical work from fiscal 2018.

In November 2016, the second council was established by Saitama Prefecture, municipalities in the prefecture, and the Saitama Sewerage Systems Agency, to discuss their joint engagement in business administration, disaster prevention, and sludge treatment.

For the sustainable implementation of sewerage works, it will be necessary to expand the initiatives for wide-area cooperation nationwide, such as by utilizing the council system. Based on this awareness, the MLIT will also play its part in supporting these initiatives.

(1) Example of an initiative for wide-area cooperation



Source) MLIT



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

Deliberations for the introduction of public facilities governance method for sewerage projects, and efforts for making further use of private sector consignment^{Note 1} for the maintenance management of sewage treatment plants, are both moving forward. Based on demands from local public organizations, the Japan Sewage Works Agency provides technical support for constructing sewage facilities, as well as for optimizing their operation and maintenance, and cultivating technical experts at local public organizations, while developing new technology.

(3) Revitalizing Communities through Sewage

The proper treatment of wastewater through improvements in sewage, and the preservation or creation of healthy water environments, stimulates promotion of tourism and industry. In addition, by creating river fronts using recycled water from advanced wastewater treatment, stimulating regional activities through the operation and management of water amenity spaces by citizens, utilizing space above wastewater treatment facilities, transferring sewage heat to be used as district heating or for melting snow, utilizing sewage sludge as fertilizer, utilizing bio-gas as energy and efficiently using sewage resources, sewage contributes to regional vitalization in numerous facets.

(4) Promoting Environmental Education in the Field of Sewage

Working groups, consisting of elementary school teachers and sewage administrator representatives, created teacher edition textbooks that were well suited for classroom use for sewage education. In order for teachers to freely make use of these teaching materials regarding sewers, they are being offered through the “Sewer Systems, the Path of Circulation Environmental Education Portal Site^{Note 2}.” Additionally, subsidies are granted by Sewer Systems: the Path of Circulation Environmental Education Assistance Council Meeting Program 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 Sewerage Environmental Education for Elementary Schools in Hamamatsu City, Shizuoka



Source) MLIT

Note 1 A method of facility management that reflects original ideas of private contractors by consigning details of operation methods in order to optimize operation while charging the responsibility to secure a specified level of capabilities such as sustaining the quality of released water to optimize operation.

Note 2 “The Path of Recycling Sewerage Environmental Education Portal Site” <http://www.jswa.jp/kankyo-kyoiku/index.html>

Section 5 Protecting the Marine Environment

(1) Control Policies over Large Scale Oil Pollution

In order to eliminate the substandard vessels (a major factor for large scale oil pollution), Japan actively participates in international initiatives, such as the formulation of the international shipping database (EQUASIS), while also strengthening Port State Control (PSC), which ensures that vessels meet standards, by conducting on-site inspection of vessels that enter Japanese ports. In addition, the scheme under which an IMO audit team audits whether a flag state's government is fulfilling the duties of monitoring and supervising its own ships was approved for establishment as a voluntary scheme at the IMO General Assembly in 2005, based on a proposal from the Japanese government. The audit scheme became mandatory in January 2016. The Japanese government introduced a quality management system based on ISO 9001, and established a system on international level for implementing conventions.

In other fronts, as countermeasures for occurrences of large scale oil pollution in the Sea of Japan, Japan is working on strengthening international cooperation and collaborative systems by drawing up plans such as the "NOWPAP Regional Oil and HNS Spill Contingency Plan" through the "Northwest Pacific Action Plan (NOWPAP)," the framework for joined efforts between Japan, China, Korea and Russia for protecting the marine environment. As for large-scale oil spillages that occur in the sea around Japan, we have formulated the Plan for Preventing and Removing Discharge Oil, etc., which sets out prevention and removal regulations and the like, and have established measures for promptly and reliably responding through the utilization of large trailing suction hopper dredgers.

