

2019

Transport and Environment in Japan



Publisher

Foundation for Promoting Personal Mobility
and Ecological Transportation

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This document is a tentative translation by the Foundation for Promoting Personal Mobility and Ecological Transportation (Eco-Mo Foundation) of “Transport and Environment in Japan 2019”, published in March 2019 by the Eco-Mo Foundation under the editorial supervision of the Environmental Policy Division, Policy Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT).

Initial translation was performed by a translation company, with necessary revisions made afterwards. Unique terminology and phrases which cannot be understood without knowledge of the societal background and conditions involved in the Japanese transport environment have been replaced with appropriate English expressions without being constrained by the original Japanese expressions. However, no additional explanations or additional text has been inserted, and, wherever possible, the tentative translation is faithful to the original text.

This document is published on the Eco-Mo Foundation website (<http://www.ecomo.or.jp/>) and available for download. We hope that it may serve of assistance with the implementation of transport environment measures in the reader's own country.

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I. Developments Related to Environmental Issues in 2018

There were a great deal of developments in 2018, both inside Japan and overseas, related to environmental issues. Belows are some of the developments in global warming, automobiles and the environment.

■ Global warming related developments

With regard to the framework for 2020 and beyond that relates to global warming countermeasures, an ad hoc working group was established at COP17, which was held in Durban, South Africa in November and December, 2011, and consensus was reached regarding the formulation by 2015 of a new framework which would apply to all countries.

Each country had to formulate its own voluntary greenhouse gas reduction targets, etc. and submit them to the convention secretariat sufficiently in advance of COP21, held in late 2015. Japan decided on by the Global Warming Prevention Headquarters Japan's Intended Nationally Determined Contribution (greenhouse gas reduction targets, etc. for 2020 and beyond) in July 2015, and submitted it to the UNFCCC secretariat. Under this INDC, Japan's emissions reduction target was defined as a 26.0% reduction in 2030 compared to 2013 (25.4% reduction compared to 2005) (approximately 1,042 million tons of CO₂).

COP21 was held from November 30 to December 13, 2015, in Paris, France. At the conference, the "Paris Agreement", a new legal framework for global warming countermeasures from 2020 onwards was adopted and went into effect on November 4, 2016.

Japan decided to become a signatory to the agreement on November 8, 2016, and presented instruments of acceptance to the Secretary-General of the United Nations on the same day.

On May 13, 2016, the Japanese cabinet approved the Global Warming Countermeasure Plan, aimed at comprehensively and systematically promoting global warming countermeasures.

The plan clarified the measures to be taken by individual entities and by the nation in order to reach the medium-term target of reducing emissions by 2030 by 26% compared to 2013 levels, laid out a roadmap for achieving these reduction targets, and stipulated a long-term target of reducing greenhouse gas emissions by 2050 by 80%.

It includes comprehensive transport sector measures such as automobile and road traffic flow measures, the promotion of public transport usage, and logistics efficiency improvements.

COP24 was held in Katowice, Poland in December 2018 and consensus was reached regarding the "Paris Agreement" implementation rules, of which negotiations had continued for three years. All countries, along with regularly updating their goals for the reduction of greenhouse gases, will attempt to kickstart a framework from 2020 onwards for working towards reaching those goals.

■ Automobile and the environment related developments

According to Japan Automobile Dealers Association and Japan Light Motor Vehicle and Motorcycle Association, light vehicles accounted for more than 70 percent of the top 10 vehicle models sold in 2018, and hybrid vehicles or electric vehicles are increasing.

II. Current Status of Major Environmental Problems of the Transport Sector

1 Current status of global environmental problems

Our globe is facing severe environmental problems, such as global warming and the destruction of the ozone layer. For the next generation to receive a planet in which they can live in security, our generation must rapidly implement countermeasures to these problems.

(1) Current status of global warming

The mechanism behind and impact of global warming

In order to produce energy, we burn fossil fuels such as petroleum, coal, and natural gas, generating gasses such as carbon dioxide (CO_2) and releasing them into the atmosphere.

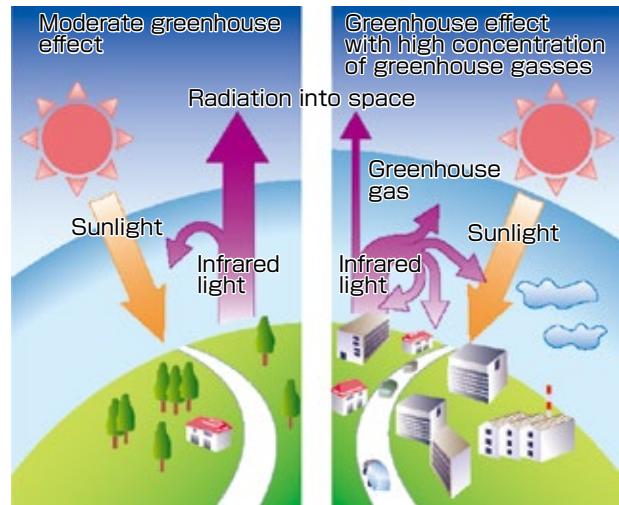
Atmospheric gasses such as carbon dioxide absorb a great deal of the light from the sun, as well as infrared radiation released from the earth's surface. This results in a warming of the atmosphere. They act like the glass in a greenhouse, raising the earth's temperature. These gasses, which have kept temperatures in the range suited for life on earth, are called greenhouse gasses.

However, factors such as the rise of industry have increased the amount of daily activity, producing a rapid rise in the amount of greenhouse gasses emitted into the atmosphere. This has intensified the greenhouse effect, producing a commensurate increase in climate temperature. This is called global warming. The 5th assessment report of the Intergovernmental Panel on Climate Change (IPCC), published between 2013 and 2014, states that the average global temperature rose 0.85°C between 1880 and 2012, and that the temperatures of every decade of the past 30 years have been warmer than any of the preceding decades since 1850. Furthermore, it states that there is no doubt that the climate system is growing warmer, and that it is highly likely that the main cause of the warming which has occurred since the mid-20th century is human activity.

Without measures to prevent global warming to counter the global growth in fossil fuel consumption, the concentration of greenhouse gasses in the atmosphere will continue to rise, resulting in further global warming. The IPCC report says it is highly likely that, in comparison to between 1986 and 2005, the average global temperature at the end of the 21st century will have risen by 0.3 to 4.8°C , and that the average sea level will have risen by 0.26 to 0.82m . Risks resulting from the climate change include droughts, flooding, rainfall changes, food shortages, negative impacts on health, and reductions in biodiversity.

The "Paris Agreement" stipulates the controlling of rises in the average global temperature to levels that are well below 2°C in comparison to before industrialization, along with continuing to maintain 1.5°C . This was again summed up in 2018 by the IPCC in their "1.5°C Special Report". This report outlines the effects and risks associated with the temperature rise to 1.5°C , along with the necessary adjustments, related emissions channels, and reduction (mitigation) of greenhouse gasses, and within the context of strengthening global efforts towards the threat of climate change, sustainable development and the eradication of poverty.

Mechanism of the greenhouse effect



● Forecast of increase in average global surface temperature

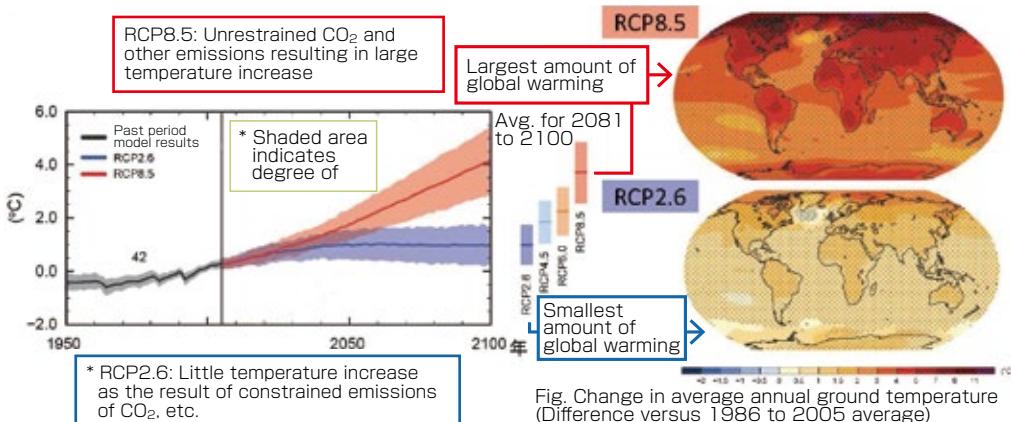


Fig. Change in average annual ground temperature between 1986 and 2005

CMIP5 simulated timeline based on multiple models (1950 to 2100)
Source: Figure: IPCC AR5 WG I SPM Fig. SPM.7(a)

Fig. Change in average annual ground temperature (Difference versus 1986 to 2005 average)
2081 to 2100 RCP2.6 and RCP8.5 scenario CMIP 5 multiple model average distribution diagram

The north pole area will warm faster than the global average, and the average increase in temperature will be greater for land areas than sea areas.
(IPCC AR5 WG I SPM Fig. SPM. P.20, lines 21 to 22)

Source: Ministry of Environment (MOE) "Overview of IPCC 5th assessment" (Tentative Translated by Eco-Mo Foundation)

■ Impact of individual greenhouse gasses on global warming

In addition to carbon dioxide, greenhouse gasses which cause global warming include methane, dinitrogen monoxide, and chlorofluorocarbon. According to the IPCC, the greenhouse effects per unit of volume of methane, dinitrogen monoxide, and chlorofluorocarbon, etc., are far stronger than those of carbon dioxide, but the amount of carbon dioxide being emitted is tremendous, so carbon dioxide emissions worldwide since the industrial revolution account for roughly 60% of all greenhouse gas contributions to global warming.

For Japan, in 2016 carbon dioxide accounted for 92% of all greenhouse gas contributions to global warming, an extremely high figure.

● Greenhouse gas and global warming potential (100 year period)(*1)

	Carbon dioxide	Methane	Dinitrogen monoxide	HFC(*2)	PFC(*3)	SF6
Global warming potential (100 year cumulative period)	1	25	298	1,430	9,300	22,800

*1: Global warming potential

Warming effect of greenhouse gasses over a 100 year period (using carbon dioxide as a baseline with a value of 1)

*2: HFC

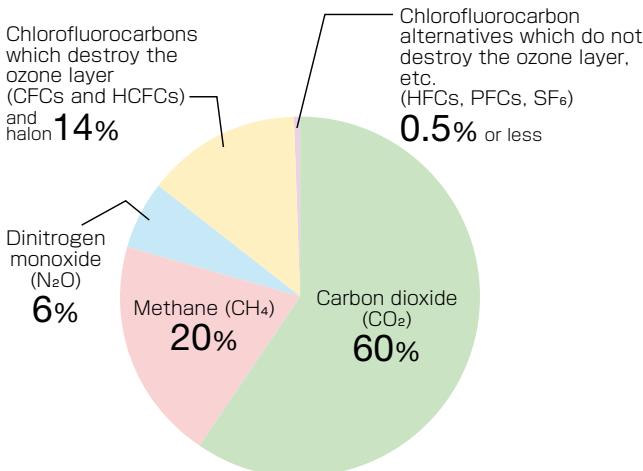
Calculated for HFC-134a, a typical HFC used as a coolant

*3: PFC

Calculated for PFC-5-1-14, a typical PFC used in rectifiers

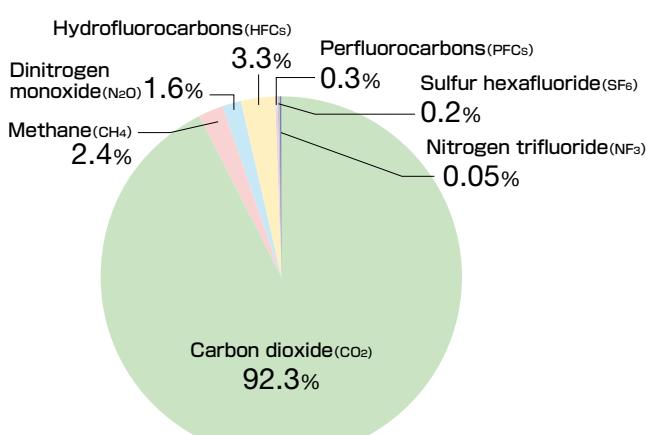
Source: IPCC (2007)

● Contributions to global warming by greenhouse gasses emitted due to human activity since the industrial revolution



Source: IPCC 4th assessment report 1st working group materials (2007)

● Contributions to global warming by greenhouse gasses emitted by Japan(for 2016)



Source: GIO "Greenhouse Gas Inventory"

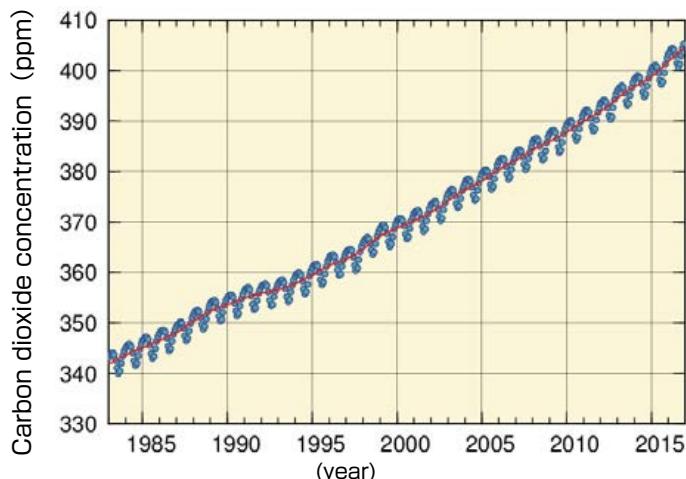
II. Current Status of Major Environmental Problems of the Transport Sector

Trends in concentration of carbon dioxide in the atmosphere

The concentration of carbon dioxide in the atmosphere varies cyclically every year due to factors such as plant photosynthesis. The amount of change also depends on the location, due to differences in local vegetation, etc.

The concentration of carbon dioxide in the atmosphere remained roughly stable at 280ppm (ppm: parts per million) before the industrial revolution in the latter 18th century, but the rapid increase in manufacturing and production activities following the industrial revolution has been accompanied by an increase in the carbon dioxide concentration. According to World Data Centre for Green house Gases (WDCGG) the carbon dioxide concentration in 2017 was 405.5ppm, significantly higher than the concentration before the industrial revolution.

● The average of concentration of carbon dioxide in the atmosphere

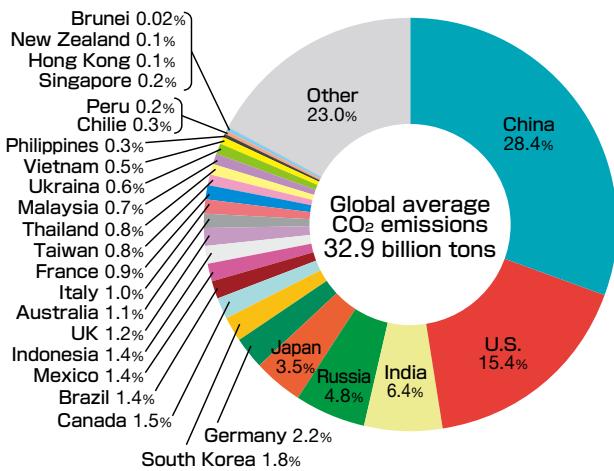


Source: Japan Meteorological Agency (JMA) "Climate Change Monitoring Report 2017" (Tentative Translated by Eco-Mo Foundation)

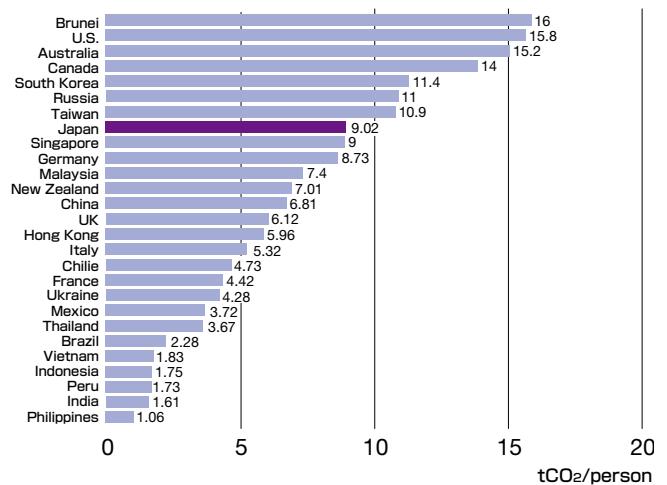
Carbon dioxide emission volume by country

In 2013, Carbon dioxide emission volume by country is as follows: China 28.4%, U.S. 15.4%, India 6.4%, Russia 4.8%, followed by Japan at 3.5%. In terms of per capita emissions by country, Japan is number 8.

● Share of carbon dioxide emission volume by country (2015)



● Per capita carbon dioxide emission volume by country (2015)



Source: EDMC "Handbook of Energy & Economic Statistics in Japan 2018"

(2) The United Nations Framework Convention on Climate Change, the Kyoto Protocol, and Paris Agreement

■UNFCCC

UNFCCC was formulated with the objective of stabilizing greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interference with the climate system. It was adopted in May 1992, and after being signed by the heads of states at the June 1992 United Nations Conference on Environment and Development (held in Rio de Janeiro), it went into effect in March 1994. As of January 2019 the European Union (EU) and 196 countries, including Japan, are signatories.

■The Kyoto Protocol

In December 1997 COP3 was held in Kyoto, and the Kyoto Protocol for achieving the convention's objectives was adopted. The Kyoto Protocol specifies the percentage by which average annual greenhouse gas emissions by developed countries are to be reduced compared to a reference year (in principle 1990) during the period from 2008 to 2012 (the first commitment period). Japan was to have reduced emissions by 6%, the U.S. by 7%, and the EU by 8%. No binding targets were set for developing countries. The November 2004 ratification by Russia satisfied the Kyoto Protocol's requirements for coming into force, and the treaty became effective on February 16, 2005. The U.S. did not ratify the Kyoto Protocol. The first commitment period of the Kyoto Protocol, which went into effect in 2008, ended in 2012. While official adoption will first require screening by the U.N., Japan met its greenhouse gas emissions reduction target.

■Paris Agreement

With regard to the framework for 2020 and beyond, an ad hoc working group was established at COP17, which was held in Durban, South Africa in November and December, 2011, and consensus was reached regarding the formulation by 2015 of a new framework which would apply to all countries.

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II. Current Status of Major Environmental Problems of the Transport Sector

The results of the December 2018 COP24 are shown below.

The 24th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 24)

The 14th session of the Conference of the Parties Serving as the Meeting of the Parties to the Kyoto Protocol (CMP14)

The 3rd part of the 1st session of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA1-3)

January 25, 2019

The 24th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 24), the 14th session of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CMP14), and the 3rd part of the 1st session of the Conference of the Parties serving as the Meeting of the Parties to the Paris Agreement (CMA1-3) took place from December 2 to 15 in Katowice, Poland. Mr. Yoshiaki Harada, Minister of the Environment, Mr. Kenichi Suganuma, Ambassador, Representative of the Government of Japan for Climate Change, and officials from relevant Ministries including the Ministry of Foreign Affairs, the Ministry of Economy, Trade and Industry, the Ministry of the Environment, the Ministry of Finance, the Ministry of Education, Culture, Sports, Science and Technology, Ministry of Agriculture, Forestry and Fisheries, and the Ministry of Land, Infrastructure, Transport and Tourism participated in the conferences.

The Paris Agreement Work Programme (PAWP) was adopted at the COP24, which enables the full implementation of the Paris Agreement from 2020 onwards. Overview of the conferences, outreach of Japan's climate change actions, and assessment of the conferences are as follows.

1. Overview of the conference

(1) PAWP

The PAWP related agendas were discussed at the meetings during the conferences toward the full implementation of the Paris Agreement from 2020 onwards. In the 1st week of the COP24, the 7th Part of the 1st Session of the Ad Hoc Working Group of the Paris Agreement (APA1-7), the 49th Session of the Subsidiary Body for Implementation (SBI49), and the Subsidiary Body for Scientific and Technological Advice (SBSTA49) were convened. The textual proposals on mitigation, adaptation, transparency framework, market mechanisms, finance, and other issues prepared by APA and SB chairs were revised reflecting the discussions focusing on the technical issues. In the second week, based on the outcomes of the discussions at APA and SB, the Parties continued technical discussions at the Conference of the Parties, while ministerial negotiations were held on the issues that should be agreed at political level.

(2) Climate Finance

OECD published an analysis report on provision of the public climate finance by developed countries to developing countries during 2013-2017. The report indicates that the public climate finance has been steadily increasing in line with the 2016 Roadmap Trajectory toward the USD 100 billion goal by 2020.

In the course of the discussions related to the PAWP, the Parties decided to establish a transparent reporting system while securing the discretion of each country for reporting ex-ante information on climate finance (Article 9 Paragraph 5 of the Paris Agreement) as well as the ex-post information (Article 9 Paragraph 7). In addition, it was decided to organize biennial in-session workshops and convene biennial high-level ministerial dialogue on climate finance focusing on ex-ante information. In deliberation on setting a new quantified goal 2025 and onwards, it was decided to consider the importance of making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development, taking into account the needs and priorities of developing countries and the achievement of 2020 goal of jointly mobilizing USD 100 billion per year.

(3) Talanoa Dialogue

To achieve the long-term goal of the Paris Agreement, the political phase of "Talanoa Dialogue" was held during the COP24 for taking stock of the collective efforts of the Parties to reduce GHG emissions and enhancing ambition. ("Talanoa" is a traditional Fijian word that was proposed by Fiji (COP23 Presidency), to convey the idea of transparency, inclusiveness and harmony)

Minister of the Environment Harada participated in the ministerial round table discussion to share Japan's experiences and visions. He expressed Japan's strong determination that Japan will take the lead in achieving the virtuous cycle between the environment and growth, introducing a successful launch of GHG observing satellite "GOSAT-2" contributing to improvement in the accuracy of GHG inventory, a successful commercial operation of a floating offshore wind farm, as well as successful transfers of decarbonized technologies to developing countries through the Joint Crediting Mechanism (JCM).

(4) Other high-level events

High-level events including "The third biennial High-Level Ministerial Dialogue", "The stock takes of pre-2020

implementation and ambition", and "Talanoa Dialogue" took place during High-level segment. Poland, as COP24 Presidency, proposed to launch three political declarations on "Just Transition", "E-Mobility" and "Forests". The Government of Japan has endorsed these declarations.

(5) COP24 Decision

The COP decisions were successfully adopted on December 15, including the draft of the PAWP, the outcomes obtained through "Talanoa Dialogue", "The stock takes of pre-2020 implementation and ambition" and the reference to the IPCC Special Report on Global Warming of 1.5°C. The decisions by the CMA, including the PAWP, were adopted subsequently.

Japan's head of delegation and experts actively participated in the negotiations of the technical issues and Minister of the Environment Harada participated in the Ministerial negotiations. Japan proactively contributed to the discussions toward adoption of the PAWP throughout the conferences. The COP25 will be convened in Chile in 2019.

2. Outreach for Japan's climate change actions

(1) Bilateral meetings

Minister of the Environment Harada met with his counterparts including the United States, EU, Maldives, China, Ethiopia, and Poland (COP24 President). He worked for the adoption of the PAWP and also exchanged views on cooperation in the areas of climate change issues.

(2) Statement by Minister of the Environment Harada at the high-level segment

Minister of the Environment Harada expressed Japan's strong determination that Japan would actively contribute to the adoption of the PAWP at the COP24. He mentioned that Japan would lead the global decarbonization promoting the model of the virtuous cycle between the environment and the growth as chair of the G20 in 2019. He also emphasized that Japan has developed the future vision of "Circular and Ecological Economies - localizing SDGs" to decarbonize the society and achieve the Sustainable Development Goals.

Furthermore, he expressed his commitment to continue supports for the implementation of the Paris Agreement through finance, capacity-building, and technology development and transfer. He further referred to steady implementation of support of 1.3 trillion yen in 2020 and further promotion of the JCM. He also presented Japan's contribution to providing scientific knowledge thorough GHG Observing Satellite "IBUKI-2" (GOSAT-2) and announced that Japan will host the 49th Session of the Intergovernmental Panel on Climate Change (IPCC) in Kyoto. In addition, he referred to the nomination of Ambassador Suganuma as a candidate for the next Executive Director of Green Climate Fund (GCF).

(3) Japan Pavilion

Japan set up an official event booth called "Japan Pavilion" in the venue of COP24. Many events were held at the Pavilion so as to promote climate actions of the government, institutions and researchers introducing advanced technologies and contributions to climate change actions including "Japan's Assistance Initiatives to Address Climate Change 2018" released on December 7.

(4) Market Mechanisms

Japan held the 6th JCM Partner Countries' Meeting where the representatives of the 17 partner countries of the JCM gathered. Japan and the partner countries welcomed the progress of the JCM and agreed to support the further formation and implementation of JCM projects.

3. Assessment

(1) Japan participated in the COP24 with three main objectives: (i) adoption of the PAWP, (ii) contribution to the Talanoa Dialogue and (iii) further promotion of Japan's climate change actions with high level events. These objectives were largely attained through the various events during the COP24.

(2) The adoption of the PAWP was the most significant outcome of the COP24. This gave momentum for the full implementation of the Paris Agreement from 2020 onwards and further promotion of the global climate change actions. Japan highly appreciates that the Parties agreed to establish a common, transparent, and effective rule applying to all Parties in line with the spirit of the Paris Agreement. Japan actively participated in negotiations including concrete text proposals and contributed to the adoption of the PAWP. Negotiations on the market mechanisms will continue so as to adopt the related guidelines at the CMA2 next year, taking into consideration of the draft decision texts elaborated during the COP24.

(3) In addition, Japan sent out strong messages that ① Japan will lead the world in achieving "the virtuous cycle between the environment and growth" through innovations, and ② Japan will further promote international cooperation so that all Parties could implement the Paris Agreement effectively.

(3) Current status of global warming issues in Japan

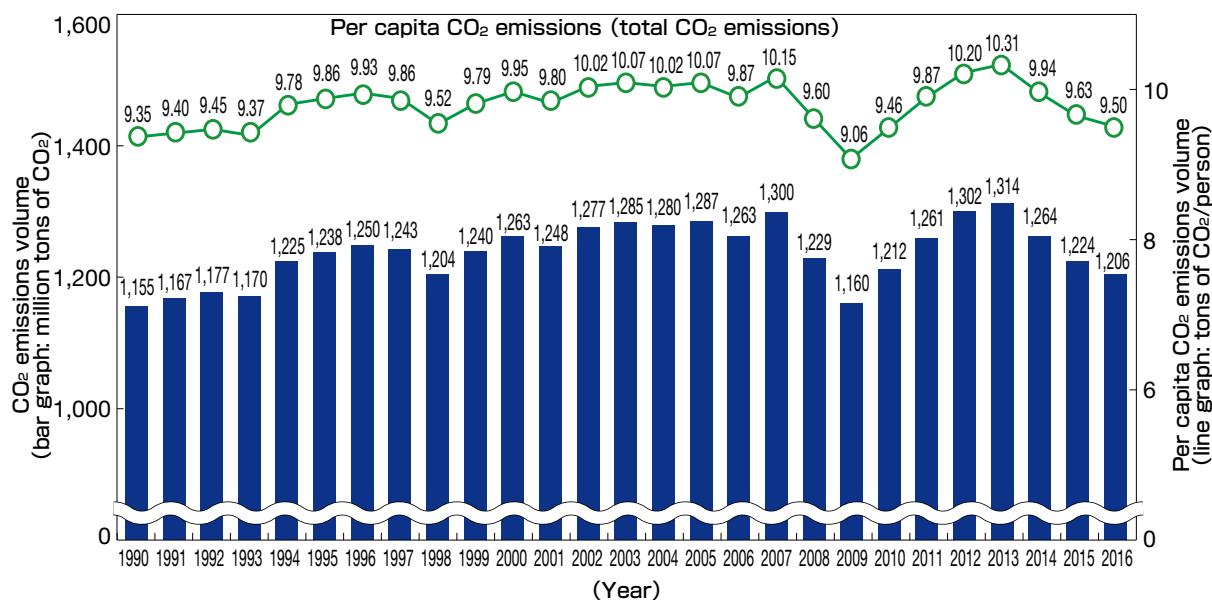
① Current status of carbon dioxide emissions in Japan

Japan is the world's 5th largest producer of carbon dioxide emissions, so it plays an extremely important role in solving the problem of global warming.

■ Trends in carbon dioxide emissions in Japan

In 2016 Japan emitted approximately 1,260 million tons of carbon dioxide, roughly 4.4% more than it did in 1990. The per capita emissions volume in 2016 was approximately 9.50 tons.

● Trends in carbon dioxide emissions in Japan

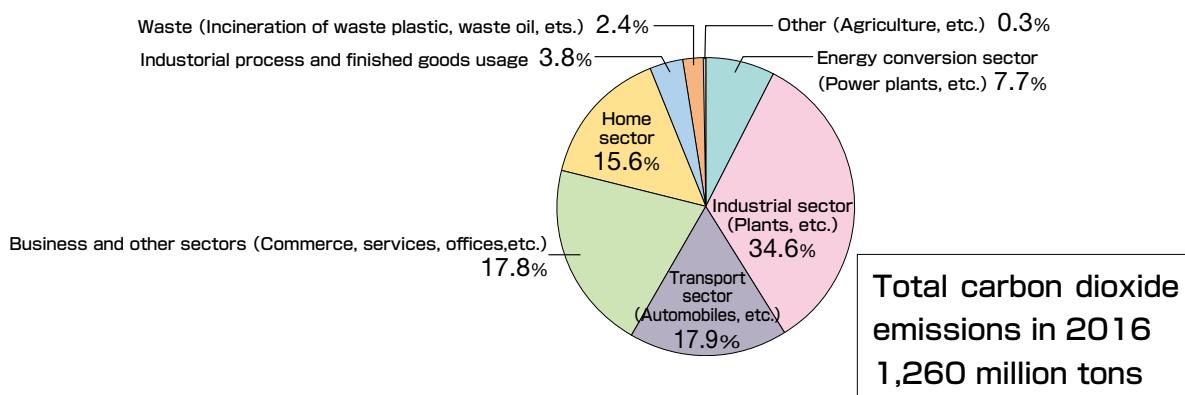


Source: GIO "Greenhouse Gas Inventory"

■ Ratio of carbon dioxide emissions in Japan by sector

The industrial sector accounts for 34.6% of Japan's carbon dioxide emissions, the transport sector for 17.9%, business and other sectors account for 17.8%, and the home sector accounts for 15.6%.

● Amount of carbon dioxide emissions in Japan (by sector) 2016



Source: GIO "Greenhouse Gas Inventory"

②Energy consumption in Japan

The rapid increase in fossil fuel consumption since the industrial revolution is considered to be one of the main causes of global warming. Global warming is inextricably linked to energy consumption.

■Final energy consumption in Japan

Japan's energy consumption grew faster than its GDP during the period of rapid economic growth which lasted into the 1970s. However, the two times oil crises in the 1970s led to increased efforts to reduce energy consumption by the manufacturing sector, and the development of energy saving products. These efforts made it possible to restrain energy consumption while still achieving economic growth. Throughout the 1990s crude oil prices remained at a low level but energy consumption of the home sector and the business sector increase. The price of crude oil began rising again in the 2000s, and energy consumption peak has been falling since peaking in 2004. In 2010 the economic recovery, together with temperature conditions, produced a major increase in final energy consumption. In 2011 the focus on energy conservation following the Great East Japan Earthquake brought about another decline in final energy consumption. In 2016, the real GDP increased by 1.2% to 2015, however, due to progress in energy conservation, the final energy consumption decreased by 1.3%.

Looking at energy consumption trends from 1973 to 2016, energy consumption for the company and business sector grew 1.0-fold (0.8-fold for the industrial sector and 2.1-fold for the business and other sectors), and 1.9-fold for the home sector, 1.7-fold for the transport sector. Since the first oil crisis, the company and business sectors, although experiencing economic growth, have seen the same level in energy consumption thanks to the implementation of energy saving measures mainly in the manufacturing industry. On the other hand, the home sector and the transport sector has seen greatly increase in energy consumption because of the spread of energy equipment and automobile. As a result, while the company and business establishment, the home, and the transport sectors accounted, respectively, for 74.7%, 8.9%, and 16.4% of total energy consumption in 1973, in 2016 these ratios had changed to 62.2%, 14.4%, and 23.4% respectively.

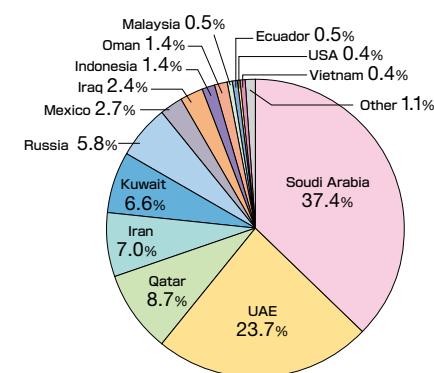
■Dependence on petroleum for energy consumed in Japan

Japan's supply of petroleum as a primary energy source fell as the result of petroleum replacement policies and energy saving measures implemented in response to the oil crises, but began rising from the late 1980s due to falling crude oil prices. From the mid-1990s onwards the development of alternative energy sources, etc. caused petroleum use to decline.

In 2016 Japan supplied 0.3% of the crude self-sufficiency ratio. Japan's major oil fields are located in Niigata Prefecture, Akita Prefecture, and Hokkaido. Because of this low level of self-sufficiency, in 2016 Japan relied on foreign imports for 99.7% of its crude oil, with nearly 90% coming from the Middle East. Japan is far more dependent on the Middle East for its oil than other countries — in 2016 the U.S. depended on the Middle East for 22.4% of its crude oil, and European OECD countries depended on the Middle East for 22.7% of their crude oil. In 2016 Saudi Arabia was Japan's largest supplier of crude oil, supplying 37.4%, followed by the UAE (23.7%), Qatar (8.7%), and Iran (7.0%).

(Source: METI "Energy White Paper 2018" (Tentative Translated by Eco-Mo Foundation))

●Crude oil imports by supplying country (2016)



Source: METI "Yearbook of Mineral Resources and Petroleum Products Statistics" (Tentative Translated by Eco-Mo Foundation)

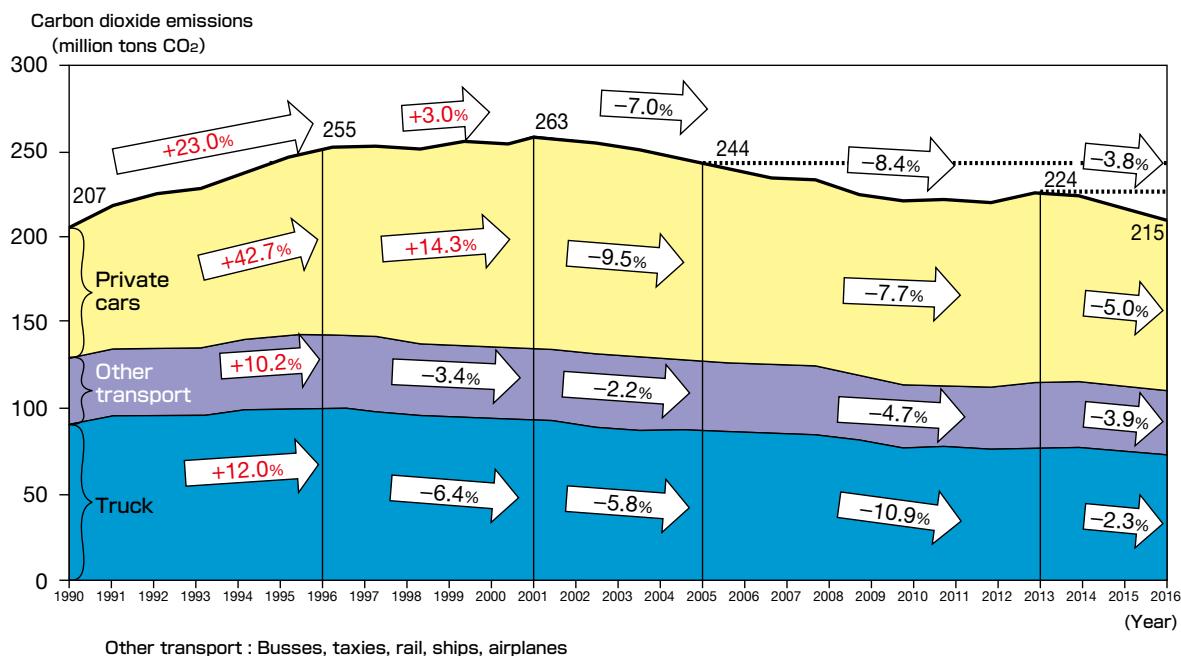
(4) Current status of global warming issues in the transport sector

① Current status of carbon dioxide emissions by the transport sector

■ Trends in carbon dioxide emissions by the transport sector

From 1990 to 1996 the amount of carbon dioxide emitted by the transport sector rose by 23.0%, but the rise in emissions then slowed, and began falling from 2001 onwards. In 2016 the amount of carbon dioxide emissions was approximately 215 million tons, 3.9% more than in 1990.

● Trends in carbon dioxide emissions by the transport sector



Source: MLIT website (Tentative Translated by Eco-Mo Foundation)

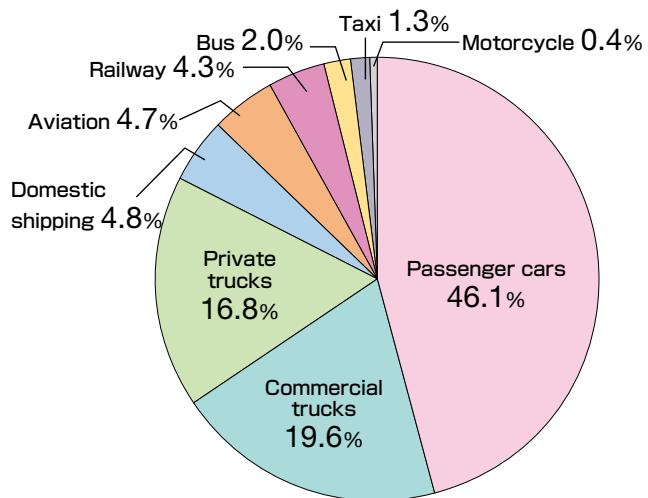
Carbon dioxide emissions from automobiles accounts for 86.2% of total carbon dioxide emissions produced by the transport sector. 46.1% of these carbon dioxide emissions are produced by private cars.

■ Carbon dioxide emission rates by the transport sector

Comparing passenger transport carbon dioxide emission rates (the amount of carbon dioxide emitted in transporting a person for 1km), private cars emit 7.1 times more carbon dioxide than rail transport. Therefore in order to reduce carbon dioxide emissions, the use of public transport, which has smaller carbon dioxide emission rates than private vehicles, need to be promoted.

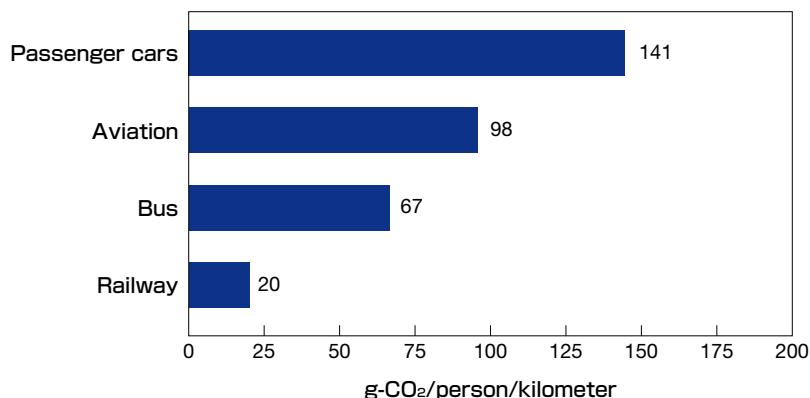
For freight transport carbon dioxide emission rates (the amount of carbon dioxide emitted in transporting one ton of freight for 1km), private trucks emit 55.2 times more carbon dioxide than trains, 30 times more than ships, and 5 times more than commercial trucks. There need to be a modal shift, moving to efficient use of commercial trucks, ships, and trains, in order to improve distribution efficiency.

● Amount of carbon dioxide emissions from the transport sector (by modes of transport) 2016

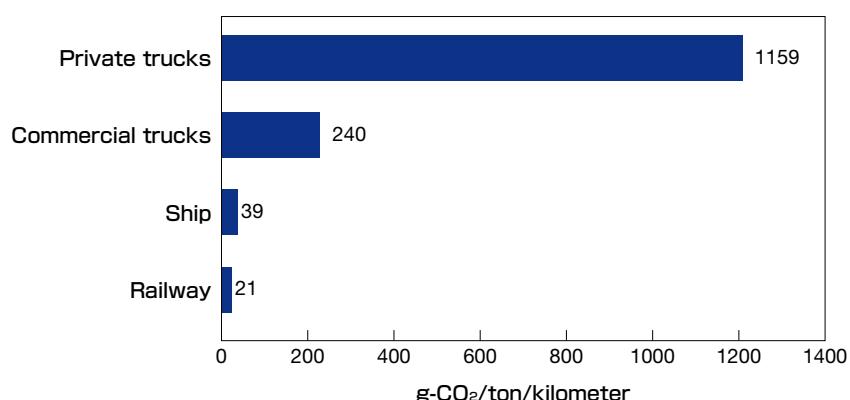


Source: MLIT website (Tentative Translated by Eco-Mo Foundation)

● Carbon dioxide emission rates by passenger transport mode (2016)



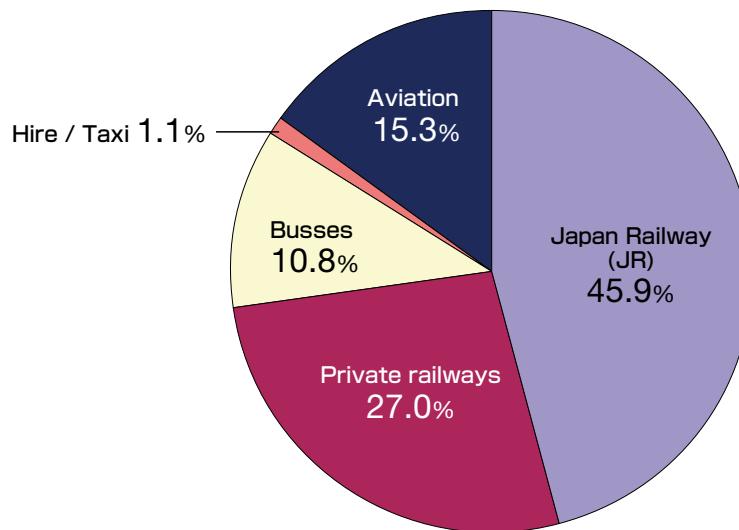
● Carbon dioxide emission rates by freight transport mode (2016)



Source: MLIT website (Tentative Translated by Eco-Mo Foundation)

II. Current Status of Major Environmental Problems of the Transport Sector

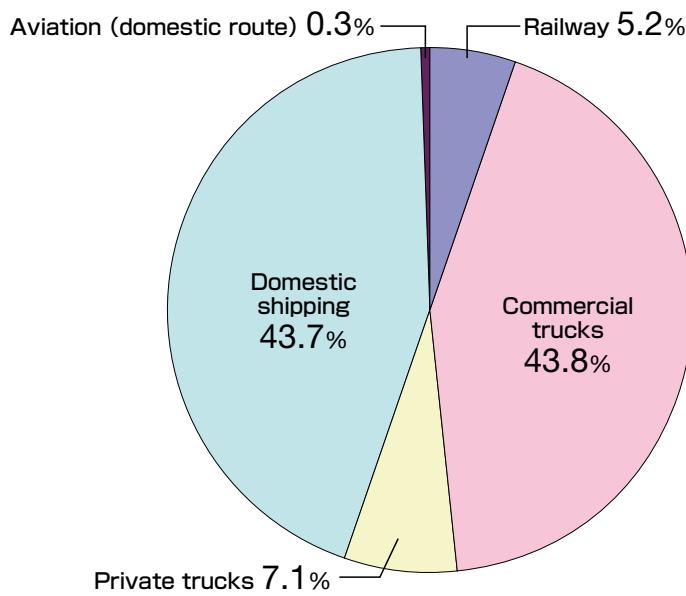
● Modal shares of domestic passenger transport (100 million person · km), 2016



*1 The air transport volume percentage is the total of both regular and irregular service.

*2 The hire/taxi percentage includes both light motor and truck.

● Modal shares of domestic freight transport (100 million ton · km), 2016



*1 The air transport percentage is the total of both regular and irregular service, and includes excess luggage and postal mail.

*2 The total of subtotals for individual transport modes and the total for transport modes may not be identical due to rounding.

Source: MLIT "White Paper on Land, Infrastructure, Transport and Tourism in Japan 2017" (Tentative Translated by Eco-Mo Foundation)

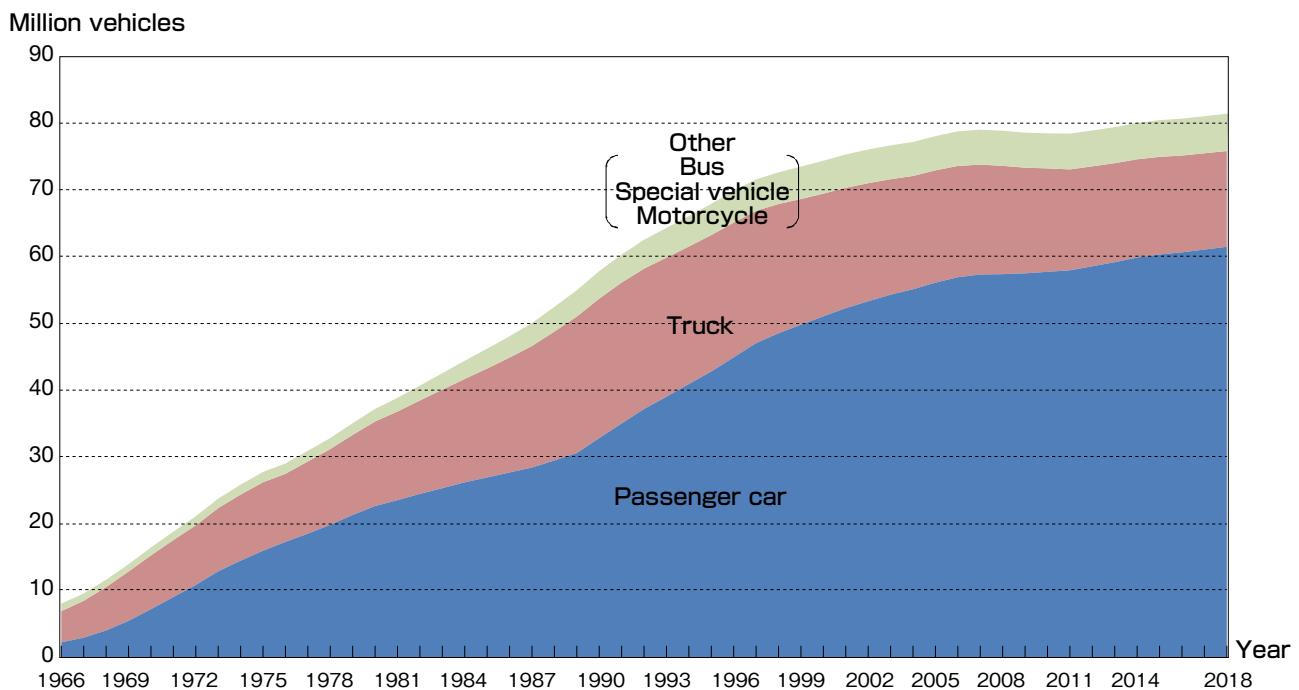
②Energy consumption by the transport sector

Within the transport sector, automobiles account for the largest amount of energy consumption, roughly 87% of the sector's total energy consumption. The majority of this is energy consumption is by cars and trucks. In terms of consumption by oil type, gasoline and diesel oil account for 87% of the transport sector total.

Over the past few years automobile fuel efficiency improvements and increased shift from in-house or private operation to commercial truck operation has brought about a reduction in carbon dioxide emissions by the transport sector. Emissions in 2016 were 215 million tons.

Efforts must continue to be made to achieve further reductions in the amount of energy consumed by automobiles.

●Automobile ownership trends



1: Passenger vehicles include mini-vehicles.

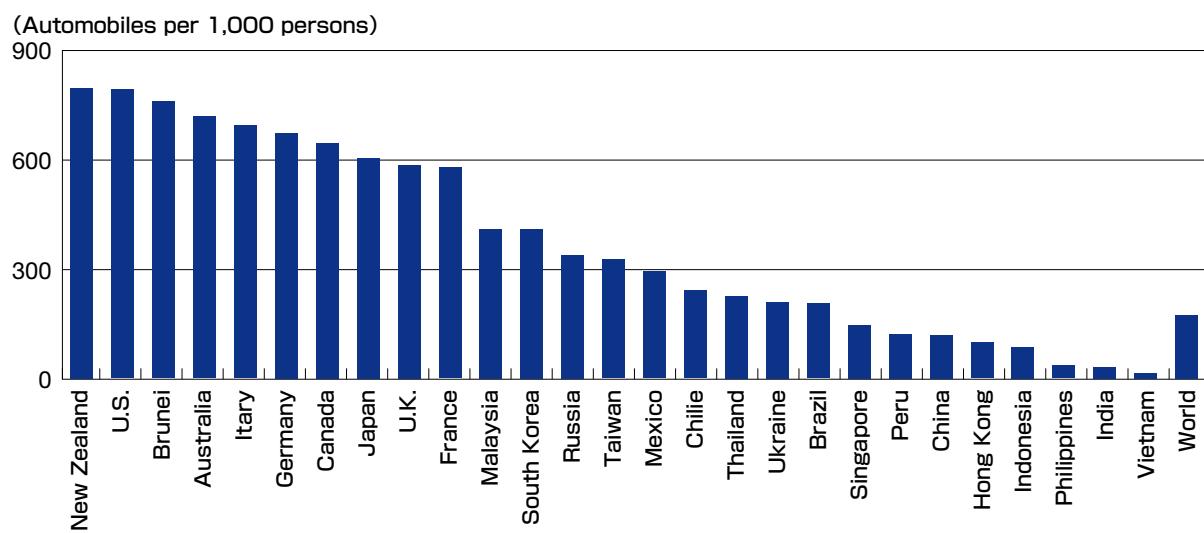
2: Number of vehicles as of the end of March of each year.

Source: Automobile Inspection & Registration Information Association website (Tentative Translated by Eco-Mo Foundation)

Automobile ownership rates around the World

In terms of automobile ownership per thousand people, the U.S. has the world's highest automobiles ownership rate, at 795 automobiles per thousand people. Automobile ownership rates are low for developing countries. In recent years developing countries such as China and India have experienced dramatic upswells in automobile ownership led by their rapid economic growth. The number of cars owned per thousand people grew by 1.7% globally in 2015, but in China it grew by 11.2%, and in India by 8.5%. Automobiles ownership in these countries, with their enormous populations, is predicted to have some impact on global warming, and is an area where attention is being increasingly focused.

● Automobile ownership rates in individual countries 2015



Source: EDMC "Handbook of Energy & Economic Statistics in Japan 2018"

2 Current status of automobile gas emissions

Road traffic related environmental problems involving the transport sector include atmospheric pollution produced by suspended particulate matter (SPM) and nitrogen oxides (NOx) such as nitrogen dioxide (NO₂) emitted from automobiles. NOx is not only a cause of acid rain and photochemical smog, but also has negative health effects (on respiratory organs). SPM is also said to harm respiratory organs by adhering to the lungs and bronchi.

In recent years all air pollution monitoring stations *¹ have met 2016 air quality standards achievement rates for NO₂, with 100% achievement rates for eleven consecutive years since 2006. Automobile exhaust gas monitoring stations *² have remained at roughly the same levels as 2015, at 99.7%. For automobile exhaust gas monitoring stations in areas implementing Automobile NOx/PM Act measures the achievement rate was 99.5%.

For SPMs, nationwide 2016 air quality standards achievement rates were 100% for air pollution monitoring stations and 100% for automobile exhaust gas monitoring stations. These have slightly improved for both types of stations in comparison to 2015 (air pollution monitoring station: 99.6%, automobile exhaust gas monitoring station: 99.7%). SPM 2016 air quality standards achievement rates for areas implementing Automobile NOx/PM Act measures were 100% for both air pollution monitoring stations, have slightly improved for automobile exhaust gas monitoring stations.

* 1 Air pollution monitoring station:

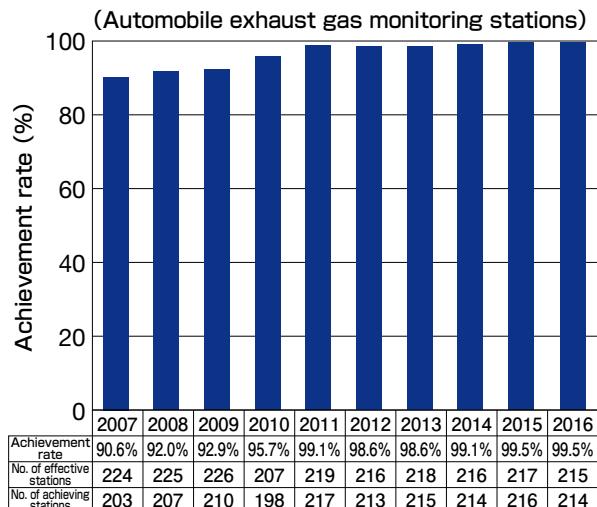
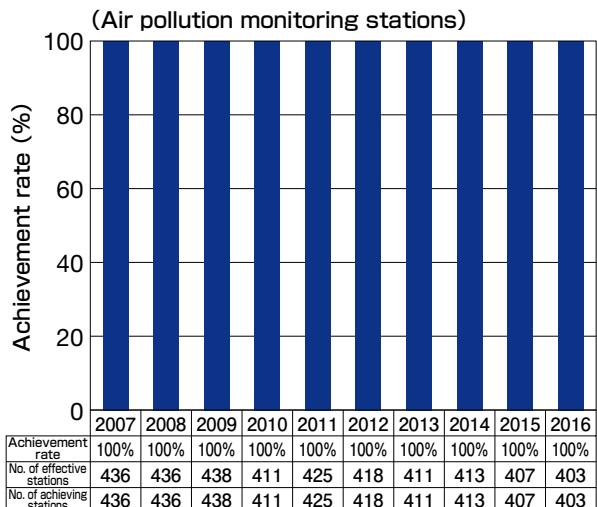
Monitoring stations performing regular monitoring of general atmospheric pollution conditions.
(Nationwide: 1,243 stations)

* 2 Automobile exhaust gas monitoring station:

Monitoring stations performing regular monitoring of atmospheric pollution conditions near intersections, roads, and road edges in which emissions from automobiles are believed to be sources of air pollution.
(Nationwide: 393 stations)

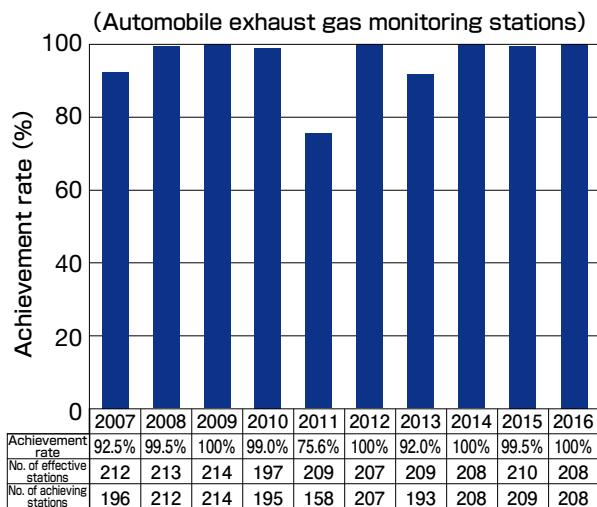
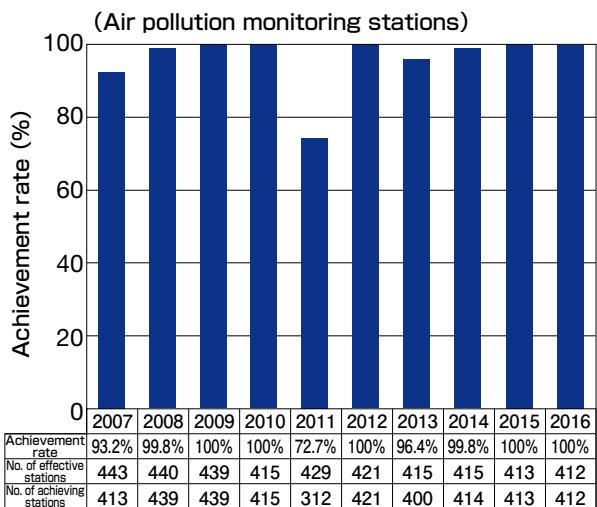
II. Current Status of Major Environmental Problems of the Transport Sector

- NO₂ air quality standards achievement rates in regions implementing Automobile NOx/PM Act measures (2007 to 2016)



Source: MOE website (Tentative Translated by Eco-Mo Foundation)

- SPM air quality standards achievement rates in regions implementing Automobile NOx/PM Act measures (2007 to 2016)



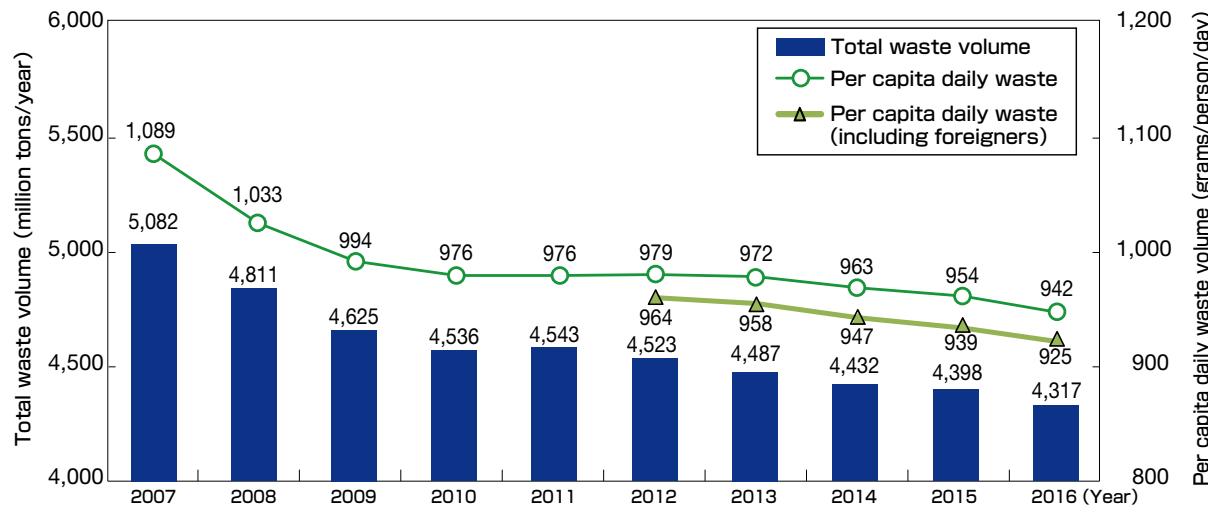
Source: MOE website (Tentative Translated by Eco-Mo Foundation)

3 Current status of waste and recycling

① Trends in general waste volume

Total waste volume and per capita daily waste volume fell slightly after the second oil crisis in 1979, but began rising rapidly from roughly 1985. From 1990 they leveled off or increased slightly, but began falling from 2001. In 2016 the total amount of waste was 43.17 million tons. The total amount of recycled waste in 2016 was 8.79 million tons. The ratio of total waste which was recycled has grown tremendously, from 5.3% in 1990 to 20.3% in 2016.

● Total waste volume and per capita daily waste volume

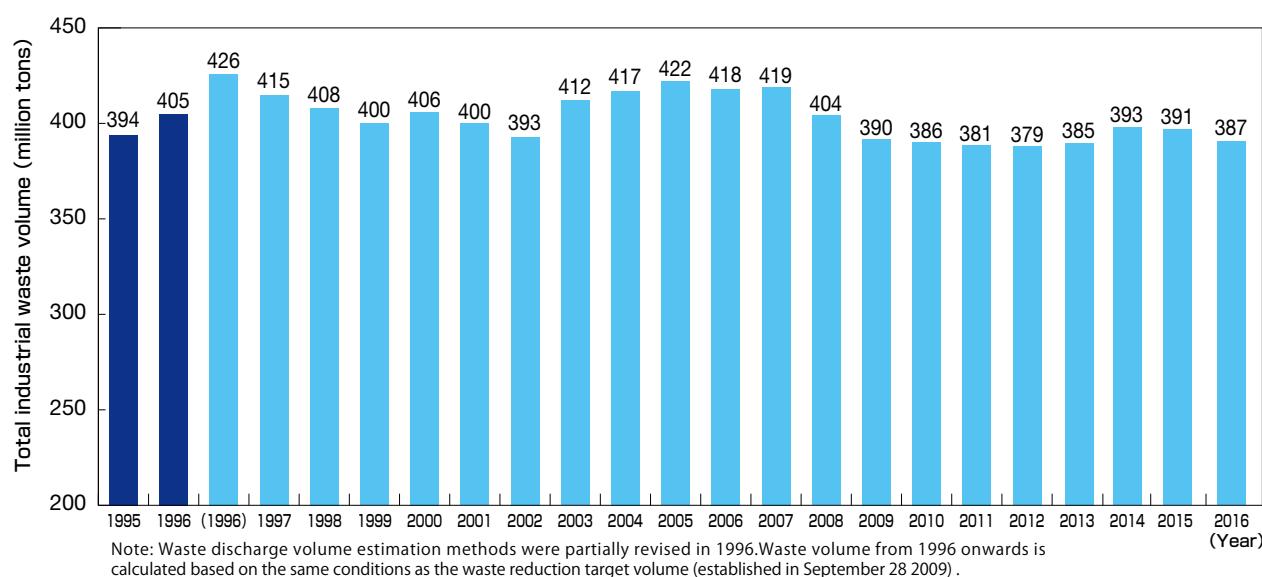


Source: MOE website (Tentative Translated by Eco-Mo Foundation)

② Trends in industrial waste volume

The amount of industrial waste produced has stayed roughly at the same level since the 1990s at approximately 400 million tons.

● Industrial waste volume



Source: MOE website (Tentative Translated by Eco-Mo Foundation)

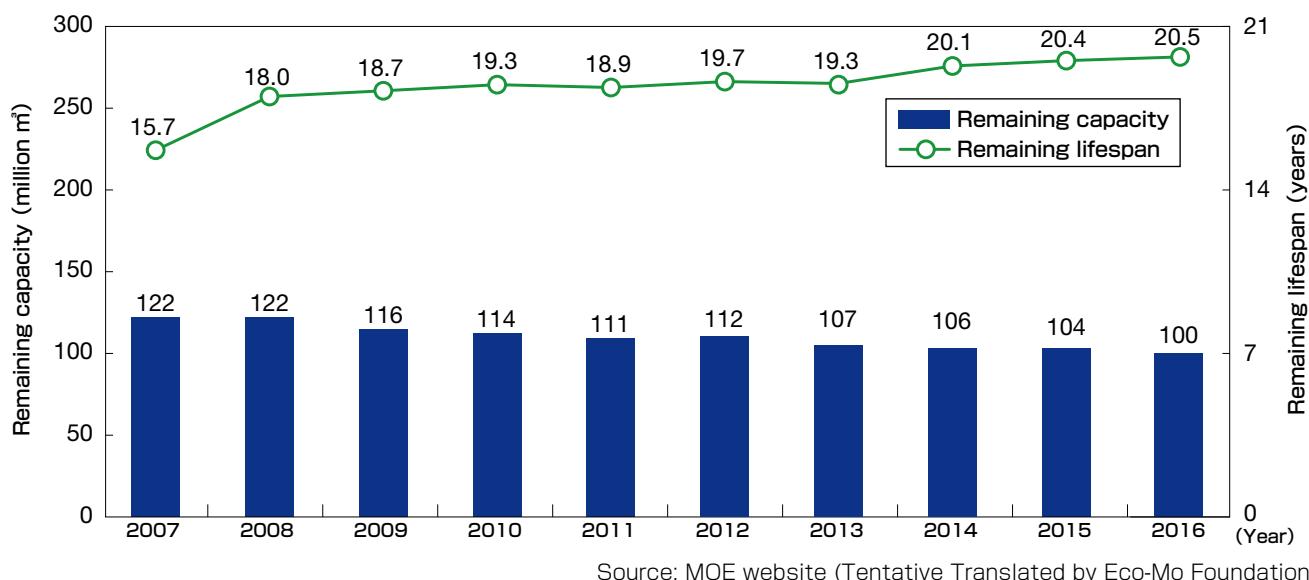
II. Current Status of Major Environmental Problems of the Transport Sector

③ Remaining lifespans and remaining capacities of general and industrial waste final disposal sites

As of the end of 2016 there were 1,661 general waste final disposal sites in Japan with a remaining capacity of 99.63 million m³. The average remaining lifespan was 20.5 years. The remaining capacity is shrinking, and the remaining lifespan is decreasing.

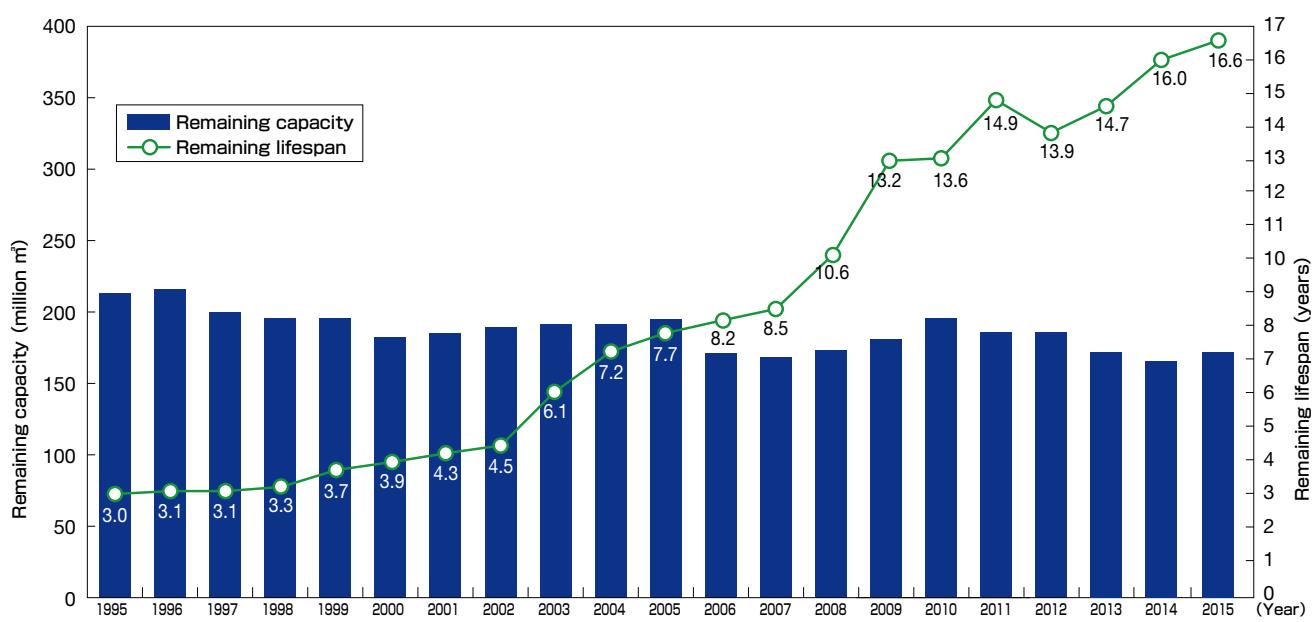
The remaining capacity of industrial waste final disposal sites as of the end of 2015 was 167.36 million m³, 1.31 million m³ more than the previous year. The average nationwide remaining lifespan is 16.6 years. Slight improvements are being made, but the remaining lifespan in the Tokyo area is 4.8 years, and remaining capacities are particularly low for major metropolitan areas.