The MARPOL Convention^{Note} imposes controls on the discharge of oil and garbage by vessels. In Japan, taxation and other forms of support for the development of facilities to receive waste oil or garbage generated inside vessels are being provided and the (draft) "Guidelines for Reception Facilities of Ship-generated Garbage in Ports and Harbors" have been formulated to ensure that oil and garbage are appropriately received in ports and harbors.

(2) Control Measures on Air Pollution from Ships

Sulfur oxide (SOx) in the exhaust gas of ships can cause respiratory illnesses and otherwise negatively affect the human body. The International Maritime Organization (IMO) regulates sulfur concentrations in fuel oil used in ships based on the MARPOL Convention, which sets out standard values for each sea area in which ships navigate. Presently, the convention stipulates a maximum sulfur concentration of 0.1% in certain sea areas subject to strict controls (special sea areas) and a maximum concentration of 3.5% in all other sea areas (general sea areas), which will be 0.5% as of January 1, 2020. Regarding the beginning of the strengthening of the controls in 2020, the convention includes a stipulation for review that allows the IMO to determine the availability of compliant fuel oil and, if it deems that compliance by vessels by January 1, 2020 is impossible, to change the effective date to January 1, 2025. At the 70th session of the IMO Marine Environment Protection Committee (MEPC70) held in October 2016, the decision was made to put the change into effect in 2020 as stipulated. Furthermore, at the fourth session of the IMO Sub-Committee on Pollution Prevention and Response (PPR4) held in January 2017, matters such as the creation of controlling mechanisms to prevent the unauthorized use of non-compliant fuel oil along with international standards on the quality of compliant oil were reviewed, and the decision was made to continue to promote specific discussions in pursuit of worldwide observance of these regulations.

In addition to participating in IMO discussions pertaining to SOx emission reductions, Japan has engaged in other initiatives with a view to promoting the use of natural gas-fueled ships that can significantly reduce the amount of SOx emission, such as by formulating safety standards and codifying them into international rules and providing construction support.

Note International Convention for the Prevention of Pollution from Ships.

(3) Responding to Issues of Invasive Aquatic Species Carried by Ships

It is pointed out that the transfer of aquatic species via ships' ballast water^{Note 1} and ships' biofouling would 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 "the 2011 Guidelines for the Control and Management of Ships' biofouling to minimize the transfer of invasive aquatic species in 2011" were adopted at the IMO. With the necessity to take action to prevent the disruption to the ecosystem caused by the harmful ballast water from international shipping and to fulfill the international responsibility under the international cooperation, the Government of Japan proposed the law to implement the Ballast Water Management Convention (amendments Act on Prevention of Maritime Pollution and Maritime Disaster) to the 186th ordinary session of the Diet, and it passed with an unanimous vote^{Note 2}. In light of these developments, Japan ratified the convention in October 2014. In an effort to put this convention into force as soon as possible, Japan called on countries that had not yet ratified it to do so as soon as possible. As a result, the requirements for putting the convention into force were fulfilled on September 8, 2016, and the convention entered into force on September 8, 2017. Japan will continue to participate actively in discussions of the International Maritime Organization (IMO) regarding the convention and guidelines toward the smooth implementation of the convention.

Column

Educational Activities on Marine Conservation

Under the slogan, "Preserving Blue Sea for the Future," the Japan Coast Guard engages in various instructional and educational activities for conservation of the marine environment. As example, it holds marine conservation lectures that aim to raise awareness of legal compliance in the maritime and fisheries sectors, sponsors coastal cleanup activities, and holds environmental lessons for the general public. A couple of major activities are introduced below.

(1) "Preserving Blue Sea for the Future" Japan Coast Guard drawing competition

The Japan Coast Guard hosts an annual drawing contest with the aim to spread the concept of marine conservation among children who will inherit the future.

The 17th competition was held in 2016, with 33,298 entries collected from primary and junior high school students throughout Japan.