● Remaining lifespans and remaining capacities of final disposal sites (general waste)



Source: MOE website (Tentative Translated by Eco-Mo Foundation)

● Remaining lifespans and remaining capacities of final disposal sites (industrial waste)

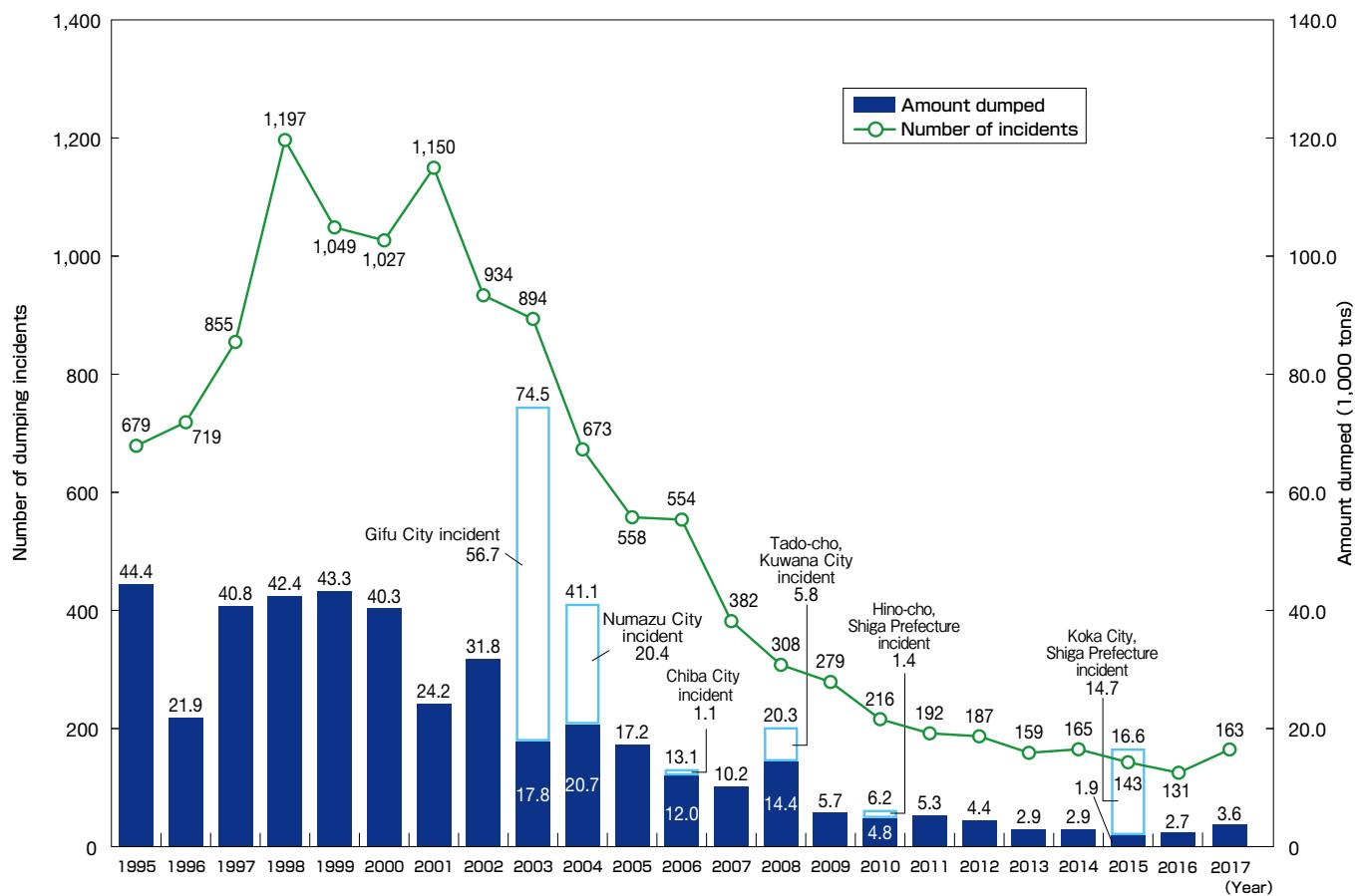


Source: MOE website (Tentative Translated by Eco-Mo Foundation)

④ Trends in number of incidents of illegal dumping, etc., and amount dumped

163 incidents of illegal dumping of industrial waste, a total of 36,000 tons of waste, were discovered in 2017, along with 161 incidents of improper disposal (60,000 tons). Newly discovered cases of illegal dumping decreased considerably and steady results are being observed. Regarding improper disposal, new incidents were discovered in 2017; thus, elimination thereof has not yet been achieved.

● Number of incidents of illegal dumping of industrial waste and amount dumped



Note)

- The number of incidents of illegal dumping and the amount of illegally dumped waste were calculated based on incidents of illegal dumping of 10t or more of industrial waste per incident identified by the governments of prefectures and designated cities (as well as all incidents of illegal dumping of special controlled industrial waste).
- With regards to the white areas of the bar graph, the incidents discovered in Gifu City in 2003 and in Numazu City in 2004 took place over multiple preceding years, resulting in the discoveries of major volumes of illegally dumped waste in the respective years. The white area of the bar graph corresponding to the 2006 Chiba City incident indicates an incident which was discovered in 1998 but was reported in 2006. The white area of the bar graph corresponding to the 2008 Tado-cho, Kuwana City incident indicates an incident which was discovered in 2006 but was reported in 2008. The white area of the bar graph corresponding to the 2010 Hino-cho, Shiga Prefecture incident indicates an incident which was discovered in 2009 but was reported in 2010.
- As for 2015, incidents of Koka city, Shiga Prefecture and Ube City, Yamaguchi Prefecture, and Kuji City, Iwate Prefecture are reported as major incident.
- The sulfuric acid pitch were not included in this study and are covered separately.
- Ferosilt dumping incidents were not included in this study. 720,000 tons of Ferosilt were sold and used as backfilling material since August 2001, but it was later discovered that the manufacturer and seller of Ferosilt had mixed in toxic waste liquid, making this an illegal industrial waste dumping incident. Illegal dumping was confirmed in 45 locations in 4 prefectures, and Ferosilt removal has been completed in all of these locations.

* Amounts are rounded, so totals may not match.

Source: MOE website (Tentative Translated by Eco-Mo Foundation)

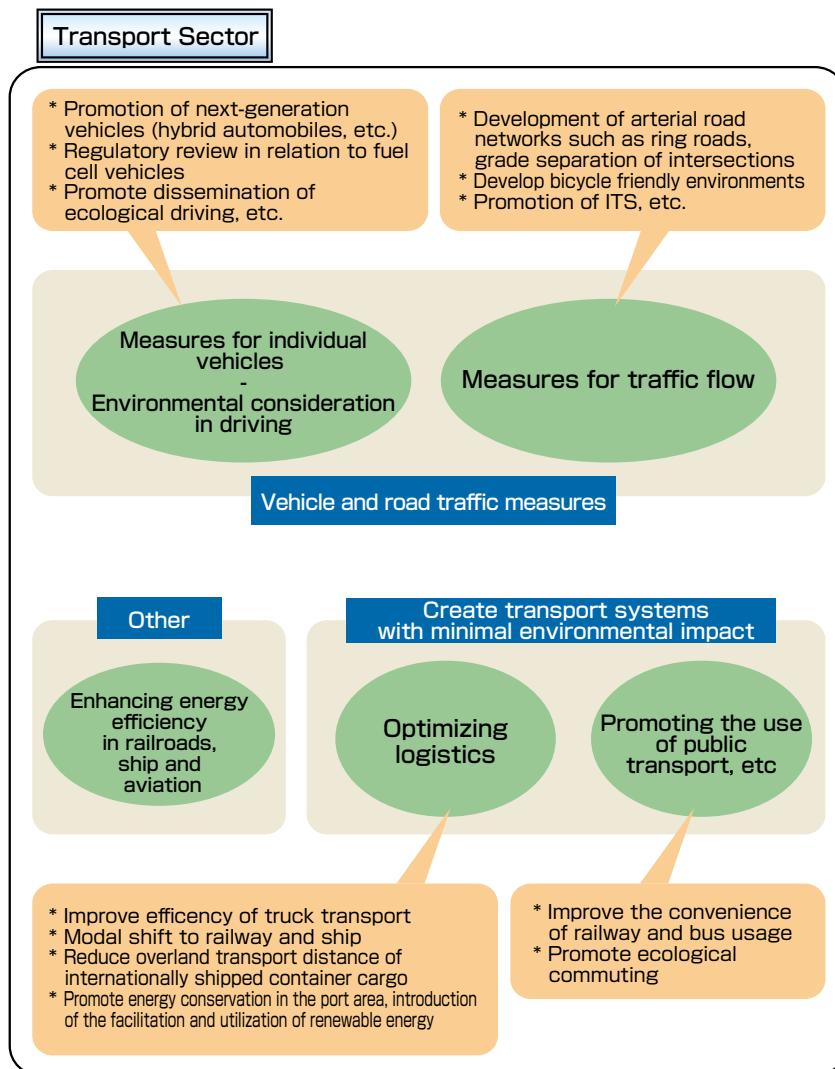
III. Measures in Response to Major Environmental Problems of the Transport Sector

1 Promotion of global warming countermeasures

(1) Transport sector countermeasures

The amount of carbon dioxide emitted by the transport sector in 2016 was 3.9% greater than the amount emitted in 1990, but emissions volume has been decreasing since 2001. In order to ensure that this decrease continues steadily, the MLIT is promoting comprehensive measures such as automobile and road traffic measures, logistics efficiency improvements, and promoting the use of public transport.

● Global warming countermeasures of MLIT



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

①Promotion of individual automobile measures

The automobile sector accounts for a large share of the energy consumed by the transport sector, so individual automobile measures have been implemented, including further improving fuel efficiency through the world's leading fuel efficiency technologies and measures to promote the use of automobiles with superior fuel efficiency and the use of clean energy vehicles.

■Fuel efficiency improvements through Top Runner Standards

○The Energy Saving Act and fuel efficiency standards (Top Runner Standards)

Improving automobile fuel efficiency is extremely important to reduce automobile CO₂ emissions and promote global warming countermeasures. In order to promote the improvement of automobile fuel efficiency, fuel efficiency standards (Top Runner Standards*) have been established based on the Act on the Rational Use of Energy (Energy Saving Act).

As a result, automobile manufacturing industry members (automobile manufacturers and importers) are required to improve fuel efficiency performance such that the average fuel efficiency of vehicles sold (determined by taking the weighted harmonic average of automobile fuel efficiency values) does not fall below standards set for each company based on their vehicle sales composition. Furthermore, it requires that they post fuel efficiency related information so that automobile users can select automobiles with superior fuel efficiency, and the fuel efficiency values are listed in the product catalogs of individual automobiles.

* Top Runner Standards: Standards based on the currently commercially available automobiles with the highest fuel efficiencies, taking into consideration future technological advances

○Fuel efficiency standards

In March 1999 fuel efficiency standards for 2010 were formulated for passenger and small cargo vehicles, based on the Top Runner Standards concept.

In March 2006 the world's first heavy duty vehicle (truck, bus, etc.) fuel efficiency standards were formulated, with a target year of 2015.

In July 2007 new fuel efficiency standards were formulated for passenger vehicles. These new standards aimed for a 23.5% improvement in fuel efficiency (versus 2004) for passenger vehicles by 2015.

In March 2013 new fuel efficiency standards were created for passenger vehicles, aimed at 2020, requiring fuel efficiency to be improved by 24.1% versus actual 2009 figures, assuming a shipped vehicle composition equivalent to that of 2009. Furthermore, in July 2015 fuel efficiency standards for 2022 were formulated for small cargo vehicles, based on the assumption of equivalent shipment volume as in 2012, requiring them to be 26.1% more fuel efficient than vehicles sold in 2012 (based on actual 2012 vehicle fuel efficiency).

○New fuel efficiency test method

In conjunction with the new 2015 fuel efficiency standards, the method for testing fuel efficiency was revised to more closely approximate actual driving conditions. In the past, 10-15 mode driving was used to test fuel efficiency, but this was changed to JC08 mode driving.

Under JC08 mode, driving is performed using a greater number of speed changes to reflect actual driving conditions. It also includes measurement methods under which vehicles are started with cold engines, in addition to starting with warmed up engines.

III. Measures in Response to Major Environmental Problems of the Transport Sector

The World Light Vehicle Test Procedure (WLPT) was established at the UNECE World Forum for Harmonization of Vehicle Regulations (WP29), held in March 2014. In October 2016 Japan added WLTP to JC08 Mode as a method of testing exhaust gas emissions and fuel efficiency for passenger vehicles.

●Passenger vehicles

[Gasoline passenger vehicles, diesel passenger vehicles, and LP gas passenger vehicles (with occupancies less than 10 people or total vehicle weight of 3.5ton or less) and minibus (passenger vehicles with occupancies of 11 or more and total vehicle weight of 3.5t or less)] Target year: 2020
Measurement method: JC08 mode or WLTC mode

Category (Total vehicle weight (kg))	~740	741 ~855	856 ~970	971 ~1080	1081 ~1195	1196 ~1310	1311 ~1420	1421 ~1530	1531 ~1650	1651 ~1760	1761 ~1870	1871 ~1990	1991 ~2100	2101 ~2270	2271~
Fuel efficiency standard (km/L)	24.6	24.5	23.7	23.4	21.8	20.3	19.0	17.6	16.5	15.4	14.4	13.5	12.7	11.9	10.6

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

●Trucks/Freight vehicles

[Gasoline cargo vehicles and diesel cargo vehicles (total vehicle weight of 3.5t or less)] Target year: 2022 Measurement method: JC08 mode or WLTC mode

Category (Total vehicle weight (kg))	~740	741 ~855	856 ~970	971 ~1080	1081 ~1195	1196 ~1310	1311 ~1420	1421 ~1530	1531 ~1650	1651 ~1760	1761 ~1870	1871 ~1990	1991 ~2100	2101~
Structure A: Vehicles with structures matching ①, ②, or ③ below.														
① Maximum carrying capacity divided by total vehicle weight is 0.3 or less.														
② The same cab contains both passenger boarding and article loading appurtenances, and the cab is separated from the outside of the vehicle by a fixed roof, window glass, or other partition.														
③ There is an engine in front of the driving cabin.														
Structure B: Vehicles to which none of the above apply.														

(Note)

Structure A: Vehicles with structures matching ①, ②, or ③ below.

① Maximum carrying capacity divided by total vehicle weight is 0.3 or less.

② The same cab contains both passenger boarding and article loading appurtenances, and the cab is separated from the outside of the vehicle by a fixed roof, window glass, or other partition.

③ There is an engine in front of the driving cabin.

Structure B: Vehicles to which none of the above apply.

[Trucks, etc. (freight vehicles with total vehicle weights exceeding 3.5t)] Target year: 2015 Measurement method: Heavy duty vehicle mode

Category (total vehicle weight (t))	3.5~7.5				7.5~8	8~10	10~12	12~14	14~16	16~20	20~	
	~1.5	1.5~2	2~3	3~								
Fuel efficiency standard (km/L)	10.83	10.35	9.51	8.12	7.24	6.52	6.00	5.69	4.97	4.15	4.04	

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

■Measures for developing and promoting the next-generation vehicles

Because Japan's overall CO₂ emissions, the transport sector occupies around 20% and around 90% of that is emissions from automobiles, the raising of fuel efficiency and emission performance in automobiles is extremely important.

In order to promote environmental conservation, starting with the reduction of CO₂ emissions, Japan's government designates electric vehicles, fuel cell vehicles, plug-in hybrid vehicles, hybrid vehicles, clean diesel vehicles and natural gas vehicles as "the next-generation vehicles" and is planning for their promotion.

Due to this, along with raising fuel efficiency through the establishment of standards and harmonizing international technical standards, measures are being carried out to encourage the promotion of the next-generation vehicles, beginning with tax benefits and support systems.

Specifically, by establishing fuel efficiency standards based on the Energy Saving Act and requiring automobile manufacturers to meet such standards, the promotion of highly fuel efficient automobiles, including the next-generation vehicles, is being encouraged. Also, Japan is taking the lead in establishing international standards for the next-generation vehicles, and this is expected to help expand such electric technologies as electric cars and fuel cell vehicles, improve Japan's automobile safety and environmental performance and strengthen the breadth of international competition.

Furthermore, a tax benefits system for automobiles with excellent environmental performance, including the next-generation vehicles, is being established and eco-car tax reductions for greater environmental performance that exempt automobile acquisition tax and motor vehicle tonnage tax are being enforced in order to encourage promotion.

Examples of automobile taxes (Motor vehicle tonnage tax, automobile acquisition tax, light vehicle tax) *As of the end of 2018

	Passenger vehicles									Heavy vehicles						
Eco-car tax reductions (motor vehicle tonnage tax / automobile acquisition tax)	2018		2015 fuel efficiency standard			2020 fuel efficiency standard			EVs, etc. *1		2018		2015 fuel efficiency standard			EVs, etc. *1
	Achieved	+5%	+10%	Achieved	+10%	+20%	+30%	+40%		No Achieved	Achieved	+5%	+10%	+15%	Tax exempt *3	
	Motor vehicle tonnage tax	Outside scope	Main regulation*2	▲25%	▲50%	▲75%				Motor vehicle tonnage tax	Outside scope	▲25%	▲50%	▲75%	Tax exempt *3	
Green tax provision (vehicle tax)	Automobile acquisition tax	Outside scope		▲20%	▲40%	▲60%	▲80%		Not taxed	Automobile acquisition tax					Not taxed	
	2017 / 2018	2015 fuel efficiency standard			2020 fuel efficiency standard					2017 / 2018	Reduction rate					
	Registered vehicle	Achieved +5% +10% +20%			Achieved	+10%	+20%	+30%		EVs, etc.*1	▲75%					
Light vehicle		Outside scope			▲50%		▲75%				▲25%		▲50%	▲75%		

*1 "EVs, etc." refers: in the case of passenger vehicles, to electric vehicles, fuel cell vehicles, plug-in hybrid vehicles, natural gas vehicles, and clean diesel passenger vehicles; in the case of light vehicle tax green tax provisions for light vehicle tax, to electric vehicles and natural gas vehicles; and in the case of heavy vehicles, to electric vehicles, fuel cell vehicles, plug-in hybrid vehicles, and natural gas vehicles.

*2 For new inspections of new vehicle only, the main regulation rate is applied instead of the intermediary tax rate (excluding hybrid vehicles and light motors from 2017 onwards).

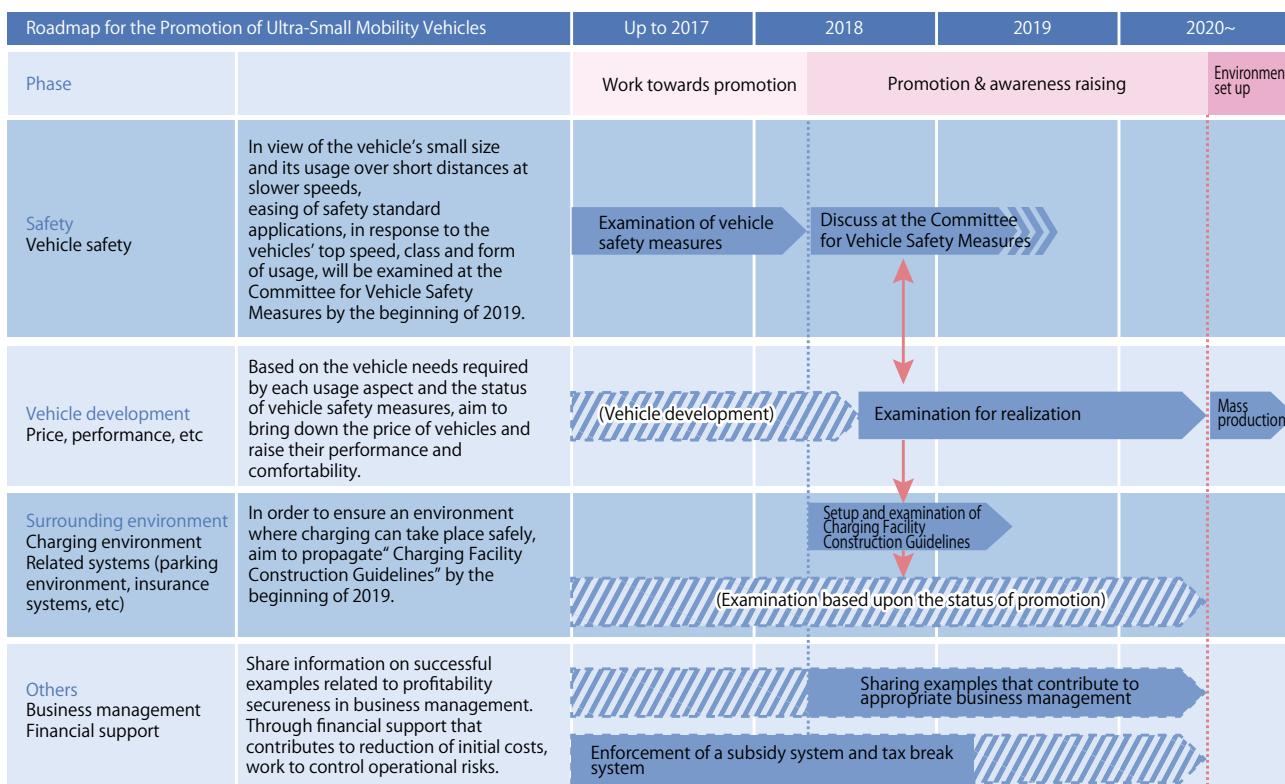
*3 For passenger vehicles, under the current system, vehicles which have received tax exemptions when undergoing new inspections of new vehicle will be exempted from taxes for initial and subsequent inspections in 2017 provided that they have satisfied tax exemption requirements and achieved the +40% fuel efficiency standard for 2020, and in 2018 provided that that they have satisfied tax exemption requirements and achieved the +50% fuel efficiency standard for 2020. For heavy vehicles, those which have received tax exemptions when undergoing new inspections of new vehicles will be exempted from taxes for initial and subsequent inspections.

*4 With regard to vehicles which have achieved 2020 fuel consumption standards, the deduction will be 50% only for those which have met the +20% 2015 fuel consumption standard.

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

In addition, for the next-generation vehicles, such as electric vehicles and plug-in hybrid vehicles that are used for commercial purposes, including buses, taxis and trucks, partial support for vehicle prices when they are introduced is being carried out.

In particular, in regard to ultra-small electric mobility vehicles that are compact, agile, exceptionally environmentally performative, are an easy means for moving around regional areas, and are for around one to two passengers, the revising of the certification system was carried out in January 2018. Also, in May of the same year a collection was publicly announced that includes a roadmap aiming for full-scale promotion and mass production at the "Seminar for Ultra-Small Mobility Vehicles Coexisting with the Region".



(May 2018) Committee summary

2020 Tokyo Olympics & Paralympics

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

②Promotion of environmentally friendly automobile usage

“Eco-driving” has been positioned as an environmentally friendly automobile usage promotion measure. The Eco-Drive Promotion Liaison Committee (National Police Agency (NPA), METI, MLIT, and MOE) formulated the Eco-Driving Dissemination and Promotion Action Plan, and the Committee and related organizations are actively promoting these efforts.

In 2006 the committee proposed the “10 Tips for Eco-driving”, which outlined specific eco-driving efforts. These recommendations were revised in 2012.

●10 Tips for Eco-driving

1 Accelerate gently.

発進するときは、穏やかにアクセルを踏んで発進しましょう（最初の5秒で、時速20km程度が目安です）。日々の運転において、やさしい発進を心がけるだけで、10%程度燃費が改善します。焦らず、穏やかな発進は、安全運転にもつながります。

2 Maintain a steady speed and keep your distance.

走行中は、一定の速度で走ることを心がけましょう。車両距離が短くなると、ムダな加速・減速の機会が多くなり、市街地では2%程度、郊外では6%程度も燃費が悪化します。交通状況に応じて速度変化の少ない運転を心がけましょう。

3 Slow down by releasing the accelerator.

信号が変わるなど停止することがわかつたら、早めにアクセルから足を離しましょう。そうするとエンジンブレーキが作動し、2%程度燃費が改善します。また、減速するときや坂道を下るときにもエンジンブレーキを活用しましょう。

4 Make appropriate use of your air conditioner.

車のエアコン（A/C）は車内を冷却・除湿する機能です。暖房のみ必要なときは、エアコンスイッチをOFFにしましょう。また、冷房が必要なときは、車内を冷やすすぎないようにしましょう。たとえば、車内の温度設定を外気と同じ25℃に設定した場合、エアコンスイッチをONにしたままだと12%程度燃費が悪化します。

5 Don't warm up or idle your engine.

待ち合わせや荷物の積み下ろしなどによる駐停車の際は、アイドリングはやめましょう^{*1}。10分間のアイドリング（エアコンOFFの場合）で、130cc程度の燃料を消費します。また、現在の乗用車では基本的に暖機運転は不要です^{*2}。エンジンをかけたらすぐに出発しましょう。

6 Plan your itinerary to avoid congested routes.

出かける前に、渋滞・交通規制などの道路交通情報や、地図・カーナビなどを活用して、行き先やルートをあらかじめ確認し、時間に余裕をもって出発しましょう。さらに、出発後も道路交通情報をチェックして渋滞を避けながら燃費と時間の節約になります。たとえば、1時間のドライブで道に迷い、10分間余計に走行するると17%程度燃料消費量が増加します。

7 Check your tire pressure regularly.

タイヤの空気圧チェックを習慣づけましょう。タイヤの空気圧が適正値より不足すると、市街地で2%程度、郊外で4%程度燃費が悪化します（適正値より50kPa (0.5kg/cm²) 不足した場合）。また、エンジンオイル・オイルフィルタ・エアクリーナエレメントなどの定期的な交換によっても燃費が改善します。

8 Reduce your load.

運ぶ必要のない荷物は車からおろしましょう。車の燃費は、荷物の重さに大きく影響されます。たとえば、100kgの荷物を載せて走ると、3%程度も燃費が悪化します。また、車の燃費は、空気抵抗にも敏感です。スキーキャリアなどの外装品は、使用しないときには外しましょう。

9 Respect parking rules and regulations.

迷惑駐車はやめましょう。交差点付近などの交通の妨げになる場所での駐車は、渋滞をもたらします。迷惑駐車は、他の車の燃費を悪化させるばかりか、交通事故の原因にもなります。迷惑駐車の少ない道路では、平均速度が向上し、燃費の悪化を防ぎます。

10 Check the readings on your fuel efficiency-monitoring equipment.

自分の車の燃費を記録することを習慣にしましょう。日々の燃費を把握すると、自分のエコドライブ効果が実感できます。車に装備されている燃費計・エコドライブナビゲーション・インターネットでの燃費管理などのエコドライブ支援機能を使うと便利です。

*1：交差点で待つことになると、車のアイドリングストップ機能が動作するため注意しましょう。（自動アイドリングストップ機能搭載車は問題ありません。）
*2：手動アイドリングストップ時に荷物の荷台やブレーキの音が響くことがあります。
*3：車の出し入れ動作や停車場における駐車料金などは考慮しない場合があります。
*4：エアコンなどの完全遮断や方向指示器などが作動しないため、先頭車両の直後や直進でのドライバードラッグストップは受けられません。

エコドライブ普及推進協議会
主催：国土交通省
事務局：交通エコロジー・モビリティ財團

Source: The Eco-Drive Promotion Liaison Committee

Definition of the levels and the status of initiatives regarding autonomous driving

In recent years, owing to technological innovation, initiatives toward autonomous driving are making headway and attention is being focused on the trends.

In "Public Private ITS Initiative/Roadmaps 2017," the Japanese government adopted the definition of SAE International's J3016 (September, 2016) as the definition for the levels of autonomous driving.

●Summary of the definition of autonomous driving (J3016)

Level	Summary	Main respondent to surveillance for safe driving
Driver carries out all or part of the driving tasks		
SAE Level 0 No automatic driving	· The driver carries out all of the driving tasks	Driver
SAE Level 1 Driver assistance	· The system carries out the driving subtask of either front/back or left/right vehicle control	Driver
SAE Level 2 Partial automatic driving	· The system carries out the driving subtask of both front/back and left/right vehicle control	Driver
Autonomous driving system carries out all of the driving tasks		
SAE Level 3 Conditional automatic driving	· The system carries out all driving tasks (within designated domain) · If continuous operation is difficult, the driver is expected to respond appropriately to the system's requests for intervention	System (Driver, when continuous operation is difficult)
SAE Level 4 Advanced automatic driving	· The system carries out all driving tasks (within the designated domain) · If continuous operation is difficult, the user is not expected to respond.	System
SAE Level 5 Complete automatic driving	· The system carries out all driving tasks (not limited to the designated domain) · If continuous operation is difficult, the user is not expected to respond.	System

Source: Home page of Prime Minister of Japan and the Cabinet
(Tentative Translated by Eco-Mo Foundation)

MLIT has started an autonomous driving service at semi-mountainous areas with Roadside-station (michi-no-eki) as the base. In semi-mountainous areas with a super-aging population, a goal has been set of introducing autonomous driving services focusing on regional hubs such as Roadside-station, and an experiment is being carried out to verify the feasibility of securing the flow of both people and goods.

This experiment includes motor-driven carts running on a designated route by sensing the magnetic force from the underground electromagnetic induction line, and motor-driven carts identifying the vehicle position based on GPS and running on a designated route.



●Example of a bus-type vehicle

Eco-tires

In the past “high fuel efficient tires” publicized by tire manufacturers were tested by themselves using their own internal testing standards. This created a demand for a unified evaluation method and selectable indices which would be used to compare products. In December 2009 the JIS tire rolling resistance testing method was established.

Based on this standard, The Japan Automobile Tyre Manufacturers Association formulated “High fuel efficient tire promotion related labeling guidelines (labeling system)” in order to promote the use of these. This guideline went into effect in January 2010.

The labeling system applies to passenger vehicle summer tires sold as replacement tires by tire retailers, etc. Tires within the following range are considered high fuel efficient tires.

Tire grading system

Rolling resistance coefficient	Grade	Wet grip performance (G)	Grade
RRC≤6.5	AAA	155≤G	a
6.6≤RRC≤7.7	AA	140≤G≤154	b
7.8≤RRC≤9.0	A	125≤G≤139	c
9.1≤RRC≤10.5	B	110≤G≤124	d
10.6≤RRC≤12.0	C		

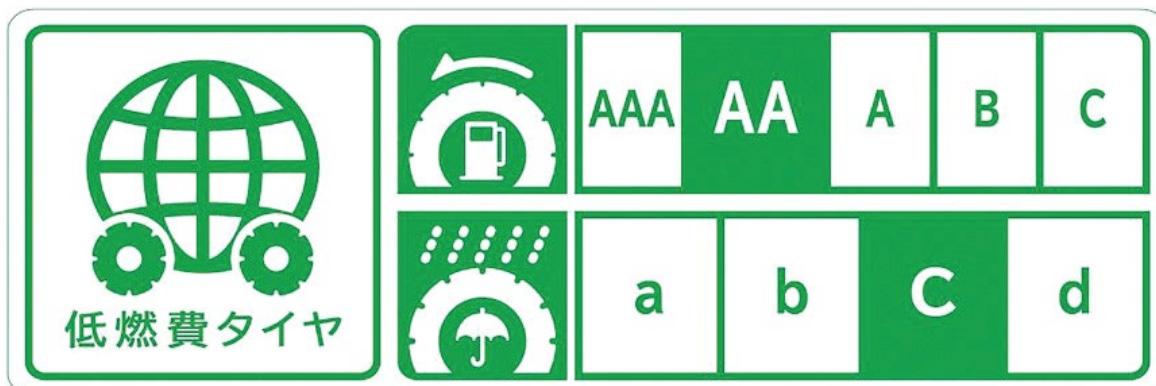
High fuel efficient tire performance requirements

Rolling resistance coefficient : 9.0 or less (Grade AAA to A)

Wet grip performance: 110 or greater (Grade a to d)

●Example of Eco-tires Labeling

In the example below, the rolling resistance grade is AA and the wet grip performance grade is c, so the tire meets high fuel efficient tire standards.



(Eco-tires)

Source: The Japan Automobile Tire Manufacturers Association
(Tentative Translated by Eco-Mo Foundation)

③Promotion of traffic flow measures

Smoother traffic flow increases driving speeds, which in turn produces greater effective fuel efficiency and reduces carbon dioxide emissions from vehicles. MLIT is implementing various traffic flow measures.

Specifically, these include the enhancement of arterial road networks, such as ring roads, which are effective at reducing the amount of traffic influx into central urban areas by providing alternate traffic routes, the creation of multilevel intersections, the promotion of projects for continuous grade separation, etc., in order to eliminate unopened railroad crossings, and other initiatives for reducing traffic congestion in urban areas. They also include the use of big data collected using ITS technology, the optimization of existing networks. Also, in order to continue environmental development for encouraging bicycle usage and reducing the carbon footprint of road facilities, LED road lighting is being installed.

■Strengthening the efficiency of distribution networks

In order to realize fast and smooth freight distribution, strengthen competitiveness on the world stage, and ease traffic congestion, the ring highways around Tokyo, Osaka and Nagoya will be intensively developed and the transport modal links between airports and harbors (distribution modal connect) will be strengthened. Also, manpower-saving and streamlining of truck transportation will be promoted through the introduction of double-connected trucks and the speed up of passing permission for special vehicles.

■Promoting efforts to smarter use roads with ETC2.0 service

Efforts to use roads more wisely will be promoted, such as pinpointing areas that are congestion bottlenecks based on scientific analysis of bigdata that makes use of ETC2.0.

■Development and support of bicycle environments

Promote the development of bicycle by providing bicycle-lanes and encourage a modal transfer from automobiles to bicycles.

■Measures for railroad crossings that don't open most of the time

Push forward the elimination of railroad crossings that don't open most of the time and congest traffic.

■Reduction of road works

Enforce the reduction of road works through collaborative construction work, concentrated work, and the development of common ducts.

■Implementing LED road lights

Push forward the implementation of energy-saving LED road lights when the lights are newly constructed or updated.