As a result of a rigid screening process, one entry was selected for the special award (MLIT Minister's Award) and three entries were selected for the Award of the Director-General of the Japan Coast Guard. On December 21, 2016, an award ceremony for the special award (MLIT Minister's Award) was held in the MLIT Minister's Office, and Minister Keiichi Ishii personally presented an award certificate to the winner of the award, Ms. Mao Suzuki, a third-grade student at Jutoku Elementary School in Fukuyama City, Hiroshima Prefecture.

The winning entry is being displayed in various places and used in PR activities to widely spread the concept of marine conservation.

Note 1 Sea water loaded as weight to balance the ship when it carries no cargo.

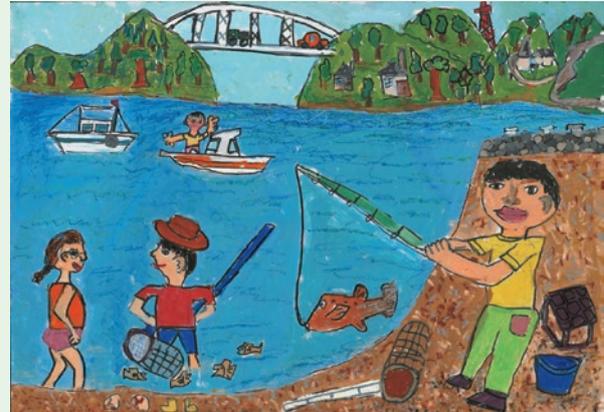
Note 2 Also, a proposal to obtain the approval for conclusion of the Convention was submitted to the 186th ordinary session of the Diet, and the proposal passed with unanimous vote.

Award presented by MLIT Minister Ishii



Source) MLIT

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



Source) MLIT

(2) A first achievement in the Ocean and Japan Project

The Japan Coast Guard designates June of every year as marine conservation promotion month, and carries out various activities for marine conservation. In 2016, it participated in the Ocean and Japan Project, implemented in 2015, as a new initiative to be pursued during the month's promotion.

In the coastal clean-up program, which was part of the new initiative, the idea of using garbage bags with the same design throughout Japan and creating a sense of unity resulted in a collection and sorting of some 3,600 bags of rubbish (the target was 1,000 bags) by 5,392 participants in thirty-five coastal regions within twenty-two prefectures. The program also promoted understanding of the impacts that rubbish in our immediate surroundings have on the environment.

Marine conservation activities will continue to be promoted while strengthening cooperation with the Ocean and Japan Project, to provide more opportunities for participation by many people, and to further disseminate the concept of marine conservation.

Marine conservation program for the general public



Source) MLIT

Section 6 Improving Living Environments by Preventing Atmospheric and Noise Pollution

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 vehicles, we have introduced the Worldwide Harmonized Heavy-Duty Certification (WHDC) for diesel heavy duty trucks and buses, reinforced regulatory values for nitrogen oxides, introduced exhaust regulations for off-cycle emissions, and mandated that vehicles be equipped with advanced on-board diagnostic systems. In addition, for two-wheeled motor vehicles, we have reinforced regulatory values for exhaust, introduced fuel evaporation gas measures and mandated that vehicles be equipped with advanced on-board diagnostic systems, and began to apply these measures in October 2016. Furthermore, in October 2016, we promulgated amendments of standards regarding the introduction of the Worldwide Harmonized Light Vehicles Test Procedure (WLTP), a global harmonized standard for testing the emissions and fuel efficiency of passenger vehicles and light duty vehicles. The amendments will begin applying sequentially from October 2018.

Regarding the Volkswagen emissions scandal that came to light in September 2015, we partnered with the Ministry of the Environment to host an expert review meeting to revise inspection methods of diesel passenger vehicles and others. In April 2016, the expert review meeting announced an intermediate summary. They recommended to introduce on-road driving tests to detect illegal software and to reduce real driving emissions and recommended to formulate guidelines regarding operating ranges of engine control required for the protection of engines and other parts genuinely (temperature ranges for control when temperatures are low, etc.). Discussions at these review meetings regarding these recommendations have continued while accounting for regulatory trends in Europe and the like, and the final summary was set to occur in the spring of 2017.

We are also implementing a program to certify low-exhaust gas vehicles that emit harmful substances from their exhaust pipes at levels far below regulatory values. These vehicles will be certified according to the level of their reduction of exhaust gas in an effort to help consumers identify and select vehicles that perform exceptionally well in terms of reducing emissions.

Exhaust gas measures in large cities, such as Tokyo, Nagoya or Osaka, such as those based on the Amendment Act on the Reduction of the Total Amount of Nitrogen Dioxide and Particulate Matters Originating from Automobiles in Designated Areas (Automobile NOx PM Law) are being implemented.

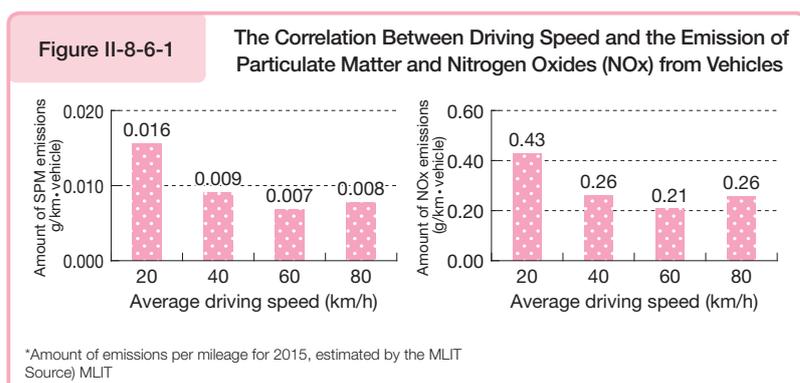
(ii) Reinforcing noise regulations

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

(2) Promotion of Traffic Flow Measures

(i) Countermeasures for air pollution

The volume of particulate matter (PM) and nitrogen oxide (NOx) emissions from automobiles is increasing because of the increasing frequency of stop-and-go traffic and the reduced travel speed. For this reason, we are advancing the shift through traffic in urban areas to bypasses as a way to improve the roadside environment.



(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 Syndrome and Soil Contamination**(1) Countermeasures for Sick Building Syndrome**

Sick building syndrome describes a situation where materials used in the interior of a building disperses chemical substances which are hazardous to health. Japan is taking measures such as regulations on building materials and ventilation in the “Building Standard Act,” and formulating performance labelling systems based on the “Housing Quality Assurance

Act.”

In the maintenance of government facilities, Japan has implemented restrictions over the usage of building materials containing chemical substances, as well as measuring the indoor concentration of airborne chemical contaminants after completing construction.

(2) Countermeasures against Issues Related to Dioxins

Studies over the water and earth quality of class A river systems throughout Japan are being conducted for dioxins specified in the “Act on Special Measures concerning Countermeasures against Dioxins.” In FY2015, the sediment of all locations and the water quality of 98% (220 locations out of 225) of the locations satisfied environmental standards.

For rivers, ports, and harbors, we have implemented dioxin countermeasures as required according to the Manual on Measures to Deal with Dioxins at the Bottom of Lakes (proposed), which was revised in April 2008, and the Technical Guide on Measures to Deal with Dioxins at the Bottom of Ports and Harbors (revised edition). Support for programs involving pollution-prevention measures is being provided for rivers, ports, and harbors where dioxins exceeding standards have been detected in samples taken from the bottom of these locations.

(3) Measures against Asbestos

Issues concerning asbestos are life-threatening. As buildings that were built in the 1970s—when mass amounts of asbestos was imported to Japan—each their dismantling period, it is important to implement pre-emptive measures to prevent injuries from occurring.