■Extending the lifetime of pedestrian overpasses

In order to extend the life of road stock, promote changing from post maintenance management, where large-scale repairs are carried out after damage has become serious, to preventative maintenance management, where repairs are carried out while the damage is still only slight.

④Improvement of freight distribution efficiency

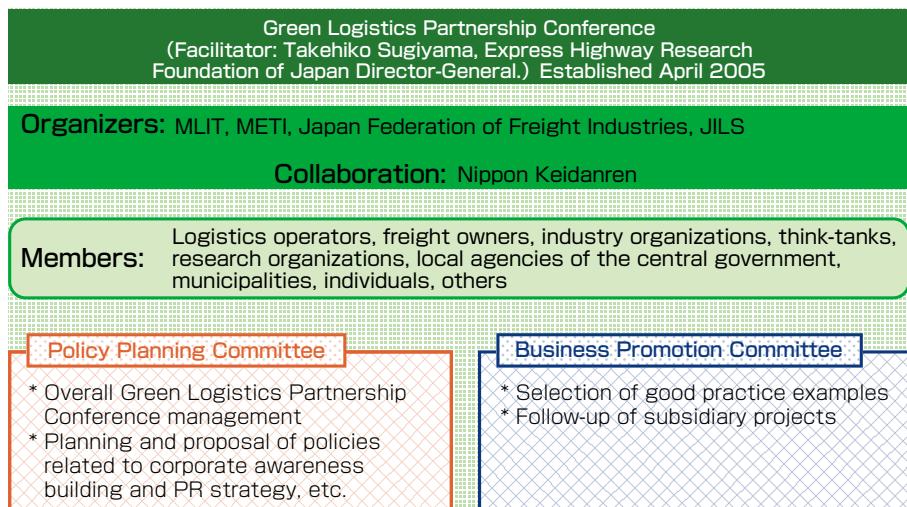
■Creation of sustainable logistics systems through collaboration between freight owners and logistics operators

○Green Logistics Partnership Conference

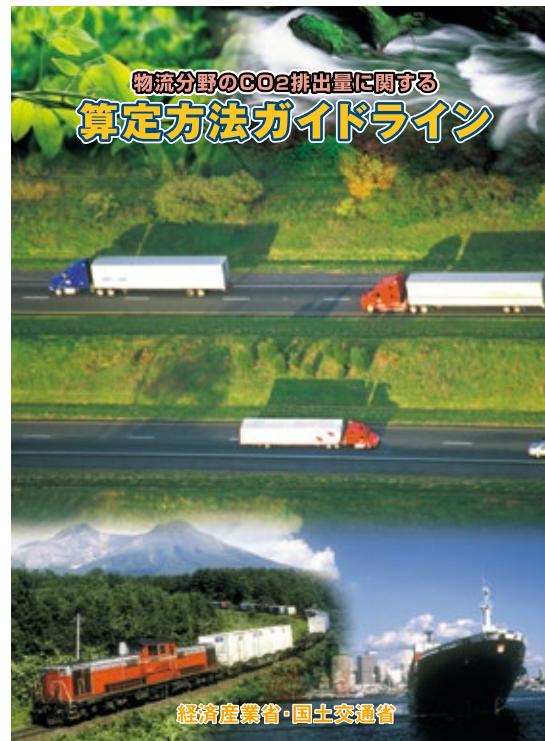
Promoting the creation of a greener overall logistics system requires greater collaboration between freight owners and logistics operators, and the expansion of sustainable logistics systems for global warming countermeasures improving productivity, etc.

The Green Logistics Partnership Conference, launched in 2004 and composed of companies and organizations united by this goal, strives to promote mutual understanding of the importance of the Green Logistics and improve coordination between freight owners and logistics operators, in order to carry out modal shifts and improve truck transport efficiency.

As part of these activities, the Joint Guidelines on the Method for Calculating CO₂ Emissions by the Logistics Sector (Ver. 3.0) (METI, MLIT) were formulated. These guidelines establish a unified method of calculating carbon dioxide emissions by the logistics sector, and can be used by both freight owners and logistics operators for smoother collaboration. They make it possible to objectively evaluate the effectiveness of individual measures. Each year the organization gathers proposals from its members regarding specific Green Logistics Partnership implementation projects in order to promote measures for reducing CO₂ emissions. Particularly successful good practice example projects involving logistics operators and freight owners engaging in partnerships to reduce CO₂ emissions, to create sustainable logistics systems for improving productivity, etc. are recognized by MLIT Minister awards.



Source: Green Logistics Partnership Conference (Tentative Translated by Eco-Mo Foundation)



(Pamflet of The Joint Guidelines on the Method for Calculating CO₂ Emissions)

Source: Green Logistics Partnership Conference

■Promotion of modal shift and increased efficiency of freight distribution

- Enhanced coastal shipping competitiveness and modal shift to sea transport

The MLIT is engaged in efforts aimed at strengthening the competitiveness of the coastal shipping industry and promoting a modal shift to sea transport.

As part of these efforts it is implementing the Eco-Ship Modal Shift Project, which promotes modal shift by selecting companies which contribute to modal shift by using some degree of sea transport, and permitting those companies to use the Eco-Ship Mark. As part of this project, the Eco-Ship Modal Shift Project Executive Committee has implemented an Eco-Ship Mark certification system (the Eco-Ship Mark indicates that a company is contributing to environmental efforts by using sea transport). Since August 2018, 146 freight owners and 164 logistics operators have received Eco-Ship Mark certification. Eco-Ship Mark certified companies are also selected to receive MLIT Maritime Bureau Chief awards.



(Poster of invitation for Eco-Ship Mark certification)
Source: Committee for Implementation of Eco-Ship Modal Shift Operations

III. Measures in Response to Major Environmental Problems of the Transport Sector

○ Project to encourage the network-type carbon footprint reduction of railway transport systems

Railroads are essential parts of the daily lives and economic activities of the people of Japan. It is vital that they will be capable of maintaining regular operation even in the event of emergency situations such as power restrictions. Implementing cutting edge efforts to reduce energy consumption and carbon emissions from rail lines, which are used by about 70 million people a day, contributes to greater societal energy conservation and environmental awareness. The MLIT is implementing Project to encourage the network-type carbon footprint reduction of railway transport systems, supporting rail operators who are implementing systematic efforts to reduce power consumption and carbon emissions for entire rail lines by using renewable energy in train stations and train control centers and installing energy saving facilities for efficient energy usage. Through this support, the project promotes reductions in energy usage by rail lines and the adoption of carbon emissions reducing technologies.

○ “Eco Rail Mark” system promotion and expansion

The “Eco Rail Mark” was established in 2005 to certify companies and products which are proactively working to achieve low environmental impact rail freight transport. By supporting companies and products certified with the “Eco Rail Mark”, awareness of environmental impact reduction efforts increases, among freight owner companies such as manufacturers, as well as consumers, with the goal of promoting a corresponding modal shift to rail freight transport. The MLIT and Railway Freight Association (RFA) are striving to further promote and expand the “Eco Rail Mark”. As of September 26, 2018 there are 181 “Eco Rail Mark” product certifications for 206 products, 87 certified companies, and 36 certified supporting companies.

○ Promotion of comprehensive reductions in carbon emissions by ports

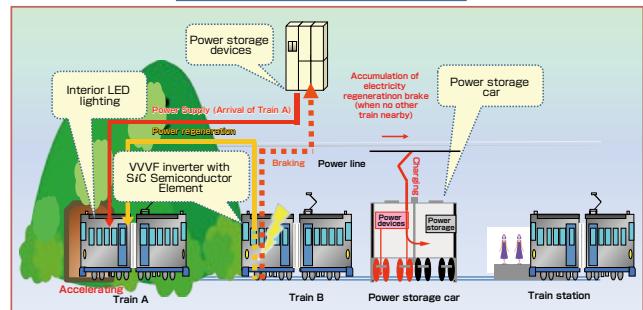
Port areas have large concentrations of cargo and passenger vessels, function as sites of industrial activity where land and sea freight distribution systems meet, and produce large amounts of greenhouse gasses. MLIT is striving to effectively reduce these emissions.

Specifically, “CO₂ Emission Source Countermeasures” are being carried out that include introducing offshore wind power generation, reducing the carbon footprint of such transport machinery as shipping vessels, cargo handling machinery and trailers, and introducing on-land power supply facilities. In addition, “CO₂ Absorption Source Countermeasures” are also being encouraged through use of blue carbon ecosystems

● Overview of Project to encourage the network-type carbon footprint reduction of railway transport systems

Promoting systematic efforts to reduce energy usage and carbon production, making entire rail lines environmentally friendly

Examples of rail measures (image)



Source: MLIT (Tentative Translated by Eco-Mo Foundation)



Source: RFA

● Comprehensive reductions in carbon emissions in ports



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

(marine forests, etc) that effectively use industrial by-product such as steel slag. By promoting these efforts, the realization of a world-first “carbon-free port” is being aimed for.

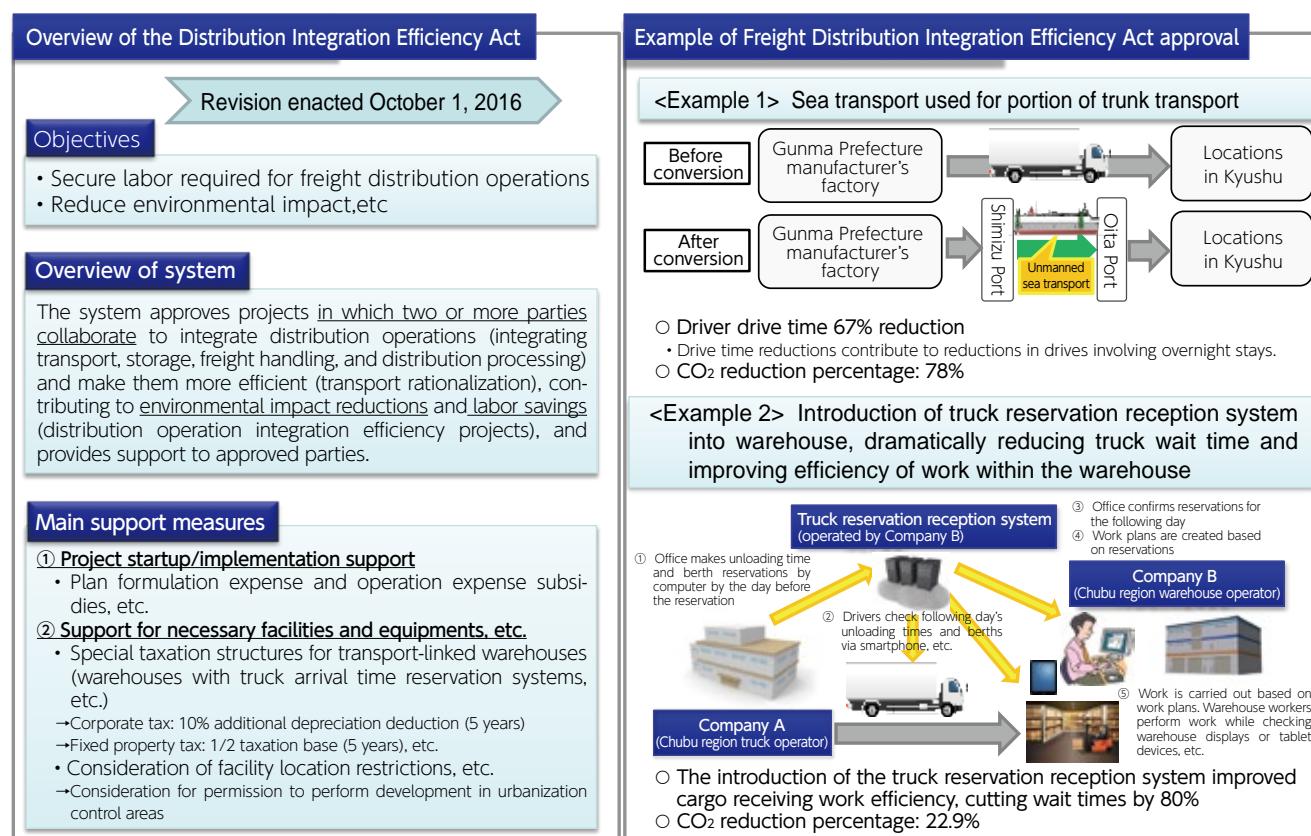
○With regards to the partial revision of the Act on Advancement of Integration and Streamlining of Freight Distribution Business (Distribution Integration Efficiency Act), in order to increase distribution efficiency and reduce environmental impact, plans have been approved for a project aimed at integrating and improving the efficiency of advanced freight distribution facilities with a specified minimum scale (specified freight distribution operation facilities) and other facilities. Roughly 300 projects have been approved since the establishment of Distribution Integration Efficiency Act on October 1, 2005.

On October 1, 2016, a revision to the Act was enacted, requiring two or more parties to collaborate during the implementation of projects. This revision was enacted in response to labor shortages in the distribution field, with the aim of expanding modal shifts among support recipients and measures which do not require joint delivery, etc., specified distribution operation facilities.

Based on this, as of the end of December, 2018, 123 diverse projects, including modal shifts, joint delivery, and special freight distribution operation facility wait time reduction, have been approved, and measures have been implemented to achieve freight distribution labor savings, improve freight distribution efficiency, and reduce environmental impact.

In June 1, 2018, an initiative was launched for the first time in Japan for shared-business of collection and delivery work of courier services within office buildings.

Distribution Integration Efficiency Act and labor savings



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

Promotion of the Green Management Certification System

In recent years there has been an increasing focus on environmental problems such as global warming and air pollution. Satisfying both environmental and economic concerns and creating a sustainable economic society has become an urgent challenge. The Eco-Mo Foundation has created and distributed a green management promotion manual containing checklists for self-assessment in order to promote environmental conservation activities by transport related companies. This manual, based on the concepts of ISO14031 (an international environmental performance evaluation standard), contains checklist items for environmental conservation items to be addressed, and descriptions of specific corresponding environmental efforts. This makes it easy to set and evaluate environmental targets, thereby achieving greener management.

Green management consists of companies assessing their own environmental conservation efforts, using promotion manuals as references in considering improvement measures based on the results of these environmental conservation efforts, creating action plans which include these improvement measures, and implementing them in order to achieve the improvements. This cycle makes it possible to implement proactive, ongoing environmental conservation activities.

The MLIT is striving to promote this green management as a countermeasure against environmental problems.

In order to promote green management, the Green Management Certification System was established in 2003. The Eco-Mo Foundation acts as the certification body under this system, objectively certifying and publicizing environmental improvement efforts by companies, based on the green management promotion manual. This produces greater understanding and motivation of the green management certified businesses by other companies and users, with the ultimate objective of reducing the environmental impact of the transport industry.



(Poster of Green Management certification System)



(Manual of the Green Management Certification System)

⑤Promotion of usage of public transport

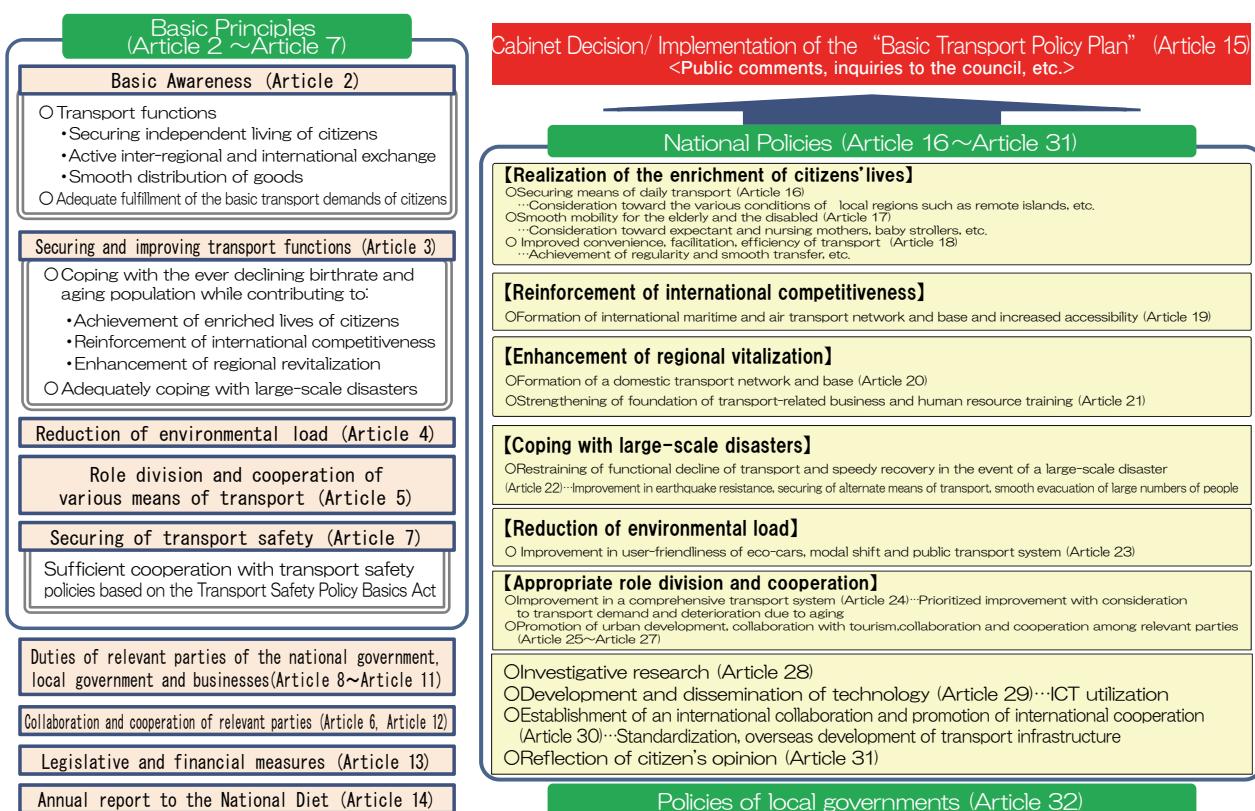
Creating new railroad lines and new transport systems, and making rail and bus transport more convenient, contribute a shift in passenger transport from private cars to public transport, which has less of an environmental impact. This leads to reductions in automobile CO₂ emissions, so various measures are being implemented in order to achieve this shift.

■Establishment of the Basic Act on Transport Policy

The Basic Act on Transport Policy defines the basic philosophy underpinning transport related measures in order to promote measures necessary for the national government to coordinate closely with local governments and transport companies in implementing comprehensive and systematic measures from the perspectives of increasing international competitiveness and regional vitality, and ensuring preparedness for large-scale disasters. This act applies to the international transport, national transport, and regional transport which acts as the infrastructure supporting Japan's economic and social activities. The Basic Transport Policy Plan which received Cabinet approval on February 13, 2015 stipulates 2014 to 2020 as the planning period and, based on this Plan, transport policies are being promoted both comprehensively and systematically.

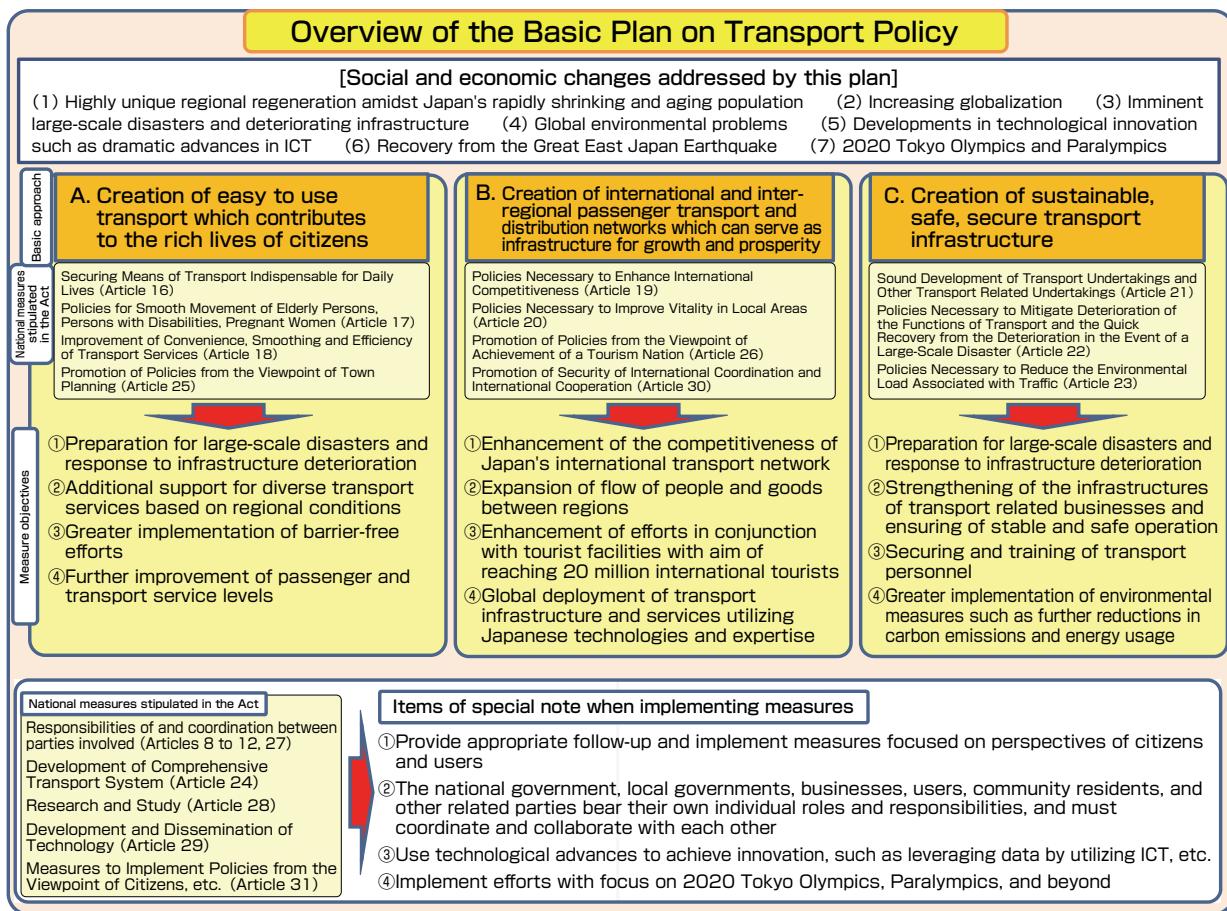
In addition, the Basic Transport Policy Plan requires Cabinet Decision on the Transport Policy White Paper and the 2018 version of the Transport Policy White Paper was decided on by the Cabinet and reported to the Diet in June 2018.

●Summary of the Basic Transport Policy Plan



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

III. Measures in Response to Major Environmental Problems of the Transport Sector



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

Measures for promoting rail use

The MLIT provides support for efforts by rail operators to promote the use of urban rail, achieve greater speeds on existing arterial railroads, achieve greater speeds on freight rail lines, convert freight rail lines into passenger rail lines, smooth interconnections, make comprehensive improvements to railway stations, and implement barrier-free measures in railway stations, etc.

It is also collaborating with rail operators in the “Eco Rail Campaign”, promoting the use of rail transport as an handy environmental action.

Support for the establishment of next generation streetcar systems (LRTs*), which are increasingly in the spotlight, is being provided as part of the Ministry's project of emergency measures for creating environments to accept foreign visitors.

* LRT: Short for “Light Rail Transit”. These next generation streetcar transport systems use low-floor trams (LRVs), improve their track and stop to provide easy boarding and unboarding, punctuality, travel speed, comfort, and other features.



(Campaign for eco using railways)
Source: MLIT (Tentative
Translated by Eco-Mo
Foundation)

●Overview of LRT systems

Overview of LRT systems

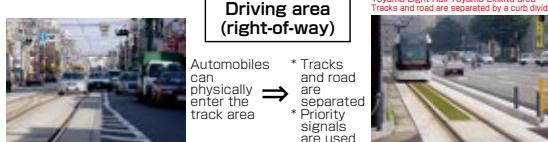
What is LRT (Light Rail Transit)?

LRT is an improvement on the driving areas, carriages, and other aspects of conventional streetcars, effectively utilizing existing road, rail, and other infrastructure. It is a public transport system which is friendly to people and to the environment, providing greater speeds, punctuality, and transport capabilities. It is gaining greater attention for its barrier free access and environmental friendliness, contributing to the restoration of urban and regional areas by vitalizing central urban districts.

Features

●High speeds and punctuality levels

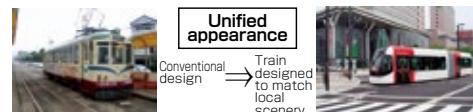
* LRT offers high speeds and high levels of punctuality through high performance carriage, the use of dedicated tracks, partial grade separation, signal prioritization, fare payment system improvements, and more.



Toyama Light Rail Toyama Ekita area
Tracks and road are separated by a curb divider

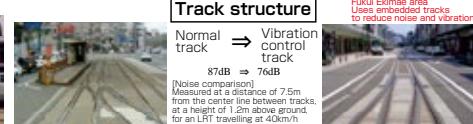
●Town planning efforts

* Installation of LRT as a town symbol to create lively center
* Can be installed in conjunction with other town planning measures such as development of station plaza and conversion of adjacent streets into transit malls, creation of park & ride parking lots, development of public facilities along the line, etc.



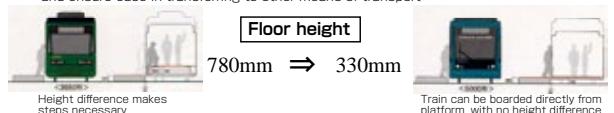
●Environmentally-friendly

* In addition to providing the environmentally friendly streetcar feature of producing CO₂ emissions less than automobiles, LRT systems also reduce noise and vibration through the use of resilient wheels and vibration control tracks



●People-friendly

* Low carriage floors, boarding and disboarding slopes, etc., eliminate height differences and ensure ease in transferring to other means of transport



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

III. Measures in Response to Major Environmental Problems of the Transport Sector

Revised Act on Vitalization and Rehabilitation of Local Public Transport Systems

In May 2014 a revision to the Basic Act on Transport Policy was issued, and enacted in November of the same year.

Also, the August 26, 2015, the Revised Act on Revitalization and Rehabilitation of Local Public Transport Systems and Japan Railway Construction, Transport and Technology Agency Act (Act No. 28 of 2015) created a system for funding, etc., projects for improving certified rail transport, etc.

● Overview of the Revised Act on Vitalization and Rehabilitation of Local Public Transport Systems

Overview of the Revised Act on Vitalization and Rehabilitation of Local Public Transport Systems(issued in May 2014)

○Revised Act on Vitalization and Rehabilitation of Local Public Transport Systems (issued in May 2014, enacted in November 2014)

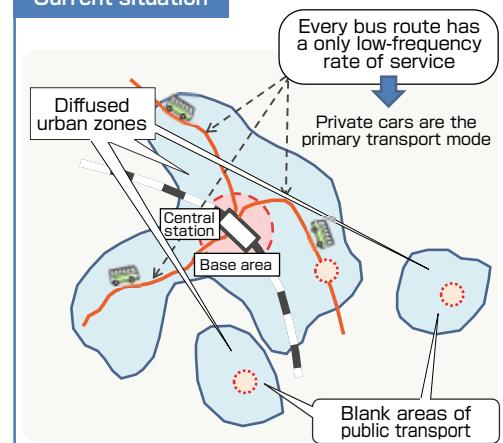
Maintain and improve regional societal vigor in the face of full-fledged population reductions

Key Points

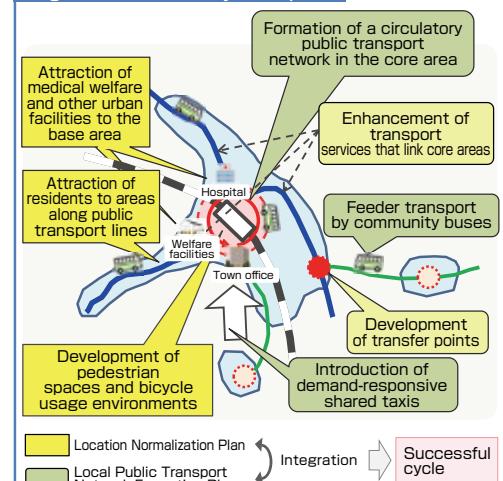
- ① Rebuild with a focus on local governments
- ② Integrate with community development
- ③ rebuild an areawide public transport network

Conceptual image of reconstruction of public transport integrated with compact city development

Current situation



Restructuring of public transport integrated with community development



Source: Prepared by the MLIT based on the approaches taken in Toyama City, Kumamoto City, Toyooka City, Sanjo City and elsewhere.

Basic scheme of the Revised Act on Revitalization and Rehabilitation of Local Public Transport Systems

Basic policy

National government formulates policy, taking coordination with town planning into consideration

Local Public Transport Network Formation Plan

Local public agencies hold coordination council upon consultation with operators and formulate plan

- Coordination with town planning in order to produce compact cities
- Rebuilding of areawide public transport networks for entire regions

Local public transport reorganization specific program

Local public transport reorganization projects

Operators, etc., implement with the support of local public agencies in order to rebuild an areawide public transport network

Tramway improvement project (LRT development)

Rail business restructuring project (Vertical separation)

...

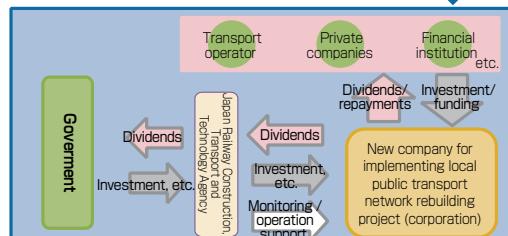
Local public transport reorganization implementation projects

Implementation plan

Implementation plan

...

Minister of Land, Infrastructure and Transport and Tourism certifies plans and provides support for plan implementation



(LRT) (BRT) (IC Card)

○ Revised Act on Vitalization and Rehabilitation of Local Public Transport Systems and Japan Railway Construction, Transport and Technology Agency Act

- ◆ Create a system for investment/funding, etc., via the Japan Railway Construction, Transport and Technology Agency by industrial investment in projects aimed at rebuilding regional public transport networks which have received certification from the Minister of Land, Infrastructure, Transport and Tourism in accordance with the Act on Revitalization and Rehabilitation of Local Public Transport Systems, and strengthen and diversify support for this system.

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

Promotion of eco-commuting

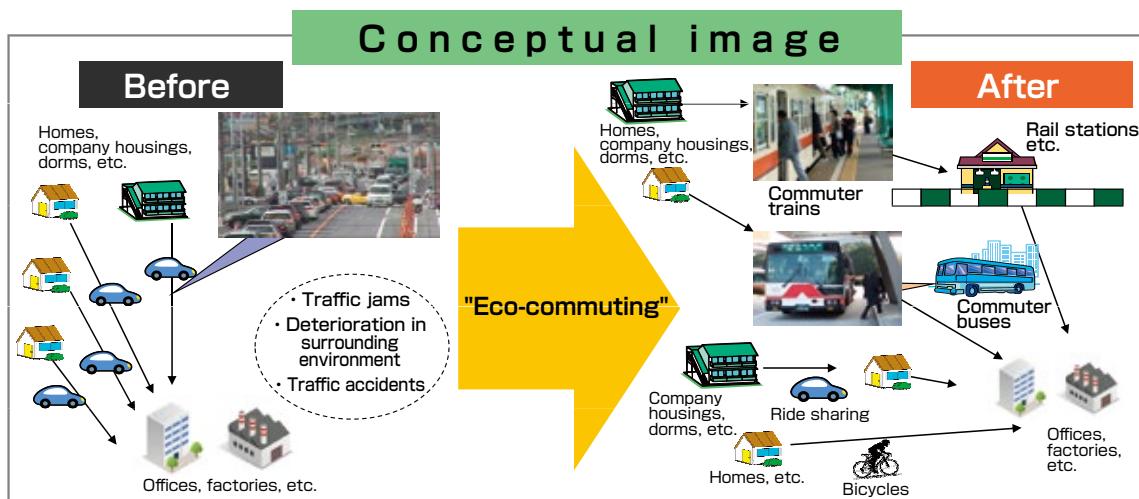
There is a growing demand for a shift in means of transport, from the use of private cars to low carbon dioxide emission measure, by promoting the use of public transport. In order to promote highly effective measures which match both user side efforts and transport operator side efforts, a Conference on Promotion of Public Transport was held in March 2005, involving transport operators, members of the business sector, and members of the government.

In November 2007 the “Eco-commuting Promotion Action Program through the Mobility Management Project” was adopted to promote conversion from the use of private cars to public transport, bicycles and on foot for commuting.

From June 2009 thereby promoting eco-commuting, the “Excellent Eco-Commuting Business Site Certification System” was launched to certify businesses which voluntarily and actively promoted eco-commuting. As of the end of December 2018, 737 business sites have been registered.

What is "Eco-commuting"?

"Eco-commuting" is an approach that encourage company workers to change their means of commuting from private cars to public transport, bicycles and on foot.



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

■ Low Carbon City Promotion Act

It is important to build up a collection of success cases of rationalization of energy usage and urban and transport carbon emissions reduction, promotive greater adoption and vitalize the housing market and local economies, by promoting private investment in urbanization areas, etc. based on changes in energy supply and demand triggered by the Great East Japan Earthquake and increasing energy and global warming awareness among citizens.

The Low Carbon City Promotion Act was passed by the Diet in September 2012 and enacted in 2012 December of the same year. As of March 2019, 24 cities have created low carbon town plans. These plans are listed on the MLIT website.