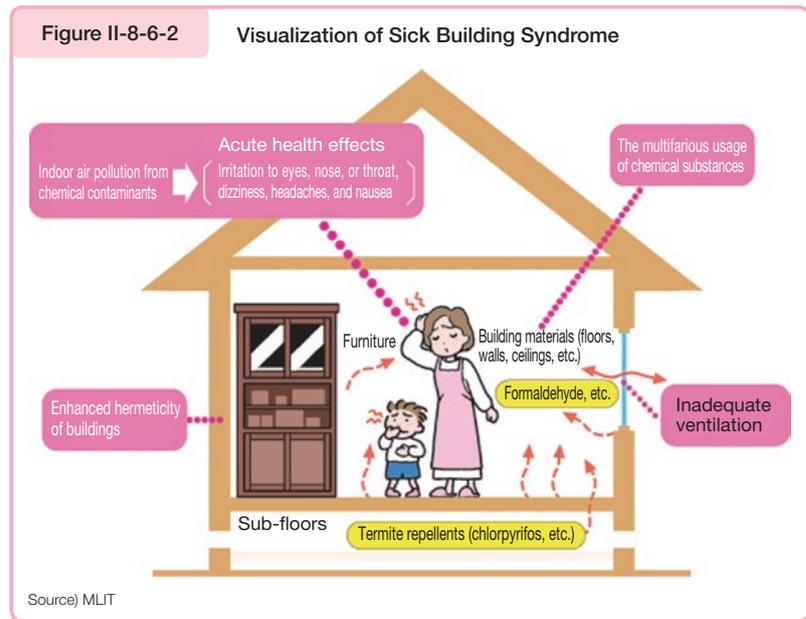
In order to accurately and efficiently determine the actual use of asbestos building materials, investigators are being trained based on the system for investigators of structures containing asbestos building materials, which was created in 2013.

Also, based on the “Building Standards Law,” the removal of sprayed asbestos when renovating a building is required, auxiliary system of comprehensive grants for social capital development is in place to promote the asbestos removal in existing buildings and follow ups are being done for the situation of the removal and anti-scattering of asbestos in the existing facilities under the jurisdiction of national ministries and agencies.

Furthermore, Japan is promoting the dissemination of information in efforts such as compiling data bases on referential cost estimates for removal work of spray-applied asbestos insulation, documents useful for identifying building materials containing asbestos (Visually identifiable building materials containing asbestos) and information on such materials, as well as pamphlets for measures related to asbestos in buildings.

6 Environmental Measures in Construction

The gas emissions measures (NO_x, 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

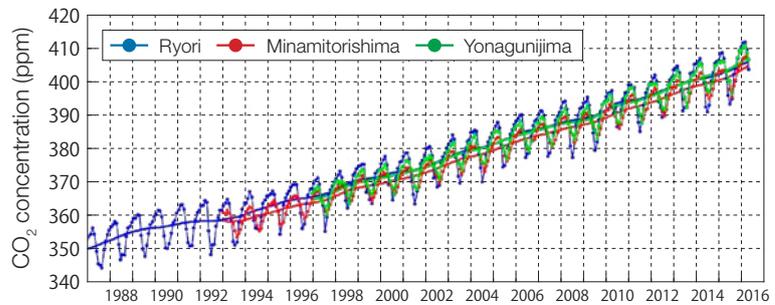
(1) Observing and Monitoring Climate Change

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. CO₂ concentrations in the marine atmosphere, as well as those in the sea surface water are being observed in the western North Pacific by research vessels. GHGs in the middle-troposphere in the western North Pacific is also being observed. Furthermore, JMA conducts observation of solar and infrared radiation at five stations in Japan in order to monitor climate changes and reduce uncertainty in global warming projections.

In addition, JMA observes sea level rise accompanied by global warming, and publish information on the long-term change in sea levels around Japanese coasts.

The JMA also produced the Japan 55-year Reanalysis (JRA-55), a historical global atmospheric data with homogeneity in space and time, and is using it to monitor climate change and improve the accuracy of seasonal forecasting.

Moreover, the “Climate Change Monitoring Reports” and the “Report on Climate Change and Extreme Weather” (in Japanese) are being compiled based on the results of observation, and future projections of climate change, extreme weather events and global warming are being disclosed to the public. Serving as the World Data Centre for Greenhouse Gases (WDCGG) of the World Meteorological Organization (WMO), the JMA also archives and provides observation data on greenhouse gases around the world.

Figure II-8-7-1 Time-series of CO₂ Concentration in Japan

Source) Japan Meteorological Agency

(2) Observing and Monitoring Extreme Weather Events

The Japan Meteorological Agency (JMA) monitors unusual weather events occurring in Japan and elsewhere in the world and summarizes and releases periodic and extraordinary information concerning weather disasters and areas where extreme high and low temperatures, heavy and light rainfalls, and other such events have been observed. Also, when extreme weather conditions are occurring that significantly affect the public, summary reports are given covering the information regarding features, factors and the outlook.

Furthermore, as a Regional Climate Center of the World Meteorological Organization (WMO), JMA provides information such as monitoring and analysis of extreme weather as well as technical assistance through training and dispatch of experts to National Meteorological and Hydrological Services in Asian countries to support the climate service in the Asia Pacific region.

(3) Observing and Monitoring using Geostationary Meteorological Satellites

The JMA continues to operate the geostationary meteorological satellite Himawari-8, and launched the Himawari-9 on November 2, 2016. It began backup operation in March 2017. With the launches of Himawari-8 and Himawari-9, the JMA has established a two-satellite system that is crucial for continuous and consistent observation. By using these satellites, in addition to improving the disaster prevention function against such things like tropical cyclones and torrential rainfalls, Japan is leading the world in strengthening its monitoring function of the Earth's environment, including global warming.

(4) Observing and Monitoring the Ocean

The ocean is greatly impacting the earth's climate by storing a much larger amount of heat than the atmosphere, and it is also easing the progression of global warming by absorbing CO₂ discharged by human economic activity. In order to monitor global warming, an accurate grasp of oceanic conditions is essential.

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

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

The Japan Coast Guard uses autonomous ocean vehicle (AOV), drift buoys and High Frequency radar to constantly monitor and fully understand the state of ocean around Japan, and publishes their observation results. In addition, the Japan Oceanographic Data Center collects and manages data obtained by Japanese marine research organizations, and discloses it to relevant institutions and to the public.

(5) Observing and Monitoring the Ozone Layer

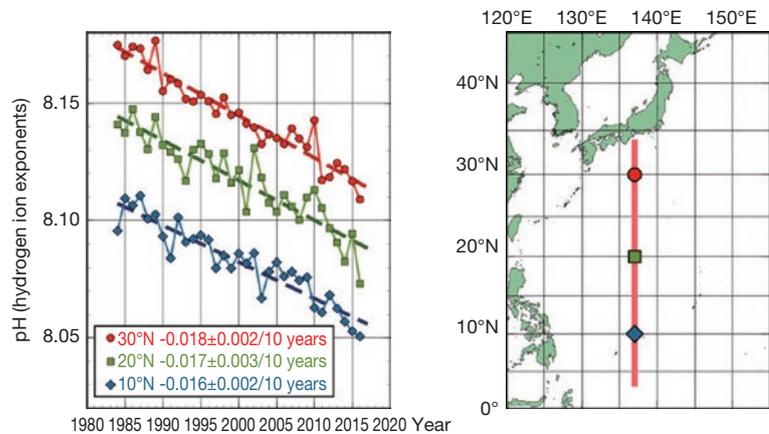
The Japan Meteorological Agency annually publishes the outcome of observations on ozone and ultraviolet radiation. According to these studies, the global amount of ozone continues to be low from a long-term perspective. Additionally, in order to prevent adverse effects to the human body by ultraviolet radiation, information on the topic is published daily using a numerical index (UV index) for easy comprehension of the intensity of ultraviolet radiation.