● Formulation of Low Carbon Town Plans (Cities, Towns, and Villages)

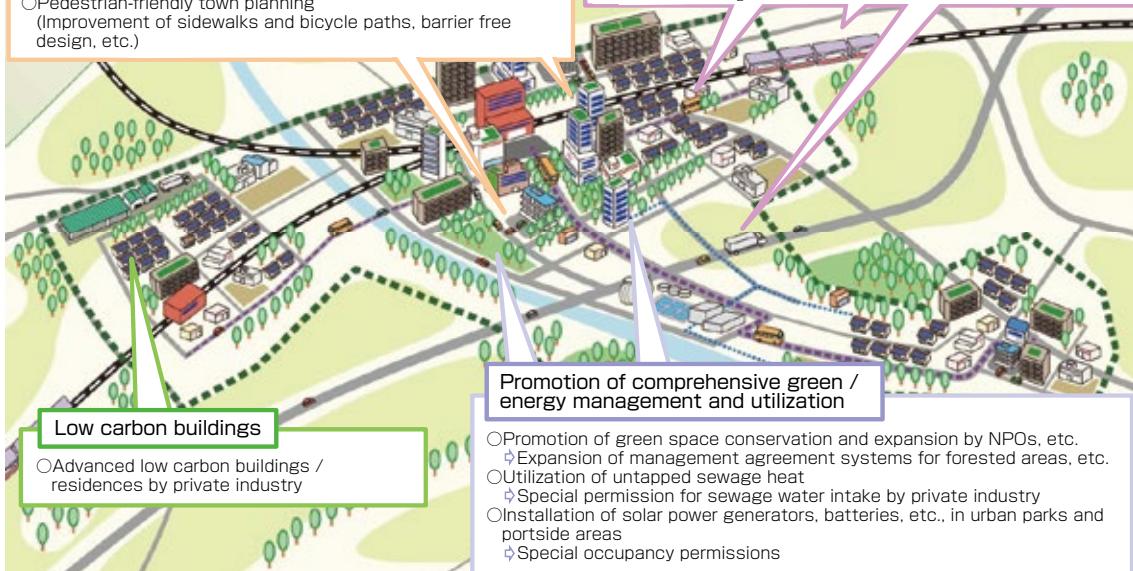
* Low carbon town planning councils (local public agencies, private businesses, etc.) are established to perform consultation and coordination

Aggregation of urban functions

- Aggregation of hospitals, welfare facilities, collective housing, etc.
 - ❖ Creation of private business certification systems
- Creation of consolidated parking facilities by private industry, etc.
 - ❖ Special provisions regarding mandatory provision of parking facilities for new buildings
- Pedestrian-friendly town planning
(Improvement of sidewalks and bicycle paths, barrier free design, etc.)

Promotion of usage of public transport, etc.

- Improvement of bus routes, LRT, etc., implementation of cooperative delivery
 - ❖ Special provisions for business laws covering buses, trains, etc.
- Automobile CO₂ emissions reductions



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

⑥Promotion of Environmentally Sustainable Transport (EST)

In order to reduce carbon dioxide emissions by the passenger transport sector, it is important to implement measures to reduce the excessive dependence on private vehicles, which account for the majority of the sector's emissions, and promote the use of public transport, etc. It is essential, when doing so, to employ measures which reflect the local area's features, and for measures to be driven by the community with the collaboration of related parties.

In order to achieve this, the MLIT has implemented an "EST Model Project", selecting areas which are implementing leading efforts at achieving Environmentally Sustainable Transport (EST), and related ministries and agencies collaborate to provide support in the areas such as promoting the use of public transport, implementing measures to smooth automobile traffic flow, promoting the use of low-emission vehicles, and promoting awareness raising.

Over the three year period from 2004 to 2006, 27 areas were selected as EST Model Project areas, and each area has implemented three year model projects. Related ministries and agencies are coordinating with each other, providing support and making information regarding the results of these projects available in order to expand EST to a nationwide scale. As part of these efforts, the MLIT website provides an EST Database with the results of these model projects, sharing information about how to effectively implement EST activities.

●MLIT website "EST Database"



Source: MLIT website

●Promotion of Environmentally Sustainable Transport (EST)

Achieving Environmentally Sustainable Transport (EST)

* From 2004 to 2006, 27 areas were selected as EST model areas due to their leading efforts at achieving EST, such as promoting the use of public transport and implementing measures to smooth automobile traffic flow. Related ministries and agencies have collaborated to provide these model regions with concentrated support.

* In the future the leading efforts of these 27 EST model regions will be applied on a nationwide scale in order to promote EST.

Autonomous regions

- * Autonomous efforts which effectively utilize local features in order to achieve environmental improvement targets (CO₂ reductions, etc.)
- * Project implementation through collaborations between a wide range of local parties, such as local governments, local shopping areas and commercial facilities, transport operators, road management authorities, police and related organizations, NPOs, etc.

Automobile traffic smoothing

- [Road maintenance, etc.]
- * Intersection improvements, etc.
- * ITS promotion
- * Countermeasures for bottleneck rail crossings
- [Traffic restrictions, etc.]
- * Implementation of illegal parking countermeasures



Promotion of usage of public transport

- [Commuter traffic management]
- * Voluntary refraining from private vehicle usage by employees, etc.
- * Park & ride
- [LRT installation and rail vitalization]
- * LRT project implementation → (arrow pointing to a photograph of a modern light rail train)
- * IC card deployment
- * Traffic node maintenance
- [Bus vitalization]
- * Omnibus town service improvement
- * PTF
- * Bus stop improvement
- * Bus location system
- * Non-step buses
- * Unified IC card



Pedestrian and bicycle measures

- [Related infrastructure maintenance, etc.]
- * Maintenance of sidewalks, bicycle paths, bicycle parking spaces,



Low-emission vehicle deployment

- [Low-emission vehicle, etc. deployment]
- * Promotion of CNG bus
- * Support for introducing low emission vehicles



Promotion and awareness raising

- [Promotion and awareness raising activities]
- * Implementation of PR activities
- * Symposium, events, etc.



Related ministries coordinate with autonomous areas implementing measures which utilize local features in order to achieve EST, sharing information regarding the results of past EST efforts, providing support, and working to promote EST on a nationwide scale.

Support coordinated with related ministries and agencies

Source: MLIT "White Paper on Land, Infrastructure, Transport and Tourism in Japan" (Tentative
Translated by Eco-Mo Foundation)

III. Measures in Response to Major Environmental Problems of the Transport Sector

■Regional EST Forum in Asia

The Regional EST Forum in Asia is a high level governmental policy discussion forum, jointly launched by the United Nations Centre for Regional Development (UNCRD) and the MOEJ with the aim of achieving Environmentally Sustainable Transport (EST) in the Asian region. Currently, there are 25 members countries (including Russian Federation) of the Forum. Participants include high level of government officials in charge of environment and transport agencies as well as experts in areas of environment and transport.

At the 10th Anniversary Regional EST Forum in Asia hosted by the Government of Lao PDR in Vientiane from 14-16 March 2017, the member states adopted the “Vientiane Declaration on Sustainable Rural Transport towards Achieving the 2030 Agenda for Sustainable Development”, recognizing the important role played by rural transport in the context of livelihood security and poverty alleviation. Some of the key messages of the Vientiane Declaration include —

- Rural transport remains a grossly neglected sector, yet sustainable rural transport is a key driver for improving rural wellbeing, economic development, community empowerment as well as livelihood and food security;
- Improved rural transport infrastructure and services are a key enabler to increased rural resiliency, rural empowerment and rural socioeconomic transformation through poverty eradication, hunger elimination, social integration, increased food security and improved supply chain logistics;
- Climate adaptive and disaster resilient transport investments in rural areas can help secure all-season access to markets and essential services and prevent isolation of fragile or remote communities, thus contributing to economic development and well-being;
- Improved rural transport connectivity to wider local, national and regional transport networks is key to achieve economic growth in rural areas; and
- It is important to explore innovative solutions to improve rural-urban connectivity; to improve and green supply chain logistics (from producers to consumers); to achieve safe and sustainable rural access, among others, are key to achieve sustainable regional development.

The 11th Forum was held in Ulaanbaatar, Mongolia from 2-5 October 2018. and the 12th Forum is scheduled to be held in the Socialist Republic of Vietnam in October 2019.

●The 11th Forum's opening ceremony



Source: UNCRD

■ Comprehensive support for energy creation, storage and saving in towns, residences and transport

Japan is facing unprecedented challenges, such as a shrinking and aging population, financial constraints, intensifying international competition, and energy restrictions prompted by the increasingly severe global environmental situation, earthquake and nuclear power plant disaster. In order to overcome these challenges and create a brighter future for Japan, the MLIT is working as one to carry out “sustainable, vibrant national and regional planning”. “The creation of a low carbon, recycling-oriented society” is one new direction of policy development, and is an essential part of creating a sustainable society.

In disaster-affected areas, Future Cities, and comprehensive special zones, regional local governments, private businesses, and others are taking the lead in considering how to create a low carbon, recycling-oriented society. The MLIT is engaged in a wide range of fields closely tied to the economy and the lives of citizens. In these fields, the Ministry is providing comprehensive support for leading efforts by regions and businesses to create, store, and save energy in towns, residences, and transport by demonstrating practical capabilities, responsive capabilities, and comprehensive capabilities.

The Ministry is also supporting the formation of advanced concepts by local governments and private businesses for the creation of models tailored to city scales and local features, etc., in order to create, store, and save energy in towns, residences, and transport.

● Planning supports for comprehensive support model creation for energy creation, storage and saving in towns, residences and transport

2016

Implementing Region	Sponsor (Representative Organization)	Co-sponsor	Title
Rikuzen Takada City, (Iwate Prefecture)	Research Institute for Sustainable Community	Rikuzen Takada City, Saneiwork Incorporated (Nippon TV group), Furukawa Electric Co., Ltd., Okano Electronics Co., Ltd.	Revitalization concept for a new Rikuzen Takada City by means of energy creation, storage and conservation for disaster prevention and transport infrastructure. - Aiming to build on the experience and lessons from the earthquake disaster to create a sustainable community -
Kurobe City, (Toyama Prefecture)	Kawabata Tekko KK	Geo Energy Co., Ltd., I'll Inc., Japan Asia Group Ltd., Kurobe City	A sustainable Kurobe urban development concept by means of small hydroelectric generation and expansion of transport network. - Aiming to achieve a city in which many citizens can receive the benefits of its abundant water resources -
Tamano City (Okayama Prefecture)	Unokotochi Co., Ltd.		Concept of transforming central Tamano City into a high value-added hub by means of energy creation, storage and conservation. - Port city Tamano situated along the Seto Inland Sea where people gather and interact -
Saikai City, (Nagasaki Prefecture)	Saikai City		Saikai Junkan Initiative which enhances the unique qualities of sea, hills and inlets. - Carbon-free Park Land concept which promotes the creation, storage and conservation of energy utilizing the features of the local sea environment -
Tsushima City, (Nagasaki Prefecture)	Tsushima City	Tokyo Institute of Technology AES Center	“Tsushima Model” concept which utilizes local energy products for local consumption with focus on hydrogen. - Low-carbon transport model project focusing on renewable energy-derived hydrogen -

2017

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

Region	Sponsor (Representative group)	Co-sponsor	Title
Ishikari City (Hokkaido)	Research Society for Practical Use of Electric Systems that Use Regional Low-Temperature Energy	Ishikari City Chubu University	A concept for smart energy in the Ishikari Bay New Port area - “Inexpensive electricity and cold/heat supplying from locally-produced energy”
Omachi City (Nagano Prefecture)	Omachi City		Shinano-Omachi Energy & Mobility concept - “A city made with water and where water is born”
Matsue City (Shimane Prefecture)	Society for Considering Eco x Universal Town Planning for Matsue	Matsue City	The next-generation town planning concept for Matsue; an eco x universal international culture tourist city - “Aiming to create a location enjoyable by everyone and with a low carbon footprint mobility network”
Yasuda Town (Kochi Prefecture)	Yasuda Town		A concept of town planning that uses energy-creation, -storing and -saving infrastructure and that supports living in Yasuda - “The challenges for Yasuda, the town we live and continue to live in”
Fukuoka City (Fukuoka Prefecture)	Sumitomo Corporation Kyushu	Sumitomo Corporation	A next-generation regional mobility concept that utilizes hydrogen produced locally in the Fukuoka City region - “Aiming to raise the city’s charms further through usage of locally-produced energy”

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

Green Slow Mobility

Based on the Paris Agreement that was concluded in 2015, the reducing of greenhouse gas emissions to essentially zero by the latter-half of the 21st century is being aimed for within a global framework. In Japan, in order to realize a low carbon society, efforts are currently being pursued to realize the unified improvement of the environment, economy and society by solving a number of economical and regional issues simultaneously through environmental policies.

At the MLIT, based on this concept of the unified improvement of the environment, economy and society, “Green Slow Mobility” is being promoted. Green Slow Mobility aims to solve various transportation problems in regional areas, such as the securing of transport where societal aging is advancing and the development of new sight-seeing mobility for tourist attractions. Simultaneously it also aims to spread low carbon mobility in regional areas.

Green Slow Mobility refers to electric vehicles that carry four passengers or over and can run on public roads at under 20km per hour. The introduction of these vehicles is expected to solve a number of transportation problems in regional areas and ensure low-carbon transportation.

Green Slow Mobility (GSM): Electric vehicles for 4 people or over that run under 20km/hr on public roads

[5 characteristics of GSM]

- ① **Green** ··· Electric automobiles with low CO₂ emissions.
- ② **Slow** ··· At less than 20km per hour they are perfect for tourist attractions.
- ③ **Safety** ··· Safe through speed limitations. Also drivable by the elderly.
- ④ **Small** ··· Their small size makes narrow roads navigable.
- ⑤ **Open** ··· Their no-windows open-air design makes for a fun ride.

* Operational for route bus businesses, taxi businesses, and onerous passenger transportation with private vehicles.

Mini vehicles	Small-sized vehicles	Standard-sized vehicle
		Vehicles for special uses (8-license plate)

[Usage scenarios]

① For transporting regional citizens

- 1) Regions without buses
- 2) Regions with aging societies
- 3) Improving welfare for the elderly
- 4) Converting from existing buses



② As vehicles for tourists

- 1) Guiding at tourist sites
- 2) Slightly-regular tourist buses
- 3) Park-and-ride systems
- 4) Usage at events

③ Short rides

From parking lots to facilities
Between facilities

④ Regional branding

As a ‘face’ for the region

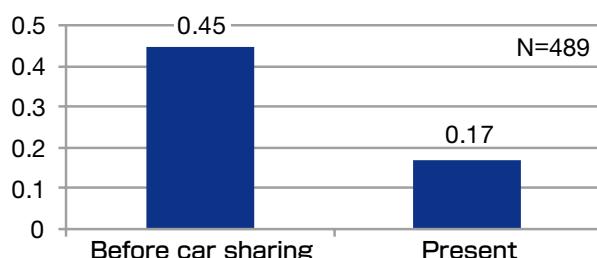
Source: MLIT homepage (Tentative Translated by Eco-Mo Foundation)

Effectiveness of car sharing in reducing environmental impact

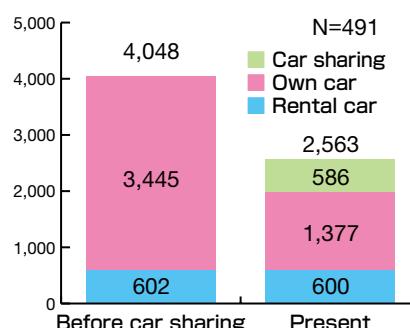
Car sharing, in which people can use cars when they need them, without owning the cars, is growing in popularity worldwide. Over 1.3million people in Japan utilize in car sharing (according to March 2018 survey by the Eco-Mo Foundation).

In 2012 the Eco-Mo Foundation performed an evaluation of the effectiveness of car sharing at reducing environmental impact. A survey of car sharers was carried out with the cooperation of five major car sharing operators. The survey found a decrease of over 60% in the number of cars owned per household after joining a car sharing scheme, a decrease of just under 40% in average annual miles driven, and an average annual reduction in automobile CO₂ emissions of 0.34t (45%). A report containing detailed survey results and measures for popularizing car sharing in the future can be found on the Eco-Mo Foundation website.

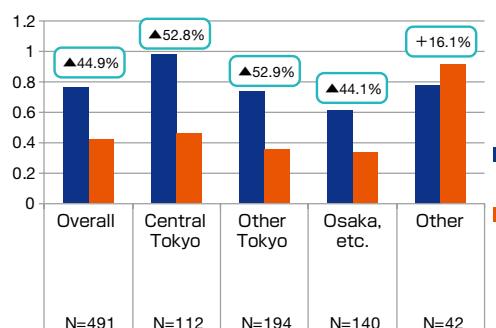
● Change in average number of automobiles owned per household



● Changes in annual total distance driven (km/year/household)



● Change in annual CO₂ emissions from automobile use (t-CO₂/year/household)



Note 1) Central Tokyo: Chiyoda ward, Minato ward, Chuo ward, Shibuya ward, Shinjuku ward, Bunkyo ward, Toshima ward

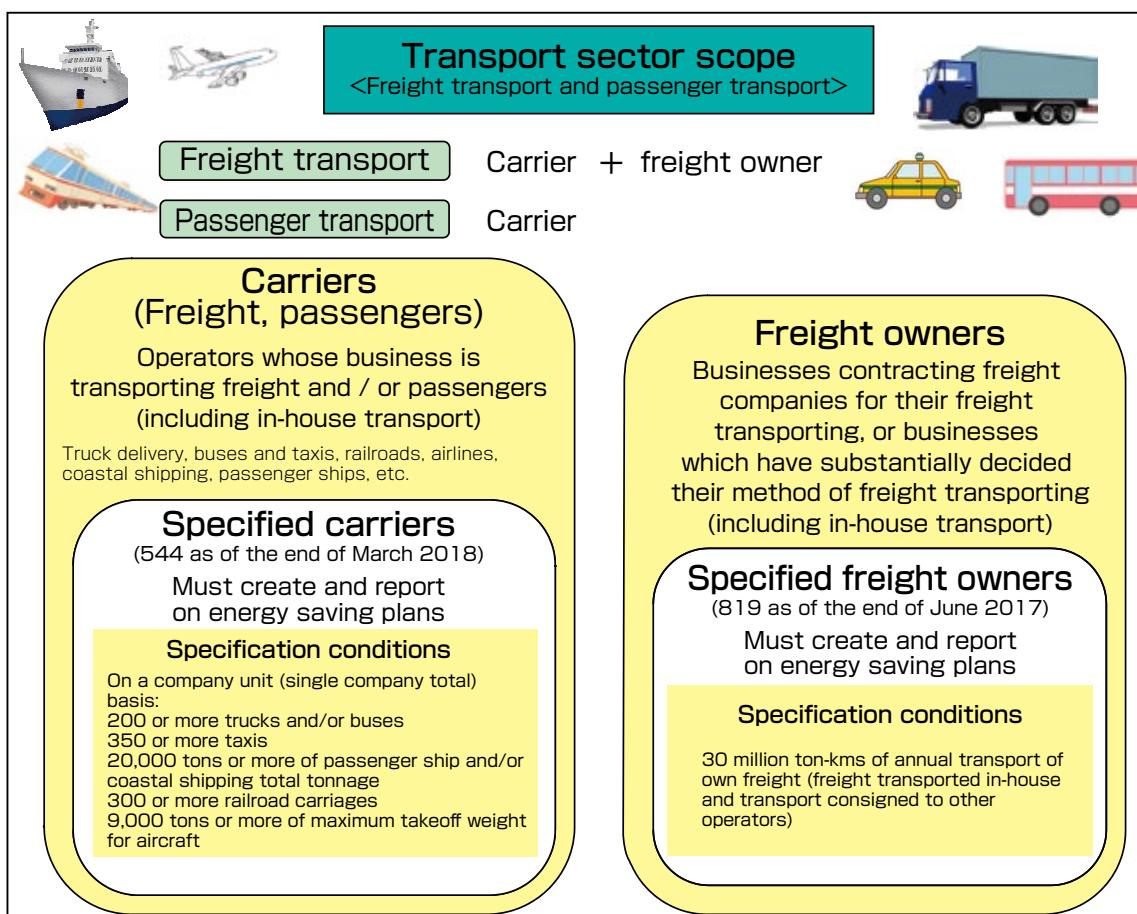
Note 2) Osaka, etc: Osaka Prefecture, Hyogo Prefecture, Kyoto Prefecture, Aichi Prefecture, Kanagawa Prefecture

(2) Energy Saving Act-based measures

The steady implementation of energy saving measures is an important challenge in tackling global warming.

The Act on the Rational Use of Energy (the Energy Saving Act) seeks to rationalize the use of energy based on operator's decision criteria defined by the national government. Operators (specified operators) using a specified amount of energy or more are required to report on their energy usage yearly, and formulate plans (medium to long term plan) (3-5 years) for rationalization of energy use. Transportation companies and shippers became applicable as of the April 2006 revision of the Act.

Furthermore, in looking towards the realization of the long-term energy supply-demand prediction (energy mix) established in 2015, in 2018 the Energy Saving Act was revised in order to encourage even more streamlining of energy usage, and businesses managing energy as one group and energy saving efforts through collaborating businesses have become able to be assessed appropriately through regular reports due to receiving authorization from the Minister of Land, Infrastructure and Transport.



Specified carrier designation status (total of 544 companies as of the end of March 2018)

	Freight				Passengers				Aviation	Total
	Railway	Commercial trucks	Private trucks	Shipping	Railway	Buses	Taxis	Shipping		
No. of carriers	1	279	78	33	25	93	22	11	2	544

[Overview of determination criteria for carriers with respect to energy usage rationalization, etc.]

The following items are specified.

- (1) From a medium- and long-term perspective, each carrier should set as a target an annual average reduction of 1% or more in energy consumption rates or electrical demand equalization evaluation rates.
- (2) Operators should formulate policies indicating their energy saving efforts, and appoint energy saving measure administrators and establish promotion systems for energy saving measures.
- (3) Carriers should strive to perform the following.

	Measures to be Taken
Common	<ul style="list-style-type: none"> · Enhance collaboration with freight owners and other carriers
Rail	<ul style="list-style-type: none"> · Introduce energy saving trains · Expand the size of universal containers and introduce freight trains capable of carrying large containers · Secure a transport capacity which accurately matches transport demand by adjusting the number of trains operated, etc. · Perform appropriate train inspections and maintenance
Automobiles	<ul style="list-style-type: none"> · Introduce low-emission vehicles and high fuel efficiency tires · Promote eco-driving through driver education and the use of digital drive records and eco-driving management systems · Promote increases in truck and trailer sizes in accordance with freight volume · Perform cooperative delivery and improve loading rates through use of return cargo, etc.
Ships	<ul style="list-style-type: none"> · Introduce high fuel efficiency ships and low friction ship-bottom paint · Use on-land power supply systems · Promote increases in ship sizes in accordance with freight volume · Perform cooperative delivery to improve loading rates
Airplanes	<ul style="list-style-type: none"> · Introduce airplanes with superior energy usage efficiency · Rationalize ground operation energy usage · Promote appropriate equipment selection in accordance with freight volume · Coordinate aircraft operation, such as by reducing ferry flight distances

【Freight owner's decision criteria】

From a medium- and long-term perspective, freight owners will aim for an annual average reduction of 1% in energy consumption rates or electrical demand equalization evaluation rates by implementing measures such as those below:

- Appointing energy saving measure officers
 - Providing in-house training
 - Selecting environmentally-friendly cargo carriers (carriers who have obtained ISO14001 or green management certifications)
 - Promoting modal shifts
 - Shifting from the use of private trucks to commercial trucks
 - Performing cooperative delivery with other companies
 - Reducing redeliveries
- etc.

(3) International marine and air transport sector countermeasures

■ Introduction of international marine transport CO₂ regulations

The Kyoto Protocol does not cover carbon dioxide emissions from international marine transport. Instead, this topic is considered within the deliberation scope of the International Maritime Organization (IMO). Japan led an international framework for reducing carbon dioxide emissions, and in July 2011 adopted a revised convention that introduced fuel efficiency regulations that apply universally to international marine transport, applying equally to developed and developing countries.

In order to comply with this revised convention, in 2012 the Act Relating to the Prevention of Marine Pollution and Maritime Disasters was revised, and regulations went into effect from January 2013. In order to increase the international competitiveness of Japan's maritime industry, which possesses exceptional CO₂ emissions reduction and energy-saving technologies, Japan is leading the development of an international framework which includes phased enhancement of fuel efficiency regulations and a fuel consumption figure reporting system. In an IMO meeting held in October 2016, through Japan's leadership a treaty revision plan was adopted that introduces a system for encouraging reduced greenhouse gas emissions from shipping via the "visualization" of separate vessel's fuel consumption records. Furthermore, in April 2018, based on a proposal from Japan, an IMO GHG reduction strategy was adopted that was a world-first in committing to aim for zero GHG emissions globally within this century in a single sector. In order to achieve the goal set out in this strategy, international negotiations for forming a new international framework were progressed at an IMO meeting held in May 2019, and also at this meeting Japan submitted a concrete proposal. There is expectation in the leadership of Japan, a country with a prominent maritime industry, as we move towards realizing a practical international framework that is compatible with both contribution to countering global warming and the feasibility.

■ International air transport sector greenhouse gas emissions reduction measures

With regards to greenhouse gas emissions reductions in the international air transport sector, the International Civil Aviation Organization (ICAO) has engaged in deliberations aimed at defining global reduction targets ([1] annual fuel efficiency improvement of 2%, [2] prevention of total emissions from increasing from 2020 onwards), introducing new technologies, improving transport methods, utilizing alternative fuels, and creating a Global Market-Based Measure (GMBM) system which utilizes market mechanisms.

The 39th ICAO Assembly was held from September 27 to October 6, 2016, and consensus was reached regarding the GMBM. From 2021 autonomously participating countries will begin implementing reductions in greenhouse gas emissions by purchasing emissions rights based on the system, and from 2027 onwards participation will be mandatory for all countries except those with emissions levels below a defined threshold.

● International air transport global warming countermeasures

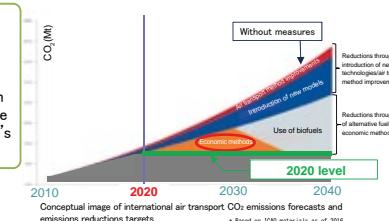
Past ICAO Assemblies (2010 and 2013) have decided on the following global CO₂ emissions reduction targets for international air transport, and have considered specific measures for achieving them

- ① Annual fuel efficiency improvement of 2%
- ② No increase in total emissions from 2020 onwards

Methods for achieving targets

- ① Introduction of new technologies (new models, etc.)
- ② Air transport operation improvements
- ③ Use of biofuels
- ④ Use of market mechanisms (Emissions trading)

- Shortfalls in measures ① through ③ will be addressed with a system that uses ④ market mechanisms
- The introduction of the system and its specific contents will be deliberated on during this year's ICAO Assembly



Japan also needs to participate in measures, such as the market mechanism-based system

The contents of the proposed system being deliberated on by the ICAO Assembly are as follows
(Based on proposal built on the results of the August 26, 2016, board of directors meeting)

Period:	2021 to 2026	2027 to 2035
Scope:	Voluntary participation by individual countries	Mandatory participation * Excluding countries with low emissions amounts, least developed countries, etc.
Airline emissions rights purchasing:	Increases in international air transport emissions from 2020 onwards to be allotted based on emissions by individual transport operators However, from 2030 onwards, individual reduction efforts by airlines will be reflected in stages	
Forecast Japanese airline burden (initial MLIT calculation):	The total for Japanese airlines is expected to rise in stages from slightly over a billion yen per year in the first year of the system to several tens of billions of yen per year by 2035	

Note: International air industry average annual growth rate: 5.3%, Japanese airline average annual growth rate: 4.6%, Emissions credit price: 6 to 20 dollars/ton in 2030. Exchange rate: 105 yen/dollar

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

Emissions trading system measures

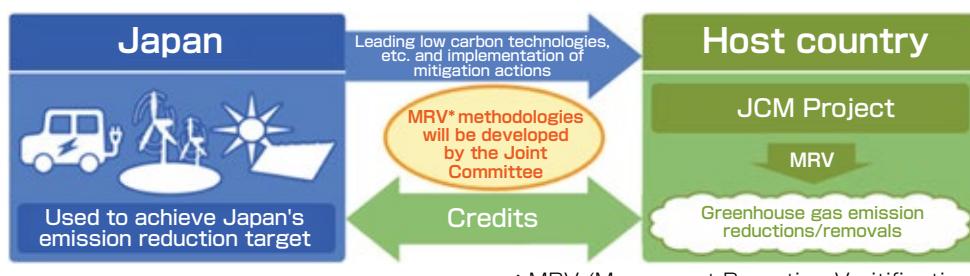
The Japanese government has proposed a Joint Credit Mechanism (JCM) for international emissions trading. With the end of the adjustment period for the first commitment period of the Kyoto Protocol (by 2015), countries not participating in the second commitment period cannot internationally transfer or acquire Kyoto Mechanism credits.

Japan is operating and promoting the J-Credit Scheme for domestic emissions trading.

Joint Credit Mechanism (JCM)

Japan has proposed the Joint Credit Mechanism (JCM) as a system for flexibly and rapidly transferring technologies and implementing countermeasures in accordance with conditions in developing countries in order to contribute to global emissions reductions and absorption. This mechanism quantitatively evaluates Japan's contributions to greenhouse gas emission reductions and absorption through usage and implementation of greenhouse gas reduction technologies, products, systems, services, infrastructure, and the like. This is used to help Japan achieve its emission reduction targets.

With the collaboration of host countries, the design of the mechanism will be further accelerated in the future, the mechanism will be put into effect soon, specific, concrete projects will be implemented, and the mechanism will provide transparency in order to contribute to UN discussions.



Source: New Mechanisms Information Platform (Tentative Translated by Eco-Mo Foundation)

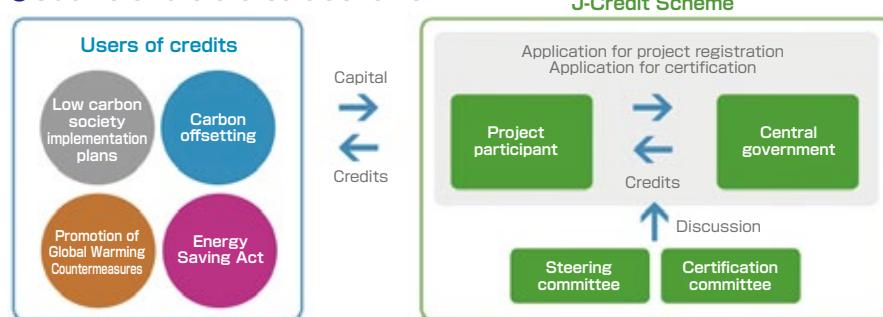
J-Credit Scheme

The J-Credit Scheme is a system in which reductions and absorption of greenhouse gasses such as CO₂ through measures such as the deployment of energy-saving devices and forest management are certified by the national government as "credits".

This system is an extension and merging of the domestic credit system and offset credit system (J-VER), and is operated by the national government.

The credits produced by this system can be used for various purposes, such as achieving "Commitment to a Low Carbon Society" and for use as carbon offsets.

Outline of the J-Credit Scheme



Source: J-Credit Scheme website (Tentative Translated by Eco-Mo Foundation)

2 Promotion of emissions gas measures for trucks and busses (diesel vehicles), etc.

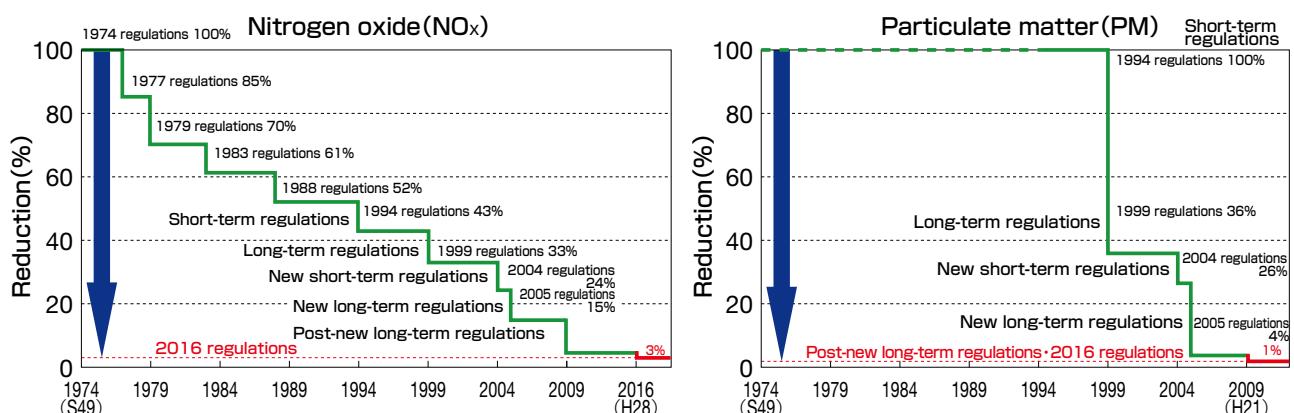
The problem of vehicle exhaust gas became a serious social problem with the rapid urbanization which began in the mid-1960s and the increase in vehicle traffic. For emissions gas measures for diesel vehicles it is especially important to reduce the amount of emissions of nitrogen oxide (NOx), which is a cause of respiratory disorders and causes photochemical smog and acid rain, and particulate matter (PM), a carcinogen. In order to do this, the government strengthened exhaust gas regulations by enacting vehicle composition regulations and repeatedly revising road vehicle safety standards. Furthermore, in 1992 the Automobile NOx Reduction Law (now the Automobile NOx/PM Law) was enacted to reduce NOx and PM emissions.

(1) Promotion of emissions gas measures for diesel vehicles

① Restrictions on manufacturers

In 2016 with the introduction of measures such as cold engine exhaust gas testing, the scope of exhaust gas regulations came to include vehicles with actual NOx emissions of about 1/3 of those included in previous regulations. As a result of the regulations, the vehicles will successively be replaced by clean diesel vehicles with dramatically improved exhaust gas performance.

● Vehicle exhaust gas restrictions (diesel-powered heavy vehicles)



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

②Restrictions on users

In urban areas where Automobile NOx/PM air quality standards had not met, nitrogen oxide countermeasure areas and particulate matter countermeasure areas were defined and restrictions were placed on vehicle users with the aim of achieving air quality standards in the areas by roughly 2010. Specifically, for areas specified in the regulations, users are prohibited from registering vehicles which do not meet specific exhaust standards (model prohibition) and mandate the submission of exhaust gas regulation plans by specified operators. Tokyo Metropolis, Saitama Prefecture, Chiba Prefecture, Kanagawa Prefecture, Hyogo Prefecture, and Osaka Prefecture have also defined ordinances restricting the inflow of non-compliance vehicles from other regions, for further reducing nitrogen oxide and particulate matter emissions.

In order to differentiate between vehicles which do and do not meet these standards, compliant vehicles are issued with stickers, preventing the influx of illegal vehicles. Despite the implementation of restrictions affecting users in areas implementing these measures, non-compliance vehicles from other areas pass through intersections with heavy traffic, resulting in areas not meeting air quality standards. In response to this situation, the Automobile NOx/PM Law was partially revised in 2008 to apply to users outside regulation-specified areas as well.

Furthermore, in March 2011 the Automobile NOx/PM Law enforcement and ministerial orders were revised, extending the application of the regulations to users in order to achieve air quality standards targets in urban areas by 2020.

	Automobile NOx/PM Law	Tokyo, Saitama, Chiba, and Kanagawa Prefectures	Hyogo Prefecture Ordinance	Osaka Prefecture Ordinance
Category	National law	Ordinance	Ordinance	Ordinance
Regulated material	Nitrogen oxide (NOx), particulate matter (PM)	Particulate matter (PM)	Nitrogen oxide (NOx), particulate matter (PM)	Nitrogen oxide (NOx), particulate matter (PM)
Contents of regulation	Prohibits registration of vehicles which do not conform with exhaust standards (vehicles do not pass ongoing vehicle inspections)	Prohibits driving of vehicles which do not conform with exhaust standards	Prohibits driving of vehicles which do not conform with exhaust standards	Prohibits driving of vehicles which do not conform with exhaust standards
Vehicles affected	Vehicles whose use is based in specified measure implementation areas	Diesel vehicles driving in the area covered by the ordinance	Diesel vehicles driving in the area covered by the ordinance	Vehicles which arrive at or depart from the restricted area (does not apply to vehicles passing through the area)
Vehicle models affected	Diesel passenger vehicles, trucks, buses, special purpose vehicles (not including light motor, special vehicles, and passenger vehicles which use gasoline or LPG as fuel)	Diesel vehicles with license plate numbers 1-, 2-, 4-, 6-, or 8- (except for passenger vehicles with 8- license plate numbers)	Vehicles with total weights of 8t or more which cannot be registered due to their use being based in non-regulated areas specified by the Automobile NOx/PM Law (for buses, buses with capacities of 30 people or more)	All trucks, buses, and special vehicles other than passenger vehicles covered by the Automobile NOx/PM Law

(2) Appropriately maintained vehicle usage and appropriate fuel usage guidance

① Appropriately maintained vehicle usage

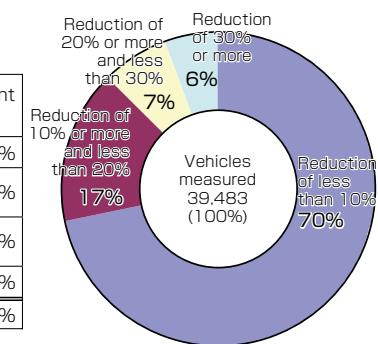
In order to reduce the environmental impact of vehicles, it is essential that they should be properly maintained and that they consistently maintain exhaust gas performance during operation. Insufficiently maintained vehicles emit greater amounts of NOx and PM than properly maintained vehicles, creating major environmental problems.

A study of reductions in emissions of black smoke after maintenance on diesel vehicles brought in for maintenance found that 30% of all the vehicles examined are found reduced the black smoke concentration 10% or more. This confirmed that inspection and maintenance significantly reduces diesel black smoke emissions.

- Reduction in black smoke emissions as the result of inspection and maintenance / Number of vehicles brought in for maintenance in October 2014

(According to a study by the Japan Automobile Service Promotion Association)

	Vehicles Measured	Percent age
Reduction of less than 10%	27,745	70%
Reduction of 10% or more and less than 20%	6,973	17%
Reduction of 20% or more and less than 30%	2,575	7%
Reduction of 30% or more	2,190	6%
Total	39,483	100%



(Breakdown of reductions in black smoke emissions as the result of inspection and maintenance)

② Appropriate fuel usage guidance

Since 2005 the MLIT has conducted street inspections to check fuel sulfur content. When incidents of use of illegal diesel fuel with high sulfur content are discovered, warnings or orders to switch to proper fuel are issued, with the goal of eliminating the use of illegal diesel fuel.

<Illegal diesel fuel>

Illegal diesel fuel refers to diesel fuel mixed with kerosene or fuel oil, and to manufactured diesel fuel which has been produced by adding sulfuric acid, etc. to fuel oil. Industrial waste such as sulfate pitch, which is discharged during the production of illegal diesel oil, is mostly disposed of by illegal dumping, creating environmental problems nationwide. Using illegal diesel fuel in diesel vehicles also increases the amount of air pollutants PM and NOx in their exhaust.

An illegal diesel fuel which mixes diesel oil and A-type fuel oil equally increases diesel vehicle exhaust gas PM levels by 14 to 17% and NOx levels by 7 to 8% in their exhaust gas.

- Illegally dumped sulfate pitch which has leaked out of its containers



3 Creation of a recycling-oriented society

(1) Creation of recyclable resource distribution systems

①Formation of a recyclable resource distribution system using sea transport

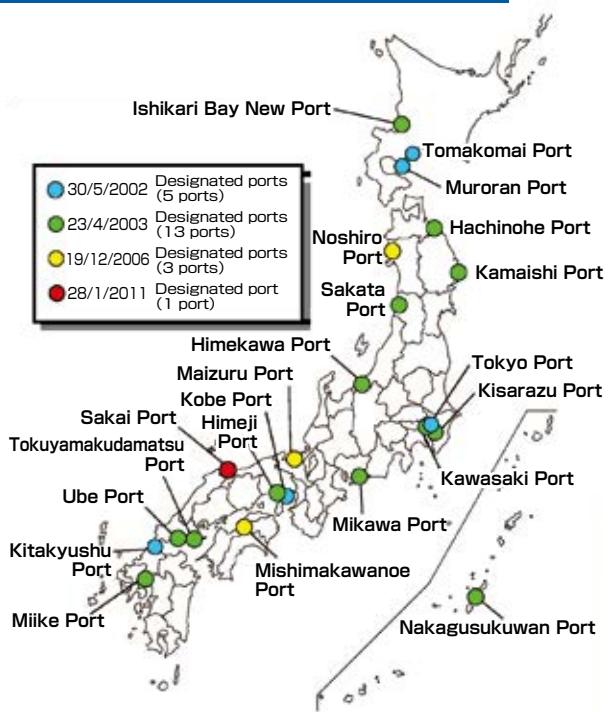
In order to create a recyclable resource cycle as part of the creation of a recycling-oriented society, 22 ports nationwide have been designated as Recycle Ports (integrated venous logistics ports), centers of wide-area circulation of recyclable resources. The MLIT provides the support necessary to improve port facilities such as shipment transfer, storage facilities, and other recyclable resource handling support facilities, and implements modal shift and transport efficiency improvement-based low carbon venous logistics promotion projects in order to reduce carbon emissions and costs using venous logistics systems which utilize Recycle Ports.

●Recycle Port locations and Recycle Port image

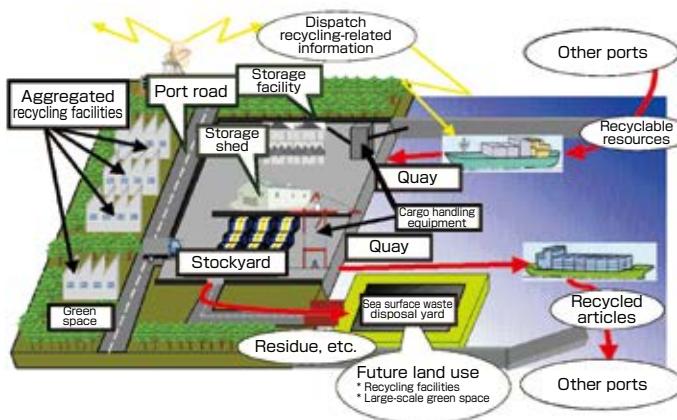
Recycle Port Policy

- Securing port facilities such as quays
- Providing support for the maintenance of shipment transfer and storage facilities, etc. (subsidized with subsidy rate of 1/3)
- Support (subsidies) for the creation of low carbon reverse logistics systems based on sea transport
- Improvement of operations related to recyclable resource handling
- Promotion of coordination between the government and private industry (use of the Recycle Ports Promotion Council, etc.)

Designated Recycle Ports (22 ports)



Recycle Port Image



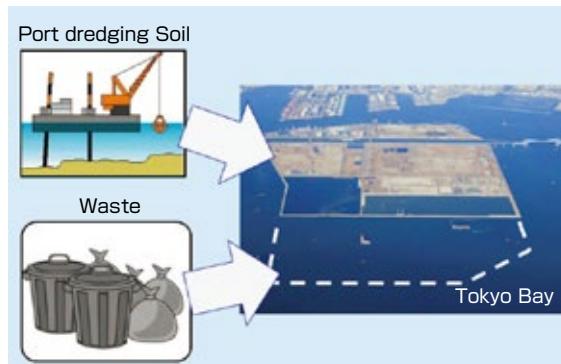
[Expected benefits] Support for the creation of a recycling-oriented society, reduction of environmental impact, reduction of recycling costs, and vitalization of coastal area industry

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

② Systematic securing of sea surface waste disposal yards

In order to dispose of dredge soil from port improvement works and waste which is difficult to handle at the inland final disposal site, a systematic development of sea surface disposal yards is underway. In particular, at Osaka Bay, a wide-area disposal yards based on the Osaka Bay Phoenix Plan is being developed which enables the disposal of waste generated from the Osaka Bay area. In addition, construction-generated soil from the Tokyo Metropolitan Area is transported by sea based on the Super Phoenix Plan and is used on a wide scale as landfill material in ports and harbors nationwide..

- Promotion of planned improvement of sea surface waste disposal yards



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

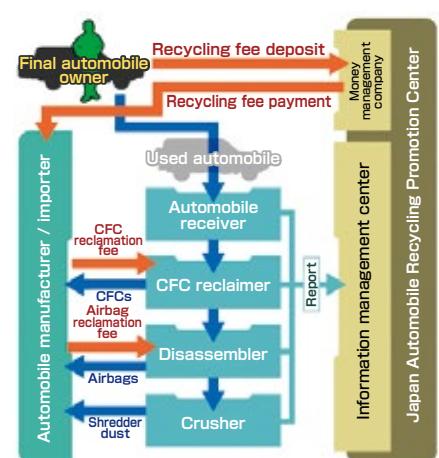
(2) Creation of vehicle recycling system

Every year between 4 and 5 million used vehicles are disposed of. Landfill space is running out, making it urgent to further increase the recycling rate, which is current roughly 80%. As of 2004, over 195,000 automobiles were improperly stored on roads, etc. each year. And over 20,000 automobiles were illegally dumped. These have a negative impact on living environments and the disposal involves tremendous social costs, making it urgent to implement countermeasures.

In response to this situation, the Act on Recycling, etc. of End-of-Life Vehicles was enacted in January 2005. This law mandated appropriate divisions of duties between the parties involved in end-of-life vehicle disposal, focusing on automobile manufacturers. At the same time revisions were made to the Road Transport Vehicles Act mandating that vehicle registration be deleted only after confirming that vehicles were disassembled as specified in the Act on Recycling, etc. of End-of-Life Vehicles, and a motor vehicle tonnage tax reimbursement system was instituted for end-of-life vehicles. The aims of these efforts were the promotion of appropriate processing of end-of-life vehicles and the prevention of illegal dumping.

As a result of these efforts the nationwide number of improperly stored vehicles was 4,600 at the end of 2017 (a decrease of 97.7% versus the number in 2004), and the number of illegally dumped vehicles was 599 (a decrease of 97.3% versus the number in 2004), succeeding in both dramatic reductions.

- Act on Recycling, etc. of End-of-Life Vehicles system



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

(3) Ship recycling

Ship recycling^{*1} is carried out primarily in developing countries such as India and Bangladesh, and the problems of occupational accidents and environmental pollution in this work are beginning to be acknowledged. In order to solve these problems on an international level, Japan, as a country with eminent naval forces and shipbuilding capabilities, led work on discussing within the International Maritime Organization (IMO) and drafting a treaty, and the “Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, 2009” (also known as the “Ship Recycling Convention”) has been adopted.

As Japan has pledged responsibility for the treaty, the country promulgated the “Proper Recycling of Ships Act” in June 2018, and related laws are being created for an early signing of the treaty. The Act will be put into effect along with the enforcement of the treaty.

For the early enforcement of this treaty, Japan is supporting India’s improvement of ship recycling facilities as a way to encourage early signing with India, a chief ship-dismantling country. Also, at Japan-India summits held in 2017 and 2018, Prime Minister Abe appealed to Prime Minister Modi for the early signing of the treaty and verified India’s intention towards signing early.

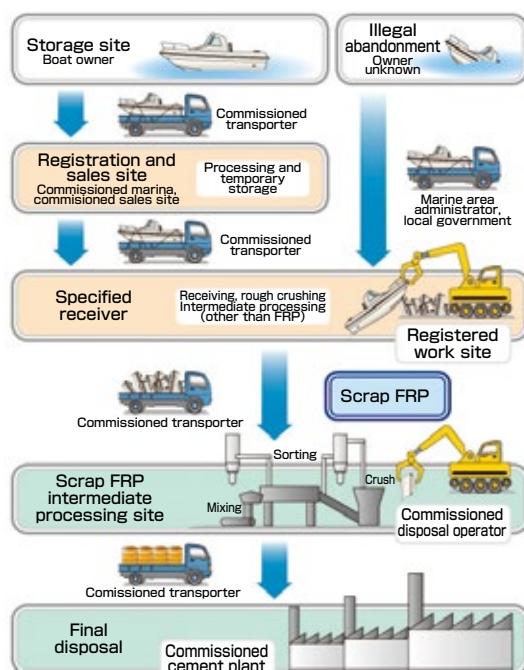
The enforcement requirements of the treaty include: (1) signing by at least 15 countries; (2) the combined merchant fleets of the signed countries is at least 40%; and (3) the signed countries’ combined maximum annual ship recycling volume in the past 10 years is at least 3% of signed countries’ merchant shipping volume. The status of fulfillment as of the end of January 2019 is (1) 7 countries, (2) 20.77%, and (3) 0.32%*2 respectively.

On the other hand, the majority of pleasure boat hulls are made of FRP (fiber-reinforced plastic), and recycling of them has been extremely difficult. Due to this, the “FRP Boat Recycling System” that uses a wide-area permit system based on the Waste Disposal Law was built up mainly by the Japan Marine Industry Association, and the recycling of FRP boats into cement-baking material has become possible. Currently, with this system around 500 ships are being recycled annually across the nation.

*1 Ships which have reached the end of their lifespans are disassembled and the majority of the ships’ materials are used for steel.

*2 Calculated using 40% of global merchant fleets in 2017.

●FRP boat recycling system



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最終更新日：2018年6月

Source: Japan Marine Industry Association FRP Boat Recycling Center (Tentative Translated by Eco-MoFoundation)

4 Measures by local governments, companies, citizens' organizations, etc.

(1) Measures by local governments

Local governments are implementing global warming countermeasures, tailored to their local features, in the transport and traffic sectors. This section looks at efforts by Kyoto Prefecture, Fukui Prefecture, and Himeji City (population: 530,000).

■Kyoto Prefecture

- Aiming for regional railways that are good to people and the environment -

With the growing rate of vehicle-sharing in regional areas, Kitakinki Tango Railway found that ridership and revenue from fares became reduced to two thirds during peak times, and this caused delays in facility investment and reductions in the number of trains running. In the end, it brought about a vicious cycle where the region's transportation activities worsened the strain on the environment.

The company aimed to turn the habits of the region's citizens from car usage to public transport usage and to promote the regional development by expansion of visitors with the provision of a transport service more deeply-rooted in the region and that was highly convenient. From April 1, 2015, service started anew as the Kyoto Tango Railway.

A Japan-first format is adopted where the infrastructure and management companies are separate. Kitakinki Tango Railway Corporation, a third-sector company invested in by local governments of areas along the railway line, owns the infrastructure such as tracks, stations and carriages, and the private company Willer Trains, Inc. handles management.

●Tango sea carriage, Miyagawa Bridge (from Oe to Oe Senior High School)



Source: Willer Trains, Inc.

■Fukui Prefecture - Creating a society that doesn't rely excessively on cars

Fukui Prefecture has one of the most automobile-reliant society in Japan. As this excessive reliance is implicated in the problems of increasing global warming and the decline of public transport, the “New Century Fukui Lifestyle Transport Vision”, which was established in 2002, advocates for the creation of a society where automobiles and public transport coexist, and efforts to revitalize public transport are being carried out. Currently, based on the prefectural governor manifesto, “mobility management” (the optimal usage of transport means), which includes track-sharing by different railway companies, the extending of station-front lines and a “Car-Saving Strategy”, is being progressed and policies for lowering the strain on the environment and expanding usage of public transport are being strengthened. These initiatives have also been adopted into the “Fukui Prefecture Environment Fundamental Plan” that was revised in 2013.

As a part of these initiatives, in 2011 the “Fukui Prefecture Citizen Meeting on Promoting the Creation of a Society that Doesn’t Rely Excessively on Cars” was established, consisting of academics, experts, transport companies and representatives of the prefecture, cities and towns. Based on an action plan formulated in 2011, they are undertaking a variety of work for preventing the increase of greenhouse gas particle emissions and the decline of public transport institutions through the appropriate usage of automobiles and public transport.

● Track-sharing by different railway companies



Source: Fukui Prefecture

Himeji City

-Urban Development Based on Public Transport (Railway and Buses)-

In Himeji City, "Himeji City Integrated Transport Plan Based on Public Transport" was formulated in August, 2008, and relevant departments are promoting the various policies. By promoting the foregoing plan, the goal is to increase the number of users for public transport which are on a downward trend and to maximize the effect from 3 perspectives, namely "economy," "safety and security", and "environment," such as by alleviating traffic congestion in the city center and CO₂ reduction in the transport sector. According to this plan, the policies are being developed based on the following 3 pillars, i.e. "improvement in the user-friendliness of public transport," "improvement in the usage environment" and "promotion of participation and cooperation"

Improvements in transport hubs and passenger terminals in areas surrounding the station including the development of new stations are being implemented, as well as operation of community buses in remote islands. Particularly around JR Himeji Station, development of a public square in front of the station is underway with a dramatic increase in environmental space and passage of general vehicles are regulated in transit malls. In addition, a share cycle system has been introduced, as a secondly means to promote public transport.

A bus location system has been introduced for fixed-route buses and improvements are being made in cooperation with transport operators such as IC tickets for railways and fixed-route buses, etc.

With emphasis on the promotion of public transport usage and triggered by West Japan Railway Company's transport improvement project and trial increase in the number of services, JR Kishinsen has begun a "3-million passengers challenge campaign" with towns along the route and business operators, exerting continuous effort to achieve increase in the number of passengers while utilizing local resources. Moreover, each year, public transport classwork are being held by transport operators with elementary school children as the target to prepare the next generation with regard to this endeavor.

- Himeji Station North Public Square and Transit Mall (World Heritage Site and National Treasure Himeji Castle shown in the front)



Source: Himeji City

(2) Measures by companies in the transport sector

① Aviation companies

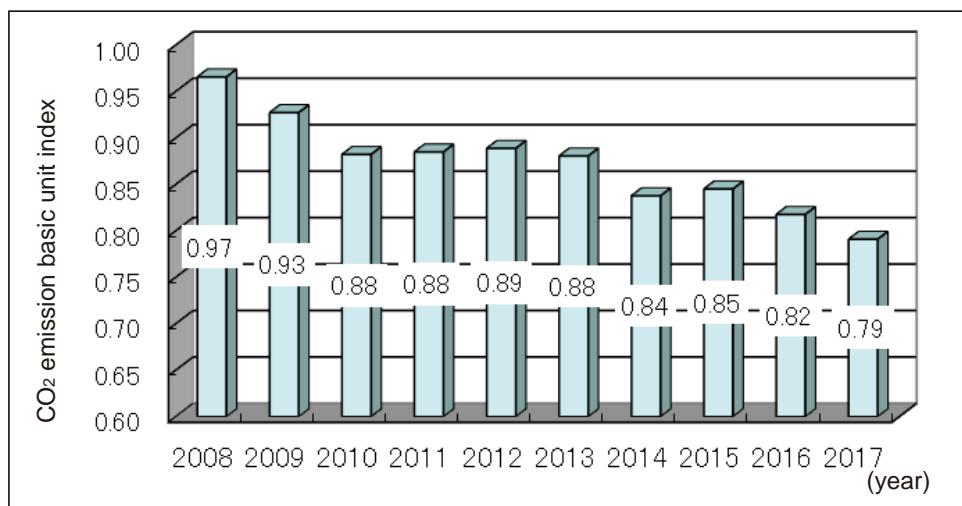
The Scheduled Airlines Association of Japan, a Japanese association of air transport operators, has implemented environmental measures. Major measures are the following.

○ Global warming prevention targets:

Target: Reduce energy consumption base units in 2020 by 21% in comparison to 2005

CO₂ emission basic units: 0.00095t-CO₂/RTK (revenue ton kilometers)

Achievement: Reduce energy consumption base units in 2017 by 21% in comparison to 2005



Source: The Scheduled Airlines Association of Japan (Tentative Translated by Eco-Mo Foundation)

Contents of measures:

- Introduce new high fuel efficiency airplanes
- Using area navigation etc, a high-precision navigation method, to reduce flight distances and times
- Reduce weight of loaded articles (reduce weights of cargo containers and in-flight meal facilities, optimize amounts of fuel and drinking water)
- Recover engine performance and improve fuel efficiency by cleaning engines
- Working with related parties to identify issues involved in introducing alternative fuels such as biojet fuel, and considering measures for resolving these issues

○ Support for the creation of a recycling-oriented society

Target: Lower industrial waste final disposal rate to 2.4% or below for 2020

Achievement: Industrial waste final disposal rate in 2016 was 3.7%

Contents of measures: Promote garbage collection by type, promote reuse and recycling, and select waste processing companies with resource recycling technologies, etc.

○ Environmental awareness raising activities

- Participation in afforestation around airports nationwide and coral planting in Okinawa and development of eco-tours related to the foregoing activities
- In order to raise environmental awareness of children who represent the future, environment seminars by pilots will be held.

III. Measures in Response to Major Environmental Problems of the Transport Sector

②Railway companies

The Association of Japanese Private Railways, an association of railway operators in Japan, has formulated "Commitment to a Low Carbon Society" and carried out the following principal measures as part of this plan.

Target: Reduce power usage basic units in 2020 by 5.7% in comparison to 2010

Reduce power usage basic units in 2030 by over 5.7% in comparison to 2010

Contents of primary measures:

○Introduction of energy saving cars

Energy saving trains such as VVVF controlled trains, which consume less power, and regenerative brake-equipped trains, which efficiently use power, are being introduced.

●Rates of introduction of energy saving cars by 16 major private rail companies

(as of March 31, 2018)

	Control method	No. of cars owned	
			Number of reduced weight cars
Cars with regenerative brakes	VVVF control	11,819 cars*	10,630 cars
	Chopper control	2,323 cars*	1,171 cars
	Resistance control, other	616 cars*	237 cars
Cars without regenerative brakes	Resistance control, other	2,460 cars	304 cars*
Total number of cars owned		17,218 cars (A)	12,342 cars
Number of energy saving cars (trains with regenerative brakes or reduced weight cars)		15,062 cars (B) (total of cars indicated with a *)	
Share of energy saving cars		87.5% (B/A)	

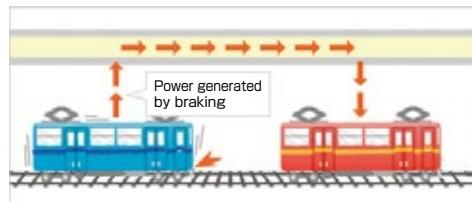
Note 1: As a general rule, only commercially used cars are included (funicular lines and new transport lines are not included)

Note 2: "Reduced weight cars" are cars made with stainless steel or aluminum.

Source: The Association of Japanese Private Railways (Tentative Translated by Eco-Mo Foundation)

○Usage of energy saving systems (regenerative brakes, regenerated power storage devices)

Trains with regenerative brakes, which generate power when braking and return the power to the overhead power lines for reuse, are being actively introduced.



○Noise and vibration reduction

Efforts to reduce noise and vibration include the introduction of reduced noise trains, the use of long rails to reduce the number of rail joints, the use of synthetic crossties, and the installation of elastic material such as rubber between concrete railbeds and crossties.



○Use of natural energy

Solar panels and wind power generators are being installed on the roofs of stations, using sunlight and wind to generate the power used by the station.



Source: The Association of Japanese Private Railways (Tentative Translated by Eco-Mo Foundation)

③Truck, bus, and taxi companies

Each industry associations have formulated voluntary action plans as environmental measures, striving to popularize green management certification and promote eco-driving, etc.

■Japan Trucking Association

Target: Reduce CO₂ emission basic units per ton kilometer from commercial trucks in 2020 by 22% in comparison to 2005.

Contents of measures:

- Promote introduction of low-emission vehicles
 - ◇Provide aid for the introduction of CNG vehicles and diesel hybrid vehicles
 - ◇Distribute pamphlets, etc. which raise awareness of replacing vehicles with low-emission vehicles
- Promote eco-driving
 - ◇Hold eco-driving training sessions and promote attendance at the said sessions
 - ◇Distribute energy saving driving manuals, energy saving driving recommendations, eco-driving promotion notebooks and eco-driving promotion manuals by data download from website
 - ◇Provide subsidies for the introduction of devices which support the shutting off of engines when parked
 - Provide subsidies for the acquisition of vehicle-mounted heating and cooling devices (air heater, truck battery driven coolers) which can be used continuously for long periods of time when engines are stopped during truck driver breaks, when waiting for cargo to be loaded, etc.

■Nihon Bus Association

- Bus business "Commitment to a Low Carbon Society" -

Target:

○Cut CO₂ emission intensity in 2030 by 6% in comparison to 2015.

○Promote shift from use of private cars to buses.

Specific activity contents:

○CO₂ emission rates reduction measures

- Nationwide promotion of eco-driving
 - Member companies are striving to ensure drivers thoroughly engage in eco-driving, such as by stopping their engines when idle, and avoiding quick acceleration and quick braking. During Eco-Driving Promotion Month, of which the Nihon Bus Association is a leading advocate, the association takes even more intensive measures, such as carrying out checks of eco-driving implementation. The association is also actively equipping buses with devices which contribute to eco-driving, such as start-stop (idling-stop) devices and digital drive recording devices.

- Promotion of introduction of high fuel efficiency buses

When purchasing new vehicles, national, local government, and Nihon Bus Association subsidy systems are used to actively strive to deploy hybrid buses and high fuel efficiency buses.

- Enforcement of detailed inspections and maintenance which help maintain fuel efficiency performance

○Measures for promoting shifting from use of private cars to buses

- Bus usage promotion

The association is implementing the following measures in order to improve omnibus convenience and promote bus usage.

◇Popularization of non-step buses and pleasant, comfortable buses

III. Measures in Response to Major Environmental Problems of the Transport Sector

- ◇Promotion of installation and improvement of shared card systems and IC card systems
- ◇Popularization of information systems such as bus location systems
- ◇Active participation in regional measures such as Park & Bus Ride and omnibus town systems
- Driving environment improvement
 - ◇Issuing of requests to related organizations whenever possible regarding the creation of bus-only lanes and bus-priority lanes, bus-prioritizing traffic signals, the removal of illegally parked vehicles on streets used by buses, etc.

■ Japan Federation of Hire-Taxi Associations

- Hire-taxi industry “Commitment to a Low Carbon Society” (voluntary action plan) -

Target level:

- 2020 target (total volume of emissions target)
Reduce CO₂ emissions by 20% in comparison to 2010.
- 2030 target (total volume of emissions target)
Reduce CO₂ emissions by 25% in comparison to 2010.

Basis used to establish targets:

- 2020 target
30% of taxis will consist of HVs, EVs, or other environmentally friendly vehicles. CO₂ emissions will be reduced by reducing fuel consumption through demand and supply optimization.
- 2030 target
40% of taxis will consist of HVs, EVs, or other environmentally friendly vehicles. CO₂ emissions will be reduced by reducing fuel consumption through demand and supply optimization.

Specific plans:

- Global warming countermeasures
In order to achieve hire-taxi industry target levels, the following countermeasures will be promoted and the federation will coordinate and collaborate with national and local governments as necessary.
 - Switchover to environmentally friendly taxi vehicles
 - ◇By 2020 30%, by 2030 40% of taxis will consist of HVs, EVs, or other environmentally friendly vehicles, and the association will encourage automobile manufacturers to speedily launch HV vehicles which use LP gas.
 - Optimization of the number of taxi vehicles
 - ◇Based on the “Act on Special Measures Concerning the Rectification and Vitalization of the General Passenger Vehicle Transport Business in Specific Regions”, revised in November 2013, the federation is promoting the elimination and suspension of vehicles in order to eliminate excess supply.
 - Taxi usage promotion
 - ◇The federation is promoting universal driver training and cultivating high quality drivers.
 - ◇The federation is striving to improve user convenience and promote taxi usage by improving taxi stands and promoting the deployment of advanced technologies such as smartphone-based technologies.
 - ◇The federation is working to expand shared taxi use and reduce the amount of private car usage.
 - Enrichment of and PR for sightseeing taxis
 - ◇The federation is striving to enrich and engage in PR for sightseeing taxis in order to reduce the usage of private cars on freeways and at destinations, cut exhaust gas emissions, mitigate traffic congestion and parking space shortages, and reduce the number of traffic accidents.
 - ◇Multilingual audio translation system and foreign language sheets which can be used by pointing at

phrases are being prepared and supplied in order to enable taxi drivers to accommodate foreign travellers.

· Improvement of operation efficiency

◇ The federation is promoting the use of GPS-AVM-based taxi assignment systems and advanced technologies such as smartphone-based technologies in order to improve operation efficiency and reduce exhaust gas emissions.

◇ Requests are being issued to related organizations to establish and improve taxi pools in order to reduce the amount of unoccupied taxi operation.

· Eco-driving

◇ The federation is working to ensure thorough stopping of engines when vehicles are stopped, prevention of excess vehicle cooling and heating, and prevention of quick acceleration and braking.

◇ Engines are to be stopped when drivers are taking rests, naps, and washing vehicles.

◇ Green management is being promoted through measures such as expanding the number of operators with green management certification.

◇ The federation is promoting the stopping of engines when vehicles are stopped and the deployment of EMS (digital tachographs) in order to support eco-driving.

· Office and business site measures

◇ Air conditioner thermostats in offices and business site are set to 28 degrees or higher during the summer and 20 degrees or lower during the winter.

◇ Training regarding environmental measures and fuel efficiency improvements are provided to mechanics and drivers through maintenance managers and driving managers.

· Improvement of environmental issue related implementation systems

◇ Environmental measure related policies such as carbon offset policies are considered by committees such as technical and environmental committees.

· PR regarding global warming countermeasures

◇ The federation will use websites, posters, stickers applied to taxis, and other means to publicize the taxi industry's efforts to reduce CO₂ emissions and increase awareness among the general public regarding the prevention of global warming.

○ Creation of a recycling-oriented economic society

Disposable economic society will be reevaluated from the position of effective resource utilization, and hire-taxi operators will do their utmost to achieve the following, in order to systematically reduce waste production, and to recycle resources.

· ELVs will be processed appropriately in accordance with the Act on Recycling, etc. of End-of-Life Vehicles.

· End-of-life tires, etc. will be appropriately processed as industrial waste.

· Recycling will be promoted through measures such as the proactive purchasing of recycled products.

III. Measures in Response to Major Environmental Problems of the Transport Sector

■ An Example of Initiatives Implemented by Companies: Ishikawa Kintetsu Taxi Inc.

Ishikawa Kintetsu Taxi Inc. are expanding their business within Kanazawa City as a regional company of the Kintetsu Taxi Holdings group. Along with actively promoting the usage of their taxis as public transport, they are also putting efforts into environmental initiatives.

<“Taxis are vehicles that are good for the Earth”>

In the height of the “my car” era, the business environment continues to see hardships due to the decrease of customers, and we transport businesses also see environmental issues as pressing problems. We felt that we wanted to widely promote the idea that taxis are a form of transport that are good for the environment and to get more people to ride them. When we considered obtaining the “Green Management Certification” we were motivated by the goal to become the first taxi company in Ishikawa Prefecture to obtain the certification.

We put up stickers on the back of our cars as well as on our business cards and homepage to spread the word of the role of the taxi as a vehicle that is good for the environment and help to convert society from the “my car” mindset.



Using stickers to promote taxis as good for the environment

<Pushing forward efforts with high goals>

We've maintained a high fuel efficiency goal from originally when obtaining the certification and also when we update it. Though we've been asked why we don't try a slightly lower goal, we've ventured to set a high goal because consistently aiming high makes what we do worthwhile, and that's how we've working towards our next endeavor.

◊ Promoting idling bans and eco-driving

Idling bans and eco-driving are the very basics of the “Green Management Certification”, however we mostly neglected these practices before we obtained the certification. In particular for idling, because leaving the engine on while standing still or washing the vehicle had become a normal behavior, correcting this bad habit was where we started. When instructing drivers during roll call or even whenever seeing a driver we would repeatedly remind them to not idle their vehicles. Even so, there were limitations in just us managers looking out for the up to 150 drivers so they would stop idling, and so we took on this endeavor as a whole company. We patrol around the precincts and waiting areas and when we see one of our taxis with an engine idling, we immediately stop there and reprimand the driver. Things are steadily progressing, but if we stop now the seam will come undone. The good habits are starting to take root, but we hope to continue to strive.

◊ Inspections and maintenance

At our service stations, along with quickly fixing defects when found through daily inspections, we also check in detail for black smoke or strange sounds. We aim for the eradication of poor maintenance by getting vehicles diagnosed at the service station when even something small seems strange. Education is also being upgraded so that there are no oversights in the inspections.