(6) Promoting Routine Operational Observation in the Antarctic

The Geospatial Information Authority of Japan 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

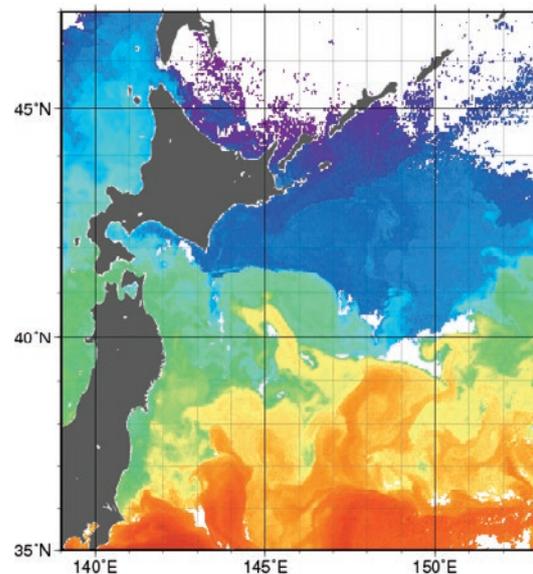
Figure II-8-7-2 Monitoring the Global Environment Using Research Vessels



The long-term changes in hydrogen ion exponents (pH) at latitudes 10, 20, and 30 degrees north along 137 degrees east meridian (left) and the area map for data analysis (right). The numbers in the graph indicate the decreasing rates per 10 years. The lesser pH indicates the more progress of "ocean acidification."
Source) Japan Meteorological Agency

Figure II-8-7-3

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



Sea surface temperature composite image based on the geostationary meteorological satellite Himawari data

• Sea surface temperature composite image based on Himawari-8 data. The image shows maximum values of sea surface temperature during the composite period.

• Areas where sea surface temperatures cannot be retrieved due to cloud cover throughout the entire period are shown in white.

(Image of sea surface temperatures on March 17, 2016 (09-20 JST))

It can be seen that sharp fronts lie between the Oyashio cold water distributed widely southeast of Hokkaido and the Kuroshio warm water extending east of Honshu. The improvement of sensors on board Himawari-8 and cloud area discrimination process make it possible to provide high-resolution, high-precision sea surface temperature product.

Source) Japan Meteorological Agency

of international policies.

The Japan Coast Guard is conducting topographical studies on the sea floor. The observation data is being used for compiling nautical charts and as the basis for research related to past environmental conditions such as glacial erosion and sedimentary environments. In addition, they conduct tidal observations and monitor the fluctuations in sea levels, which are closely tied to global warming.

2 Research of and Predictions of the Global Environment

The Japan Meteorological Agency and the Meteorological Research Institute are developing prognostic models on changes in climate around Japan and the world, and actively participate in international research programs such as the World Climate Research Programme (WCRP). Earth system models that track the carbon cycle process and other changes and higher resolution regional climate models are being developed, and research for making warming predictions is being conducted. In FY2016, the JMA released Global Warming Projection Volume 9, which takes uncertainty into account as it shows detailed warming predictions for the area around Japan based on a highly developed regional climate model. In addition, the JMA made proactive contributions to the fifth assessment report of the Intergovernmental Panel on Climate Change (IPCC) (released in 2013-2014), the National Plan for Adaptation to the Impact of Climate Change (adopted by a Cabinet decision in November 2015), the Plan for Global Warming Countermeasures (adopted by a Cabinet decision in May 2016), and efforts toward the development of adaptation measures by local governments and others.

The National Institute for Land and Infrastructure Management released the results of research into climate change adaptation conducted from the standpoints of flood control, water utilization, and the environment through the Report on Research into Climate Change Adaptation (2017) and other documents. These results have been incorporated into various materials, including Adapting to Climate Change in the Area of Water Disasters (August 2015), a report issued by the Social Development Council, and a plan for adapting to climate change (November 2015) as formulated by the MLIT.

3 Promoting Worldwide Geodetic Observation

The objectives of the Global Mapping Project, in which basic geospatial information for all the land on the planet was developed, were achieved. Thus the Geospatial Information Authority of Japan implemented coordination to conclude the project as the Secretariat of the International Steering Committee for Global Mapping, and transferred the Global Map data to the Geospatial Information Section of the United Nations. In addition, the Geospatial Information Authority of Japan and the Japan Coast Guard contribute to the determination of the shape and movement of the Earth through activities such as international observations using Very Long Baseline Interferometry (VLBI, a method of observation using radio waves from quasars) and Satellite Laser Ranging (SLR, a method of measuring the distance to artificial satellites using lasers), tide observations, absolute gravity measurements, and participation in the International GNSS Service (IGS), and is promoting the establishment of a global geodetic reference frame.

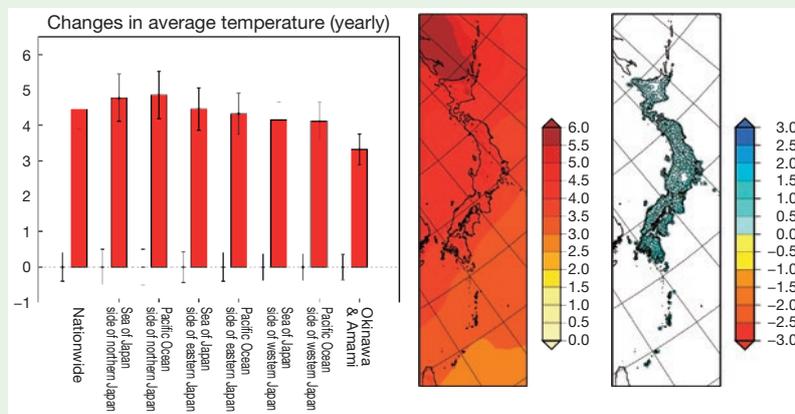
Column

Publication of Global Warming Projection Vol. 9

The Japan Meteorological Agency has released the results of global warming predictions based on a numerical model running since fiscal 1996, in the form of the “Global Warming Projection,” to contribute to implementation of measures for mitigation and adaptation, and to disseminate scientific knowledge related to global warming. In March 2017, it compiled and released the latest of the series, Global Warming Projection Vol. 9, using the results of predictions made by the Program for Risk Information on Climate Change, a project of the Ministry of Education, Culture, Sports, Science and Technology.

The Intergovernmental Panel on Climate Change (IPCC) presents several scenarios on greenhouse gas emissions, but Vol. 9 bases its predictions on the scenario in which greenhouse gas emissions continue at the highest level (the RCP 8.5 scenario), from the perspective of heightening disaster prevention awareness. It also provides information on the range of annual changes and the results of a reliability evaluation.

Vol. 9 predicts that annual average temperatures in Japan in the late 21st century will increase dramatically by +3.3 to +4.9°C, depending on the region, compared to the late 20th century. There will be a significant increase in the number of extremely hot days with temperatures topping 35°C, and a significant decrease in the number of midwinter days when temperatures do not rise to 0°C. Furthermore, it predicts a nationwide frequency increase in heavy rains and short-term downpours, with the number of days of heavy rains that bring more than 200 mm/day of rainfall, and the frequency of waterfall-like rains (short-term downpours that bring more than 50 mm/hour of rainfall) both more than doubling. At the same time, the number of dry days is also predicted to increase on a nationwide scale, possibly impacting water resource management. Snowfall is predicted to decrease significantly on the Sea of Japan side of the main island of Japan, but the same amount of snow as in the late 20th century is predicted to fall in some years of the late 21st century, so measures against heavy snow will continue to be needed.



[Change predictions in temperature and rainfall in the late 21st century, compared with the late 20th century]
 (Left) For each region, the thin line on the left indicates the range of yearly differences in annual average temperatures in the late 20th century; The bar graph indicates changes in annual average temperatures in the late 21st century; And the thin line on the right indicates the range of yearly differences (unit: °C).
 (Middle) Change distribution in annual average temperatures (unit: °C)
 (Right) Change distribution in the frequency of yearly occurrences regarding rainfalls releasing more than 50 mm/hour (unit: frequency) (only regions with reliable predictions are displayed).
 Source) Global Warming Projection Vol. 9