◊ Introduction of new cars

Introducing new cars is one contributor to raising fuel efficiency. While it's important to take care of each car over a long period of time, new cars come with improvements, including fuel efficiency, so they are being introduced systematically. The introduction of new cars is also essential in consideration of the increase in customers. As a result of introducing new cars, our fuel efficiency (LPG) recently (within the last year) has been

5.54km per liter, which is a 5.7% rise compared to 2009 when we obtained the certification. As the scorching heat continues during summer, fuel efficiency suddenly drops, however we think that this result of 5.7% has been realized mainly through the steady efforts of idling bans and eco-driving.

< Efforts aimed at increasing customers >

We are also working on increasing passengers of public transport which leads to more eco-friendliness.



Improving convenience
by easily ordering taxis via a tablet

◊ Cleaning cars

Introducing new car-washing machines and always maintaining cleanliness is leading to an improvement in our image. Also, with the increase in people who mind about odors, we have begun antibacterial, antiviral and deodorizing measures that make use of disinfectants and deodorants. They are sprayed throughout to coat the inside of the cars and the effect lasts for around one year and doesn't affect the human body or the in-car equipment. It's being adopted to make the inside of our cars comfortable and have our taxis used continuously by our customers.

◊ IT utilization

We are refreshing our homepage, working on our recognition, and improving convenience by having taxi ordering procedures and internet payments be available via smartphones and tablets. We are also installing custom tablets in accommodation facilities and restaurants to use for ordering taxis. Being able to call on taxis easily via a tablet, rather than the previous way where they could only be ordered by phone, is being supported by both facilities and customers. Also, by being able to order taxis through a free app we are working to reduce the strain on the environment.

< "Green Management Certification" raises ability to meet conditions for bidding participation >

For a taxi company, being able to participate in the bidding of public institution is a large advantage. In recent years, with the fact that the "Green Management Certification" has been added to the bidding requirements for transactions with government offices, the authorizing of the "Ishikawa Prefecture Eco-Driving Promotion Office" and the receiving of the "Ishikawa Prefecture Eco-Driving Excellent Office Award", we have received objective appraisal and this has raised the motivation of drivers. The "Green Management Certification", which we originally aimed for in order to be the first in Ishikawa Prefecture to obtain the certification, was obtained through these various reasons and we feel very glad about it. In May 2015, the Hokuriku Shinkansen was extended to Kanazawa City. With the increase in tourists has come an increase in passengers, and also with the effects of the various efforts we've taken to increase taxi riders, the taxi ordering rate, which was previously down to 40%, raised to 52.7% in November 2018, and on busy days this sometimes even exceeds 60%. From here on also we will work to maintain our "Green Management Certification" for the sake of protecting the Earth's environment as well as the livelihoods of our drivers.

④Warehouse companies

The Japan Association of Refrigerated Warehouses is continuing its efforts to reduce "CO₂ emissions and energy usage" in 2018 as well, through measures such as: ① Acceleration program (subsidizing 1/3 of project costs) of the introduction of energy-saving natural refrigeration equipment for the early realization of a CFC-free and low carbon society, and promote energy-saving machines that don't use CFC, ② carrying out "Energy usage fact-finding studies" and "Coolant studies" to collect basic data related to CO₂ emissions reductions, and ③ promoting the acquisition of green management certifications (subsidizing part of the cost of acquiring new green management certifications).

(3) Measures by citizens' organizations

The expansion of lifestyles which are dependent on the use of private cars has resulted in chronic traffic congestion and the waning of public transport. In order to create a shift from the use of private cars to public transport, Car-free Day are taking place.

Every year cities around the world take part in Mobility Week (September 16 to September 22), initiatives in which residents refrain from using their own personal vehicles in central city areas and consider the issues of traffic and its effects on the environment, and urban life and how to best use vehicles. These transport measures and events, which began in Europe, have spread to roughly 2,000 cities around the world, linked by a common objective and working at the same time in a global environmental and transport event. In 2018 11 cities in Japan participated. (Sendai City*, Saitama City, Yokohama City*, Matsumoto City, Kanazawa City, Fukui City*, Toyohashi City, Kyoto City*, Osaka City*, Nara City, Naha City*).

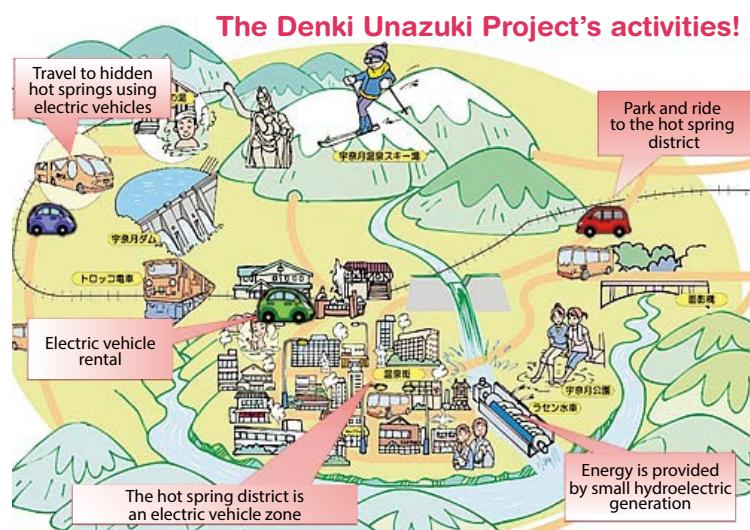
*Citizen group-sponsored; Those unmarked are government-sponsored. Office: Car Free Day Japan

In addition, the “Kumamoto Prefecture All Citizen Stop Warming Movement Meeting” is a prefectural citizen's movement started in August 2008 for reviewing lifestyles and corporate activities so that each citizen can completely eliminate the waste of energy and the efforts to reduce greenhouse gases can be progressed further. Based on the fact that automobiles are the main means of transport in areas outside the central zone of Kumamoto Prefecture, the concept of eco-driving was put in the spotlight.

Specifically, eco-driving diagnoses via safe driving eco-driving support systems that use GPS receivers are being actively promoted in collaboration with Kumamoto Prefecture. These are devices for managing drivers, rather than just cars, and diagnoses are possible even if the vehicle driven is different - if it is for example a company car or a private vehicle. Offices purchase the devices and loan them out to participants to conduct eco-driving diagnosis relays with all citizens.

The Denki Unazuki Project Planning Committee (in Toyama Prefecture) was established in July 2009, and with the cooperation of community residents, it has carried out activities aimed at creating a natural energy public transport system that exists in harmony with the rich natural environment though measures such as small hydroelectric generation, with the aim of achieving local consumption of locally produced energy. In July 2013 the unincorporated association became the Association of Denki Unazuki Project.

At the Unazuki Hot Spring, it introduced a public transport project using renewable energy such as small hydroelectric generation and Green Slow Mobility (eCOM-8 low-speed eight wheel electric community vehicles, known as “EMU”). The Association is working to attract tourists to Unazuki Hot Spring, which has flourished as an advanced eco-hot spring resort as the result of this power development, and to promote autonomous community development from the perspective of local consumption of locally produced energy.



Source: Denki Unazuki Project website (Tentative Translated by Eco-Mo Foundation)

Nationwide Bus Map Summit (Bus map creation initiative by citizens)

The Nationwide Bus Map Summit is held roughly once a year by the Nationwide Bus Map Summit Planning Committee, which is composed of citizens' organizations and other bus map creating organizations.

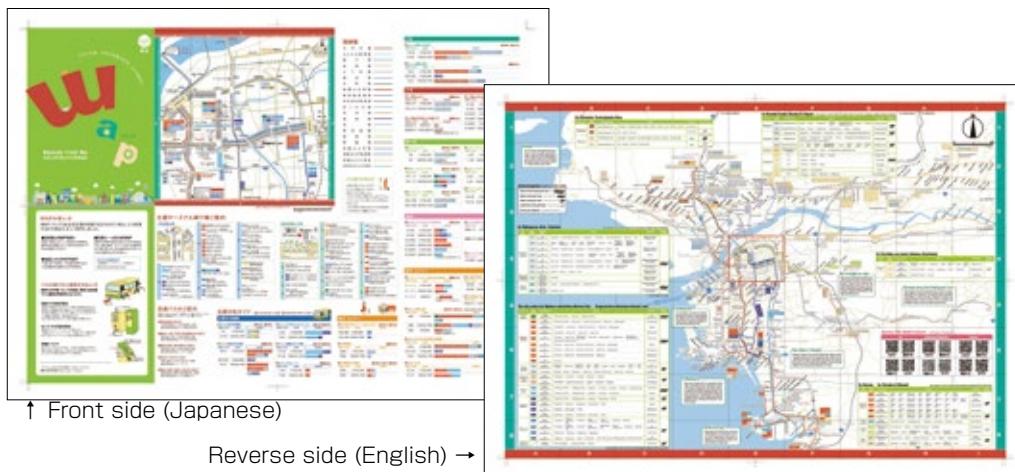
Approximately 100 people from across Japan participate in each summit, sharing the map creation expertise of citizens, not transport operators or administrative authorities, and engaging in passionate discussions about the future of public transport.

●List of citizen's organizations in the Nationwide Bus Map Summit Planning Committee

Region	Name	Bus Map, etc.
Sapporo	Yourun NPO Inc.	Sapporo Super Convenient Bus Map Hakodate Super Cool Bus Map Iwamizawa Super Rice Bus Map
Hirosaki	H · O · T Managers	"Hotto" informational magazine
Sendai	Community Development Policy Forum	100 Yen Pakku Map
Tokyo (Metropolitan Area)	YUKAI. (3-chome) RACUMobi	Bus Service Map
Niigata	Niigata Environment and Transport Research Society	Niigata City Transport Map
Fukui	ROBA (Fukui Tram and Machizukuri Association NPO Inc.)	Fukui Norinori Map BUS-DENSYA-NET FUKUI
3 Tokai Prefectures (Aichi, Gifu, Mie)	Public Transport Machizukuri Promotion Network	Rosenzu.com Gifu City Bus Map, etc.
Wakayama	Wakayama City Planning Council - Wakayama Komachi	wap
Matsue	Project UI NPO Inc.	Doko Demo Bus Net Doko Demo Bus Book Doko Demo Bus Map Sugoroku
Okayama	Rail transport system Amenity Community Design Association (RACDA) NPO Inc.	Bokke Convenient Bus Map Bisan Seto Access Map
Hiroshima	Hiroshima BRT Research Society	Bus Supermap
Okinawa	Bus Map Okinawa	Bus Map Okinawa

Source: The Nationwide Bus Map Summit website (Tentative Translated by Eco-Mo Foundation)

●Bus maps example (wap)



Source: Wakayama Transport Machizukuri Council — Wakayama Komachi

(4) Measures by the Eco-Mo Foundation

① Implementation of the transport business Green Management (low environmental impact business management) Certification System

The Green Management Certification System, which objectively certifies the efforts of companies to make environmental improvements, strives to encourage companies to engage in environmental efforts, and contributes to reductions in the environmental impact of industry by fostering understanding and cooperation between certified companies, society, and users. The system, with the Eco-Mo Foundation as its certifying body, certifies and register transport operators whose environmental activities meet or exceed levels defined in the Green Management Promotion Manual*. The system was launched for the truck industry in October 2003, for the bus and taxi industry in April 2004, and for the passenger ship, coastal shipping, port transport, and warehouse companies in July 2005. As of the end of 2018 there are 3,477 certified businesses and 6,864 certified business sites. These are indicated as "Environmentally-friendly transport operators" on the Eco-Mo Foundation website, and each month press releases are issued to newspaper companies containing newly certified businesses. Vehicles owned by certified truck, bus, and taxi operators account for between 11.6% and 16.2% of the vehicles owned by companies in Japan.

* The Green Management Promotion Manual contains specific measures for individual environmental conservation items, based on the concepts of ISO14031 (an international standard for environmental performance evaluation). They make it easy to establish targets and carry out evaluations, which in turn make it easy to implement environmental management on an ongoing basis.

● Number of vehicles owned

	Certified Companies as of December 31, 2018	Companies Nationwide	Percentage Owned by Certified Companies	Notes
Trucks	147,123	1,264,799 (Note 1)	11.6%	(Note 1): Number of vehicles owned as of the end of March 2017. This includes the number of commercial trucks (excluding trailers) and the number of commercial special purpose vehicles as indicated in the "Transport Statistics Collection" (from the MLIT). It does not include the number of registered light trucks.
Buses	15,781	115,823 (Note 2)	13.6%	(Note 2): Number of vehicles owned as of the end of March 2017. Based on the "Transport Statistics Collection" (MLIT).
Taxis	32,734	202,198 (Note 3)	16.2%	(Note 3): Number of corporate taxis owned as of the end of March 2017. Based on information on the Japan Federation of Hire-Taxi Associations website

■ Evaluations of Green Management Certification

The results of various green management efforts have been tested and verified, and this certification system has come to be evaluated highly, even being included as an element in government measures.

○ Freight owner considerations required by notices based on the Energy Saving Act

One of the energy saving measures required of freight owners under the Energy Saving Act (enacted in December 2018) is the selection of environmentally-friendly freight carriers (carriers who have obtained ISO14001 or green management certifications).

○ Addition of transport and delivery, chartered buses, and taxis to the procurement items specified in the Act on Promoting Green Purchasing

The 2007 basic policy on the Act on Promoting Green Purchasing (Act on Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities) was approved by the Cabinet on February 2, 2007. It added 【transport and delivery】* to the list of specified procurement items. The 2008 basic policy was approved by the Cabinet on February 5, 2008, and added 【chartered buses and taxis】 to the list. The decision criteria are the “neutral evaluation by a third party” of measures such as “implementing measures for promoting eco-driving”. In general, this corresponds with green management certified companies.

* Transport and delivery operations within green procurement scope: Domestic correspondence, parcel delivery, parcel post, mail express

○ Express inclusion in the “Guidelines for the Selection and Use of Chartered Buses in Order to Ensure Transport Safety”

【Published: June 29, 2012】

The MLIT has formulated and issued guidelines which clearly explain the key points involved when travel companies, local governments, educational institutions, etc. select and use chartered bus operators.

These guidelines clearly specify “green management certification” as one of the “evaluation items and evaluation elements involved in comprehensive evaluation” indicated in the guidelines’ “key points regarding the selection of chartered bus operators” and “key points regarding bidding, etc., for chartered bus procurement”.

○ Express inclusion in the “Community Bus Deployment Guidelines” as specified in the notice regarding the revision of the Road Transport Act

【Notice: MLIT Notice 633, April 10, 2013 “Concerning the Approach of the MLIT to Regional Public Transport Councils”】

The notice clearly states that the perspective of “environmentally consciousness” is to be included by cities, towns, or villages, etc. when selecting community bus operators, and specifies “acquisition of Eco-Mo Foundation Green Management Certification or ISO14001 certification” as a means of evaluating this environmental consciousness.

○ Relaxation requirements for Superior Hybrid Vehicles and CNG Vehicles deployment subsidy systems

In order to promote the greater use of low-emission vehicles, the MLIT provides systems for partial subsidization of the difference in prices between low-emission vehicles and standard vehicles. Subsidy requirements such as fleet size limitations are relaxed for truck transport operators who have received the Green Management Certification.

○ Certification acquisition subsidy systems

III. Measures in Response to Major Environmental Problems of the Transport Sector

Local governments:

8 organizations (Chuo-ku, Tokyo; Shinjuku-ku, Tokyo; Sumida-ku, Tokyo; Katsushika-ku, Tokyo; Yokohama City, Kanagawa Prefecture; Ina City, Nagano Prefecture; Shiojiri City, Nagano Prefecture and a local government)

Industry group

Japan Association of Refrigerated Warehouses and 37 prefectural Trucking Associations (Hokkaido, Aomori Prefecture, Iwate Prefecture, Akita Prefecture, Fukushima Prefecture, Ibaraki Prefecture, Tochigi Prefecture, Gunma Prefecture, Saitama Prefecture, Chiba Prefecture, Tokyo Metropolis, Kanagawa Prefecture, Niigata Prefecture, Yamanashi Prefecture, Nagano Prefecture, Fukui Prefecture, Gifu Prefecture, Shizuoka Prefecture, Aichi Prefecture, Mie Prefecture, Shiga Prefecture, Osaka Prefecture, Hyogo Prefecture, Nara Prefecture, Wakayama Prefecture, Tottori Prefecture, Okayama Prefecture, Hiroshima Prefecture, Tokushima Prefecture, Kagawa Prefecture, Kochi Prefecture, Fukuoka Prefecture, Nagasaki Prefecture, Kumamoto Prefecture, Oita Prefecture, Miyazaki Prefecture, Kagoshima Prefecture)

②Implementation of the Excellent Eco-Commuting Business Establishment Certification System

The Excellent Eco-Commuting Business Establishment Certification System has been implemented since June 2009 to certify business establishment which actively promote eco-commuting, widely sharing information on their efforts in order to promote greater adoption of eco-commuting.

The Conference on Promotion of Public Transport, consist of various transport operator organizations, economic organizations, related government bureaus, and other organizations, acts as its certification body. The MLIT and the Eco-Mo Foundation jointly operate the certification system as the secretariat. By the end of December 2018, 737 business sites have been certified.

Certified business sites implementing best measures may also be recommended for MLIT awards. In 2018, Aizu Olympus Corporation, the “Fukui Prefecture Citizen Meeting on Promoting the Creation of a Society that Doesn’t Rely Excessively on Cars”, and the Minami-Uzumasa Self-Governing Association / Kyoto City’s Ukyo Ward Office were selected as the winners of the “2018 Minister’s Award for Excellent Business Implementing Traffic-Related Environmental Conservation Efforts”.

●Aizu Olympus Corporation



●Fukui Prefecture Citizen Meeting on Promoting the Creation of a Society that Doesn’t Rely Excessively on Cars



●Minami-Uzumasa Self-Governing Association / Kyoto City's Ukyo Ward Office

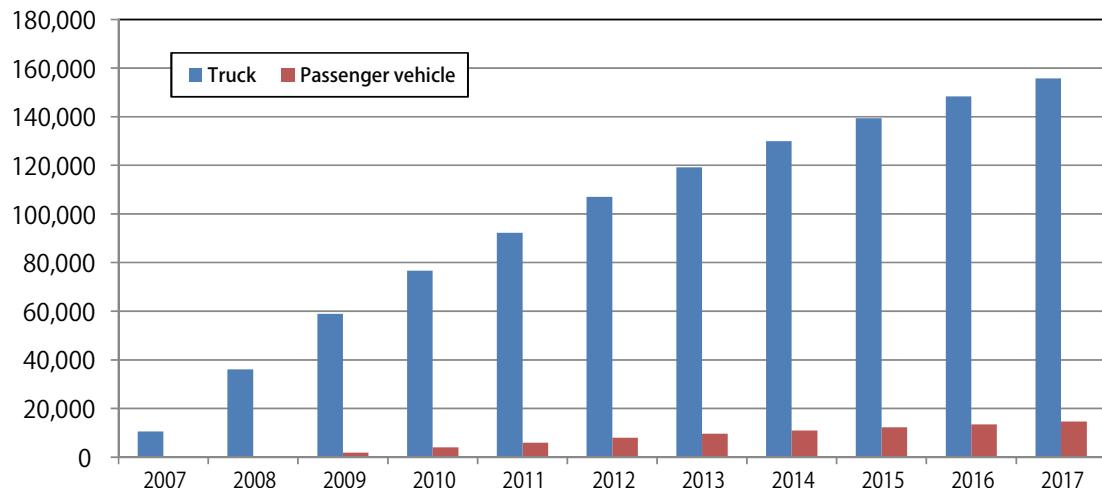


③ Promotion of eco-driving

The Eco-Mo Foundation acts as the secretariat of the Eco-Drive Promotion Implementation Council (consist of 16 transport related organizations), established based on the results of the “COP3 to the UNFCCC” held in Kyoto in 1997. It also carried out various unique eco-driving promotion activities. Since April 2007 it has offered truck eco-driving training certification, and then passenger vehicle eco-driving training certification from September 2008, and presents attendants who have successfully completed training at certified organizations with completion certificates.

Since 2011 it has also held the “Eco-Drive Activity Contest” with the support of the Eco-Drive Promotion Liaison Committee (consist of the NPA, METI, MLIT, and MOE) and the Eco-Drive Promotion Implementation Council. Since 2014 Minister of Land, Infrastructure, Transport and Tourism Award (transport business category) and Minister of the Environment Award (general category) have been conferred, and the award ceremony for top winners was held as part of the “2018 Eco-Drive Symposium” on November 28.

- Accumulated number of completed certificates issued



● 2018 Eco-Drive Activity Contest award ceremony



● Contest leaflet



III. Measures in Response to Major Environmental Problems of the Transport Sector

④Promotion of Environmentally Sustainable Transport (EST)

The OECD has proposed Environmentally Sustainable Transport (EST) (see page 39), and organizations such as Japan's MLIT have implemented EST model projects. In order to achieve greater use of EST by local governments and transport operators, since 2006 the Eco-Mo Foundation has worked with academic experts, related groups, EST related ministries and agencies, and other organizations to promote EST.

In 2018 the Eco-Mo Foundation collaborated with the Regional Transport Bureau in holding workshops for local governments and transport operators (EST Emergence Seminars) in Kyoto Prefecture and Himeji City. In addition to these workshops, tours and review sessions were also held as part of a three day personnel development training session (the 8th such session) in Fukui Prefecture. The 10th EST transport Environment Awards, recognizing exceptional regional transport environment efforts, were also held. And the Awards were also publicized on the EST portal site (<http://www.estfukyu.jp/>), email newsletters, and Twitter (<https://twitter.com/#!/officeEST>).

⑤Promotion of mobility management education (Transport Environment Education)

In order to promote mobility management education, the Eco-Mo Foundation provides support to local governments and elementary and junior high schools, creates centers for ongoing education, publishes educational manifestos to serve as guidelines, publishes textbooks, and engages in other education promotion activities.

Regarding support for the local government, support continue for Shiga Prefecture.

<Supporting local government initiative>

Shiga Prefecture : Apart from the visiting lecture conducted primarily by the prefecture, programs that are easy to put into practice by the teaching staff associated with the subject were also conducted and classes were carried out at 18 schools.

In addition, support for schools has been provided to the following 14 schools.

●Names of supported schools and educational themes

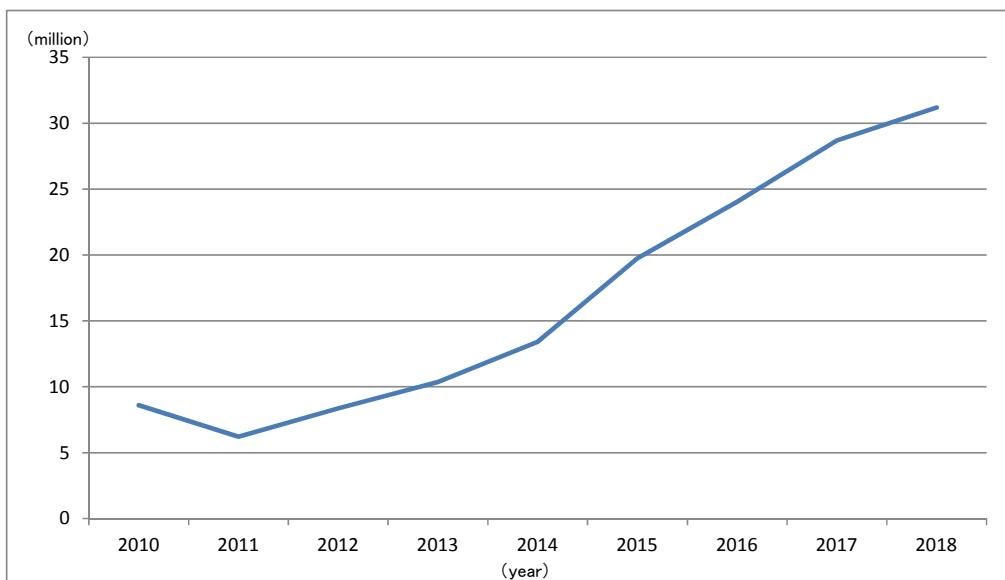
School	Theme	Subject
Atago Elementary School, Okazaki City (Aichi Prefecture)	The growth of transport learning in social studies of new guidelines for teaching and learning that uses transport	Social Studies
Mamigaoka Junior High School, Koryo Town (Nara Prefecture)	A compact city proposal through development of the transport network - "For the future of Koryo Town"	Social Studies
Joetsu University of Education-attached Junior High School (Niigata Prefecture)	Proposing an ideal form of sustainable transport in close regions	Social Studies
Hijidai Elementary School, Mitoyo City (Kagawa Prefecture)	Challenge! Furusato (Hometown) Transport Eco-plan 2	Social studies, Integrated studies
Kyoto Junior School attached to Kyoto University of Education (Kyoto Prefecture)	Thinking about Kyoto's attractions and future town planning	Integrated studies
Aikawa Elementary School, Kurume City (Fukuoka Prefecture)	A study that considers regional public transport environments that feature children of the special support class	—
Fuke Elementary School, Misaki Town, Sen'nan District (Osaka Prefecture)	Touring Misaki - "Let's spread the encounters and learning from regional transport"	Social studies
Naoetsu Elementary School, Joetsu City (Niigata Prefecture)	"Shionari" activities	Social studies
Heisaka Junior High School, Nishio City (Aichi Prefecture)	Exploring the reason why subway lines are built on differing elevations	Science
Shiseikan Elementary School, Sapporo City (Hokkaido)	Carrying out transport environment learning during fifth year elementary school integrated studies	Integrated studies
Doshisha Junior and Senior High School (Kyoto Prefecture)	Eizan Electric, Hachiman-mae Station Project	Special studies
Shimizu Ryogochi Junior High School, Shizuoka City (Shizuoka Prefecture)	Ryogochi Hometown Learning - "What we can do for Ryogochi"	Integrated studies
Kyowa Elementary School, Honjo City (Saitama Prefecture)	Vehicle Exploration	Lifestyle
Sapporo Elementary School attached to Hokkaido University of Education (Hokkaido)	Carrying out mobility management education in fifth year elementary school social studies	Society

⑥ Regional promotion of the smooth mobility of foreign tourists

In the “Tourism Vision to Support Tomorrow’s Japan” that was established in 2016, the Japanese Government released the clear goals of 60 million foreign tourist visitors and 15 trillion yen in the consumption annually in 2030, and these numbers are being aimed for through various efforts.

As a result of these efforts, at the end of 2018 the annual number of inbound tourists exceeded 30 million annually for the first time and the number of foreign tourists continues to increase each year. On the other hand, foreign independent tours (FIT) in which travelers make independent airline and accommodation reservations are increasing and the need for an improved environment to enable smooth and comfortable mobility for such independent travelers is an urgent issue.

● Transition of inbound foreign tourists



Source: Japan National Tourism Organization (JNTO)

Thus, from 2017, we are supporting the funding, know-how and consensus-building of two groups that are improving transport means and enriching guide information for smoothly moving foreign tourists.

In April we publicly invited support groups and received 22 applications from around the nation. Two support groups were selected by the “Committee for the Promotion of Smooth Transport for Foreign Tourists in Various Regions” (Chairman : Haruno Ishida, Specially - appointed Professor of University of Tsukuba) of which was formerly established within this Foundation.

● The work of the support groups

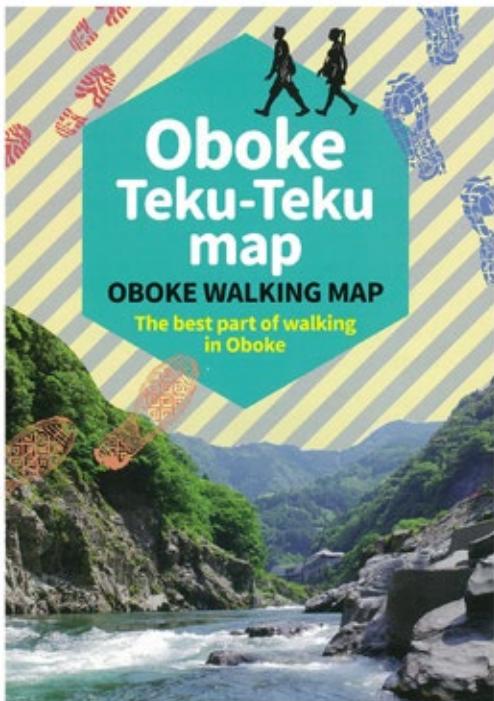
Group	Project name and summary of 2018 work
Tokachi District Intermodal Passenger Transport Vitalization Promotion Council	<p>Tokachi District Project for the Smooth Transport of Foreign Tourists.</p> <p>We carried out development of new travel packs, tested a baggage transport service for empty-handed travel between Obihiro Station and both Obihiro Airport and Tokachigawa Hot Spring, and examined the common route maps and schedule designs of two bus companies.</p>
Miyoshi City	<p>Miyoshi City “Sennen-no-kakurenbo Smooth Transport Project for Tourist Areas”</p> <p>Along with creating sightseeing and excursion maps around Oboke Station, we also examined the introduction of new on-demand sightseeing excursion taxis.</p>

III. Measures in Response to Major Environmental Problems of the Transport Sector

●Guide to the Tokachi District Project



●Excursion map at Oboke Station in Miyoshi City



⑦Eco-Products 2018 Exhibition

The Eco-Products Exhibition, held annually since 1999 in order to promote environmentally-friendly products and services, is a comprehensive environmental exhibition held at Tokyo Big Sight. It is one of the largest-scale exhibitions in Japan, attended by business persons, members of the government, and general consumers.

The Eco-Mo Foundation has operated booths at the exhibition featuring videos and panels explaining the current state of the global warming issues related to the transport sector, global warming countermeasures, and the activities of the foundation.

(Eco-Products 2018 data: Exhibitors: 538 companies and organizations. Visitors: Approx. 160,000. Eco-Mo Foundation booth visitors: Approx. 4,500)



⑧Promotion of usage of carbon offsets in the transport and tourism sectors

One global warming countermeasure is the use of “carbon offsets”, which eliminate or absorb greenhouse gasses to compensate for emissions made elsewhere as the result of the usage of products or services. Product or service users or providers bear the costs of purchasing emissions rights produced elsewhere to compensate for their emissions. In the transport sector, carbon offsets are already being used by airlines, rail operators, bus operators, taxi operators, truck operators, and travel companies.

Carbon offsets don't only highlight the efforts being made by the companies which use them to prevent global warming, but they can also promote voluntary greenhouse gas reductions across a wide spectrum of users, including individuals. They also serve to provide funding to projects for reducing or absorbing greenhouse gasses.

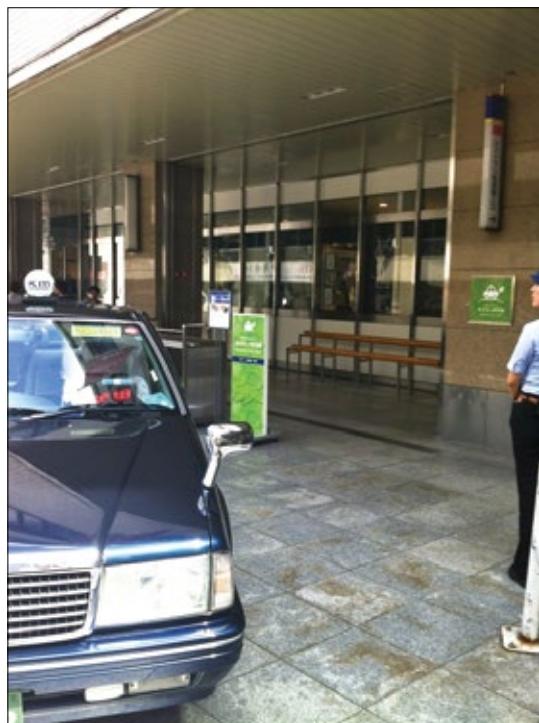
In order to promote greater usage of carbon offsets by the transport and tourism sector, in December 2009 the Eco-Mo Foundation established the “Transport and Tourism Carbon Offset Support System.” This system reduces the burden placed on companies in introducing carbon offsets for transport and tourism related services, and makes it possible to calculate CO₂ emissions and purchase emissions rights via the web. The system is already being used by local government transport bureaus and a wide range of companies, including major private rail operators, bus companies, taxi companies, truck companies, and tourism companies.

●Example of carbon offsets using the support systems

Implementing company: Kokusai Motorcars

Name: Environmentally-friendly taxi stand

Overview: A taxi stand exclusively for taxis from Kokusai Motorcars, part of the KM Group, was set up at the main Isetan location in Shinjuku, and the CO₂ emissions for the base fare distance (2km) of each taxi trip departing from the taxi stand was offset by the company



Taxi stand



お客様 × ISETAN × KM



Leaflet

⑨Use of electric compact low-speed vehicles within communities and sightseeing areas

The waning of public transport in provincial regions of Japan has produced a greater environmental impact as the result of growing use of personally-owned vehicles and created mobility problems for senior citizens unable to drive.

Electric compact low-speed vehicles have little environmental impact and can coexist harmoniously with pedestrians due to their low maximum speed of under 20km/h. Hopes are high for the potential these vehicles have to address environmental impact and reduced senior mobility problems when used for living activities within communities and as a means of transport in tourist destinations, helping achieve an even lower carbon society.

However, there has been little research regarding the use of electric compact low-speed vehicles. Golf carts have been permitted to drive on public roads since 2014, and societal pilot tests have finally begun, but necessary information has yet to be shared by related parties within Japan, so starting from 2016 studies are being conducted of cases of actual electric compact low-speed vehicle usage. The use of golf carts in Wajima City and Ofunato City has been observed, promotion scenarios for a range of uses have been studied, and the results have been presented in a seminar in 2016.

Along with carrying out demonstration experiments in 2018 at the three regions adopted (Yokohama City, Wajima City and Matsue City), test drives were also carried out in areas such as Otaki Town, Toshima and Kyoto City.

●A test drive event at Keikyu Tomioka in Yokohama City



●Driving on the Wajima City seaside sightseeing route



●Driving in a suburban area of Matsue City



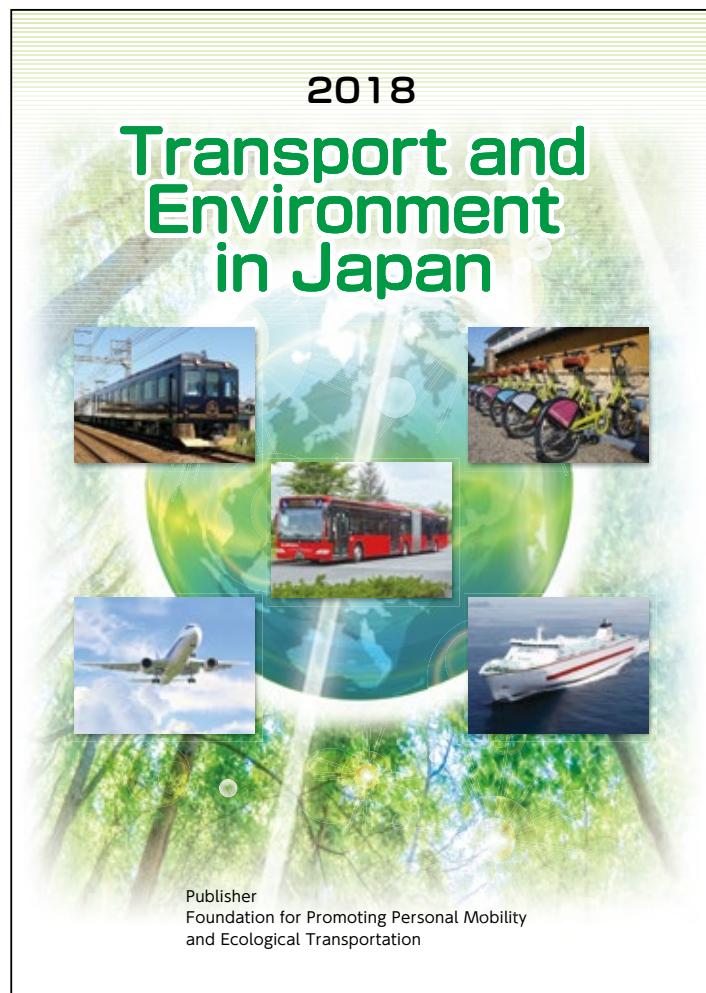
●Driver training in Wajima City (driving within a school)



⑩Publication of “Transport and Environment in Japan”

The Foundation has published “Transport and Environment in Japan,” which provides basic data and the latest countermeasures against the environmental problems and challenges of the transport sector (global warming, air pollution, waste, recycling, sea pollution, noise, etc.), as well as introducing the activities of local governments, businesses, citizens’ groups, the Eco-Mo Foundation, and more. Since 2016 an English version has also been published to showcase Japan’s transport environment measures and countermeasures overseas. (The English version can be downloaded from the Eco-Mo Foundation website.)

●Transport and Environment in Japan 2018



IV. Measures in Response to Other Environmental Issues

1 Noise related measures

(1) Automobile noise countermeasures

A study of motor vehicle noise environmental standard compliance status conducted in 2016 found that of the 8,618,400 homes studied, 526,400 (6.1%) homes had motor vehicle noise levels which exceeded environmental standards either during the day (6:00 a.m. to 10:00 p.m.), at night (10:00 p.m. to 6:00 a.m.), or both. 247,900 homes (2.9%) exceeded environmental noise standards both during the day and at night.

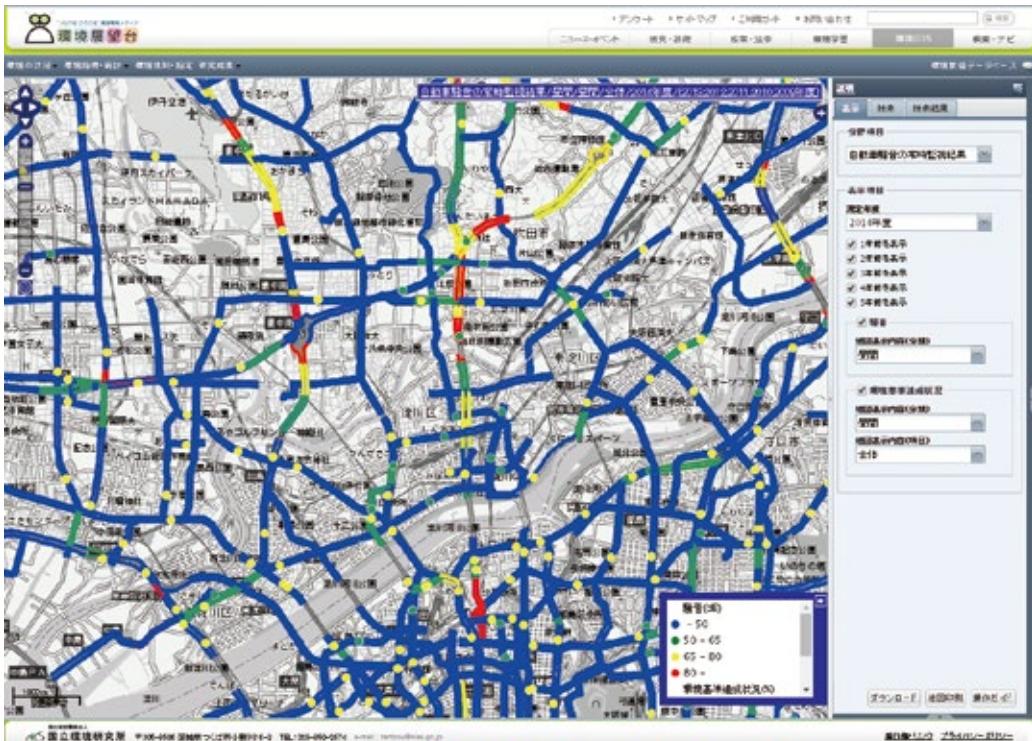
Of the 3,634,300 homes in areas along major arterial road, 376,200 (10.4%) homes exceeded environmental noise standards during the day, at night, or both. Of those, 173,800 (4.8%) homes exceeded environmental noise standards both during the day and at night.

Changes in the compliance of environmental noise standards must take into consideration changes in the homes investigated each year, but within the reported scope there appears to have been a gradual improvement over time.

Broken down by road type, the largest share of homes in areas exceeding environmental noise standards either during the day, at night, or both were located near general national highway. Of the 2,355,300 homes located in these areas, 247,100 homes (10.5%) exceeded environmental noise standards.

This information is provided together with corresponding maps on the Nationwide Motor Vehicle Noise Map (Environmental GIS Motor Vehicle Noise Survey Report) website, operated by the National Institute for Environmental Studies (NIES).

●Nationwide Motor Vehicle Noise Map



Source: NIES

(2) Rail noise countermeasures

In regard to noise from Shinkansen trains, based on “About the Environment Standards Associated with Shinkansen Railway Noise” that was announced by the Environment Agency in 1975, we are carrying out measures, such as setting up and raising soundproof walls, in order for the environment standards to be attained.

Of these measures, for the noise associated with the Tohoku (between Tokyo and Morioka), Joetsu, Tokaido and Sanyo Shinkansen lines, the “75 Decibel Countermeasures” are currently being promoted by related government institutions and offices in order to bring the noise levels down to below 75 decibels in the target areas, which include densely populated areas.

So far, the 75 Decibel Countermeasures have been enforced across stages 1 to 5, and extra measures are being taken for places that exceed 75 decibels in the measurement points of the target areas, as found in a stage 5 survey associated with the Tohoku, Joetsu and Sanyo Shinkansen lines. Also, in places outside the target areas there are still locations that haven't achieved 75 decibels, and so we are continuing to promote the “75 Decibel Countermeasures” to achieve the environment standards.

In addition, in regard to noise from conventional railways, based on the “Noise Countermeasure Guidelines Regarding the New Construction or Large Scale Improvement of Conventional Railway Lines” that was notified by the Environment Agency in 1995, we are carrying out measures such as rail welding for long rail in order to meet these Guidelines.

(3) Aircraft noise countermeasures

Aircraft noise countermeasures in Japan can be broadly categorized into source control, improvement of the airport structure and environmental measures in areas surrounding airports. Combinations of these measures are being implemented in a balanced way according to the characteristics of each airport.

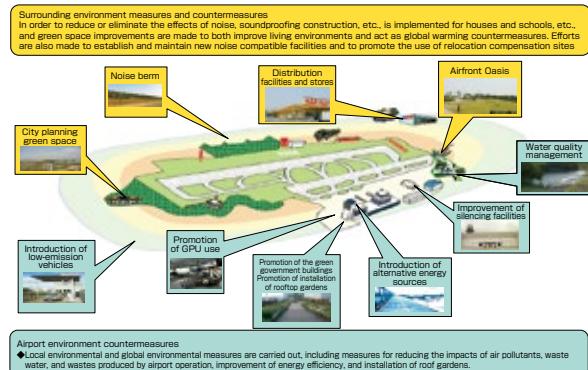
Regarding the source control, there are such measures as noise reduction of aircrafts, improvement in the operation method and restrictions on departures and landings. As a result of advancements in noise reduction technology, the latest aircrafts can achieve an approximately 30dB noise level reduction in comparison to aircrafts 50 years ago.

As for improvement of the airport structure, efforts are being made to open offshore airports where the effects of noise are minimal, as well as to install sound-insulating walls.

With regard to environmental measures in areas surrounding airports, based on the Act on Prevention of Damage Caused by Aircraft Noise in Areas Around Airports (Act No. 110 of 1967), subsidies for noise prevention works in residences and schools are being granted and development of green belts, etc. is being carried out.

The Eco-Airport Guidelines were established in order to assist with environmental protection and creation for airports and their surrounding communities. Based on these guidelines, eco-airport design is being implemented in airports through measures such as the creation of environmental plans for airports and their surrounding areas, and through support for the installation of Ground Power Units (GPUs).

Eco-airport conceptual diagram



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

2 Sea pollution countermeasures

(1) Large scale oil spill countermeasures

One of the major factors behind the large scale oil spills in recent years is the existence of ships which do not meet the standards set forth in marine safety and sea environmental conservation treaties (sub-standard ships). In order to eliminate these ships, Japan is participating in international efforts such as the creation of an international ship database (EQUASIS), as well as enhancing port state control (PSC) by performing onboard inspections of foreign vessels stopping in Japanese ports confirming that they meet treaty standards.

The creation of a system, advocated for by the Japanese government, for checking that flag state governments are fulfilling their duties to monitor and supervise ships flown under their flags was approved at the 2005 IMO general meeting as a voluntary system. Based on the efforts that followed, this system was made mandatory from January 2016.

Japan maintains three large dredging and oil reclamation ships to quickly reach and clean up oil spills in the seas around Japan, and in accordance with the Act on the Prevention of Sea Pollution, a joint public-private oil pollution prevention and cleanup system has been created. Furthermore, Japan, China, the Republic of Korea, and Russia have established a collaborative system for cleaning up large spills of oil or hazardous substances in the Sea of Japan, the Sakhalin area, and the Sea of Okhotsk. The system of international collaboration and coordination is being strengthened through the “Action Plan for the Protection, Management and Development of the Marine and Coastal Environment of the Northwest Pacific Region (NOWPAP) Regional Oil and Hazardous and Noxious Substances (HNS) Spill Contingency Plan” (2008).

- Coverage scope of system of 3 large dredging and oil reclamation ships



"Hakusan" can start oil recovery operation within 24 hours in the Japan Sea area, and even in the Hokkaido sea area can start operation within 2 days. Together with the "Seiryu Maru" and the "Kaisho Maru", it helps further enhance Japan's ability to respond to oil spills around Japan.

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

(2) Countermeasures against harmful aquatic organisms in ballast water

Organisms such as plankton in ship ballast water (sea water used to weigh empty ships for greater safety) can contaminate areas where they are not normally found when ballast water is purged, harming the local ecosystem as well as having negative effects on human health and economic activity. In February 2004 the International Maritime Organization (IMO) adopted the Ballast Water Management Convention in order to regulate ballast water countermeasures using a consistent global standard. Japan became a party to the convention in October 2014.

As of November 2013 nine ballast water management systems have been approved. The first unit of the “JFE Ballast Ace”, a ballast water processing system developed by JFE Engineering Corporation and commercially released after being the first system to receive model approval by the MLIT, was installed in August 2010 in the Emerald Leader, a vehicle carrier owned by NYK. Other ballast water countermeasures are also being earnestly implemented. These include the FineBallast®OZ ozone-based ballast water processing system, jointly developed by Mitsui Engineering & Shipbuilding, the Japan Association of Marine Safety, and five other companies, which received approval by the MLIT in June 2011.

3 Ship exhaust gas emissions countermeasures

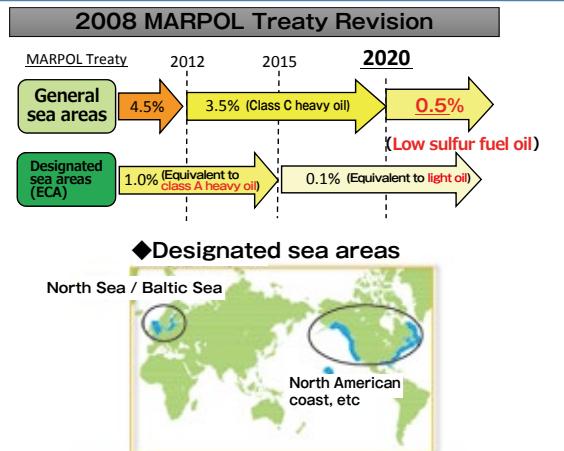
As part of air pollution control measures, in order to reduce the emission of sulfur oxides (SOx) and particulate matter (PM) from ships, sulfur concentration in fuel oil is being regulated on a global scale. This regulation reduces the sulfur contained in fuel oil of ships in stages, and regulation levels will be set according to general sea areas (all sea areas) and designated sea areas (North Sea, Baltic Sea, etc.). Due to revisions in the International Convention for the Prevention of Pollution from Ships made in 2008, the regulation level of sulfur in fuel oil in general sea areas (present level 3.5% or less) will become 0.5% or less from 2020.

In preparing for the beginning of the regulation reinforcement from January 2020, IMO is currently steadily enforcing the regulations and also continuing to examine regulation-unifying enforcement measures for ensuring fair competitive conditions in the naval industries. In Japan as well, in order to smoothly handle the beginning of reinforcement of these regulations in related industries, we are collaborating with the naval industry, oil industry, the MLIT and the Ministry of Economy, Trade and Industry to push forward the work for ensuring stable supplies of oil that conform to the regulations and that are of appropriate quality.

●International regulations for reducing sulfur oxide (SOx) and particulate matter (PM) emissions

Summary of SOx regulations

- Through the revising of the 2008 Ocean Pollution Prevention Treaty by the International Maritime Organization (IMO), from 2020 regulations for the concentration of sulfur within fuel oil for ships will be strengthened around the whole globe from below 3.5% to below 0.5%.
- For Japan, as an environmentally advanced country, it is necessary to appropriately handle the reduction of the bad effects on human health and the environment from the SOx emissions of ships.



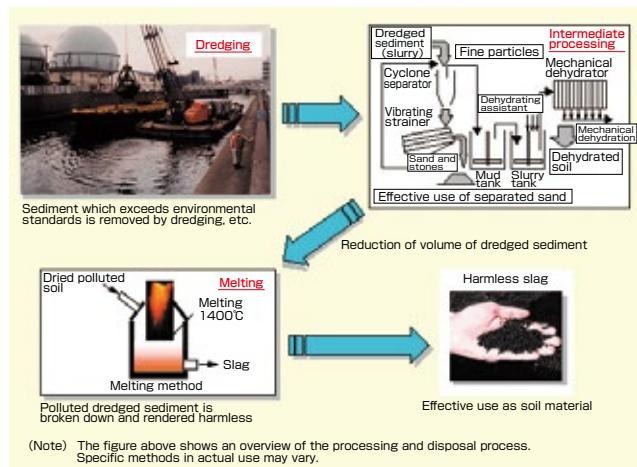
Source: MLIT (Tentative Translated by Eco-Mo Foundation)

4 Chemical substances countermeasures

(1) Dioxin, etc. countermeasures

Dioxins are produced when garbage and other matter are burned. There are concerns about the harm these chemicals cause to the human body. The MLIT is studying dioxins and implementing countermeasures, monitoring marine pollution conditions, and carrying out other measures by establishing a Fundamental Policy Regarding Countermeasures Against Sediment Dioxins, technical guidelines concerning the removal of sediment in ports with dioxin levels exceeding environmental standards for sediment, and revising the "Manual of Sediment Dioxin Countermeasures for Rivers, Lakes, etc." (the River Manual) and the "Technical Guidelines Regarding Sediment Dioxin Countermeasures for Ports" (the Port Guidelines).

●Dioxin, etc. countermeasures



Source: MLIT (Tentative Translated by Eco-Mo Foundation)

(2) Endocrine disruptors countermeasures

Endocrine disruptors (environmental hormones) disrupt the endocrine systems of people and wild animals, producing a number of adverse effects such as reducing sperm counts.

The need for countermeasures in response to these endocrine disruptors is growing year by year. In September 2008 the International Convention on the Control of Harmful Anti-fouling Systems in Ships (AFS Convention) went into effect. This global convention completely prohibits the use of ship hull antifouling paint containing tributyltin (TBT), an endocrine disruptor. The convention prohibits new application of TBT paint, and requires ship owners to completely remove all TBT paint already applied to ships, or to coat painted portions with a protective layer which prevents leaching of TBT into seawater. All foreign ships entering Japanese ports are prohibited from using TBT hull antifouling paint, so when the MLIT actively includes monitoring for TBT hull antifouling paint usage as part of its port state control (PSC) monitoring of whether arriving foreign ships are in conformance with international conventions regarding marine safety and marine environmental conservation, with the aim of eliminating foreign ships on which toxic hull paint has been used.

●Endocrine disruptor website



Source: Ministry of Health, Labour and Welfare (Tentative Translated by Eco-Mo Foundation)

(3) Asbestos countermeasures

Asbestos, used in various facilities, such as warehouses and storage sheds, present a life-threatening hazard. The buildings constructed in the 1970s and onwards, when large amounts of asbestos were imported, are reaching the ends of their lifespans and will be dismantled, so it is important to implement preemptive measures to prevent this work from causing public harm.

The MLIT is following up on the status of asbestos removal and scatter prevention measures for facilities under its jurisdiction in order to advance the removal of asbestos from existing buildings. In addition, measures for removing spray-applied asbestos insulation in existing buildings are being promoted through activities such as subsidies for residence and building safety stock formation operations and local housing subsidies.

In conjunction with revisions to the Building Standards Act the use of spray-applied asbestos insulation etc. in buildings has been prohibited, and Japan is disseminating information in the form of asbestos removal work reference estimates, documents which assist with the process of identifying building materials containing asbestos (visually identifiable building materials containing asbestos), by compiling databases of information regarding building materials containing asbestos, and preparing pamphlets regarding building asbestos countermeasures. Japan is also implementing measures for thoroughly ensuring the prevention of asbestos scattering or exposure during building dismantling.

● Asbestos countermeasure pamphlet



Source: MLIT

(4) PRTR(Pollutant Release and Transfer Register) system

There is growing interest around the world in environmental pollutants such as environmental hormones and new chemical substances produced by high-tech industry. In 1992 the UN Conference on Environment and Development (Earth Summit) indicated the need for a system for managing the discharge and movement of hazardous chemicals in order to reduce their inherent risks.

In response, in 1999 Japan formulated the Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof (PRTR Law). This act defines a system for confirming, tabulating, and publicly releasing data on which of a wide range of hazardous chemicals have been produced, by whom they were produced, how much of the chemicals have been released into the environment, and how much of the chemicals have been taken off from company properties in the form of waste products. This system has been in effect since 2001.

Under this act, warehouse operators (limited to warehousing to store farm products or to store gas or liquid in storage tanks) and automobile maintenance operators are also required to report transfers of specified chemical substances.

● PRTR pamphlet



Source: METI and MOE

5 Ozone layer destruction prevention

The ozone layer which envelops the earth plays an important role in protecting life on earth by absorbing harmful ultraviolet radiation. When this ozone layer is damaged, it allows a greater amount of hazardous ultraviolet radiation to pass through, increasing the incidence of skin cancer and cataracts and impairing immunity in humans as well as affecting animal and plant ecosystems.

Fluorocarbons (CFCs and HCFCs), used as coolants in devices such as refrigerators and air conditioners, are known to damage the ozone layer. Fluorocarbons are greenhouse gasses that are hundreds to tens of thousands of times stronger than carbon dioxide, so it is important to prevent fluorocarbons used in devices (CFCs, HCFCs, and HFCs) from being discharged into the atmosphere in order to protect the ozone layer and prevent global warming.

“The Act on the Protection of the Ozone Layer Through the Control of Specified Substances and Other Measures,” passed in 1995, prohibited the manufacturing of specified fluorocarbons (CFCs), and “the Act for Recycling of Specified Kinds of Home Appliances (the Appliance Recycling Act)”, passed in 2001, mandated the reclamation of fluorocarbons from domestic refrigerators and air conditioners. In 2002 “the Act Concerning the Recovery and Destruction of Fluorocarbons (the Fluorocarbon Recovery and Destruction Act)” mandated the recovery of fluorocarbons from industrial air conditioning and refrigeration equipment and vehicle air conditioners.

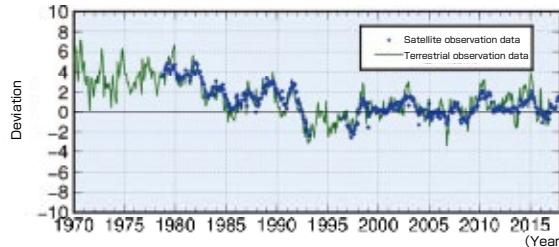
With regard to the recovery of fluorocarbons from vehicle air conditioners and subsequent destruction, due to the fact that vehicle air conditioners are constituent components of automobiles, in January 2005 they were excluded from the scope of “the Fluorocarbon Recovery and Destruction Act”, and regulated together with the disposal of vehicle bodies and engines under “the Act on Recycling, etc. of End-of-Life Vehicles”, which regulates the appropriate processing and disposal of end-of-life vehicles.

In response to a rapid increase in emissions of fluorocarbons (HFCs) with very strong greenhouse effects, particularly those used as coolants in air conditioning and refrigeration equipment, in June 2013 the Fluorocarbon Recovery and Destruction Act was revised to require that the manufacturers of fluorocarbons and devices which use fluorocarbons, and the users of industrial air conditioning and refrigeration equipment, rationalize fluorocarbon use and appropriately manage fluorocarbons. It also established mechanisms such as a fluorocarbon filling operator registration system and a recycling operator licensing system, and the name of the law was changed to “the Act on the Rational Use and Management of Fluorocarbons (Fluorocarbon Discharge Prevention Act)”.

●Changes in global amount of ozone over time

Amount of ozone worldwide

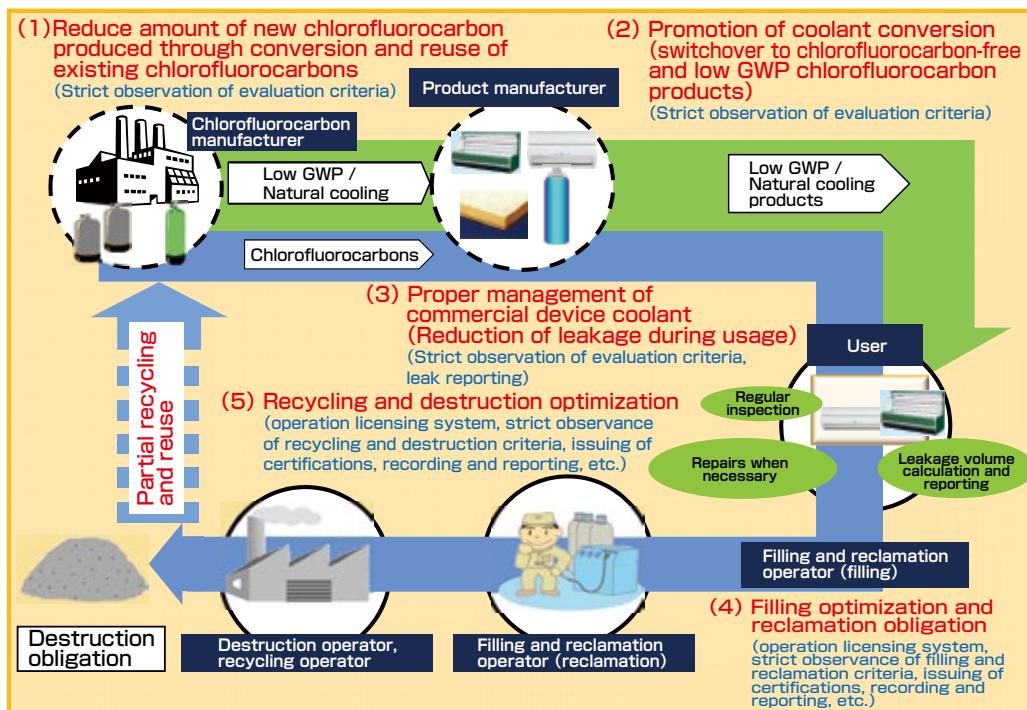
Except for low latitudes, the average amount of ozone worldwide, as measured terrestrially and from satellites, fell significantly from the 1980s to the early 1990s. Since the late 1990s it has remained constant or increased slightly, but the total amount of ozone remains low.



This graph shows the percentage of increase or decrease in the average amount of ozone worldwide compared to the average amount for the 1994 to 2008 period. These value changes have been adjusted to eliminate the influence of seasonal variation. The solid lines indicate data from terrestrial observation sites, and the dots indicate averaged satellite observation data between N70 and S70 degrees latitude. The terrestrial observation site data was supplied by the World Ozone and Ultraviolet Radiation Data Centre. The satellite observation data was obtained from data supplied by the US National Aeronautics and Space Administration (NASA).

Source: JMA (Tentative Translated by Eco-Mo Foundation)

● Overview of the Fluorocarbon Discharge Prevention Act



Source: METI and MOE (Tentative Translated by Eco-Mo Foundation)

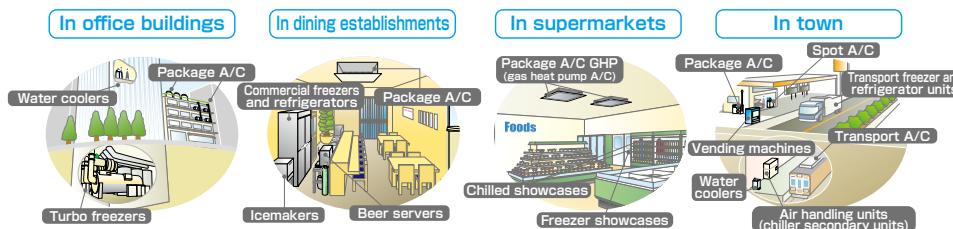
● Fluorocarbon Discharge Prevention Act pamphlet

Fluorocarbons must be reclaimed whenever performing disassembly work!

Under the Act on the Rational Use and Proper Management of Fluorocarbons (Fluorocarbon Release Prevention Act), fluorocarbons must be reclaimed when disposing of commercial air conditioners, refrigerators, or freezers which use fluorocarbons (CFC, HCFC, and HFC).

It is against the law to allow fluorocarbons to be released into the atmosphere when performing disassembly work.

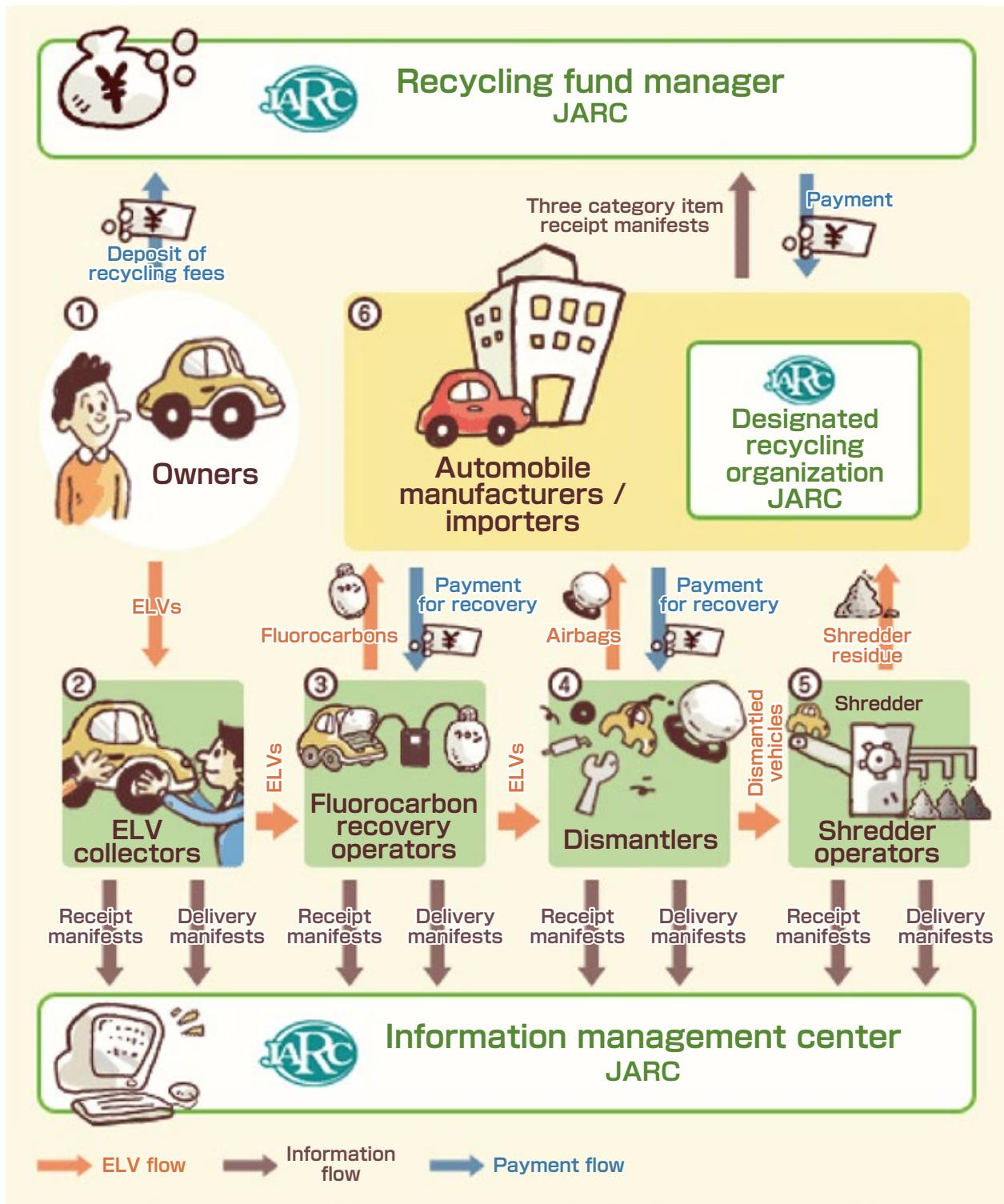
Examples of devices which use fluorocarbons (commercial refrigerators, freezers, and air conditioners)



The penalty for reckless releasing of fluorocarbons is imprisonment of for up to 1 year or a fine of up to 500 thousand yen.

Source: METI and MOE (Tentative Translated by Eco-Mo Foundation)

- Overview of the Act on Recycling, etc. of End-of-Life Vehicles process



Source: Japan Automobile Recycling Promotion Center (Tentative Translated by Eco-Mo Foundation)

6 Global environmental observation and monitoring

Implementing precise environmental problem countermeasures in the transport sector requires the accurate assessment of air and sea changes through steady, long-term observation and monitoring. Diverse air, sea, and other observation and monitoring are being implemented by global monitoring networks.

(1) Climate change observation and monitoring

International efforts aimed at tackling global environmental issues such as global warming are being enhanced. In addition to its previous ongoing efforts, the JMA is implementing the following measures in accordance with the “Strategic Policy Regarding Future Global Environmental Operations”, formulated and announced in 2008.

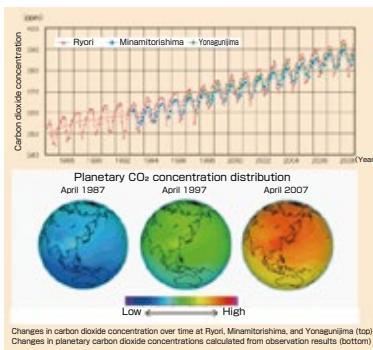
In order to assess greenhouse gas conditions, the amount of CO₂ in the atmosphere is being measured at three locations in Japan and the amount of CO₂ in the surface sea water and the air above the northwest Pacific Ocean is being measured by marine weather observation vessels. Furthermore, since 2009 precise sunlight and infrared radiation measurements have been performed at five locations in Japan.

Sea level increases levels caused by global warming are also being monitored, and information is being released regarding long-term sea level changes along the coast of Japan.

In order to achieve more accurate climate change monitoring and seasonal forecasts, a Long Term Re-Analysis Project is being carried out in conjunction with the Central Research Institute of Electric Power Industry. This project analyzes past global atmosphere conditions using consistent methodology, and the findings of the project are being released to research organizations in Japan and abroad.

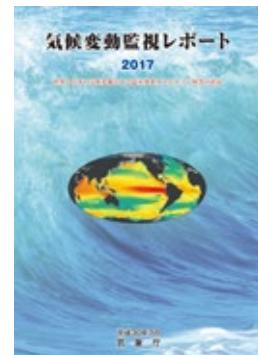
Climate change monitoring reports and anomalous weather reports are created based on observation results, and views on annual climate changes, anomalous weather, and global warming conditions and changes are also released.

● Changes in carbon dioxide concentrations in Japan and global concentration distribution of carbon dioxide (3 measurement points)



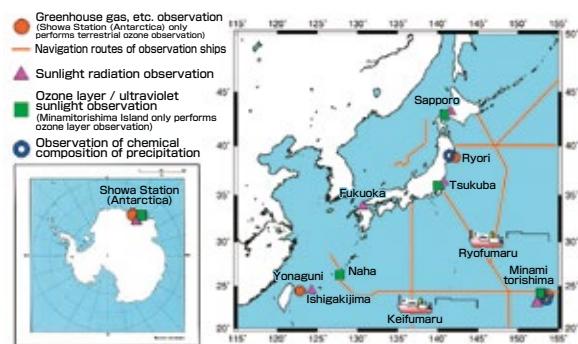
Source: MLIT (Tentative Translated by Eco-Mo Foundation)

● Climate change monitoring report



Source: JMA

● Atmospheric environment monitoring network

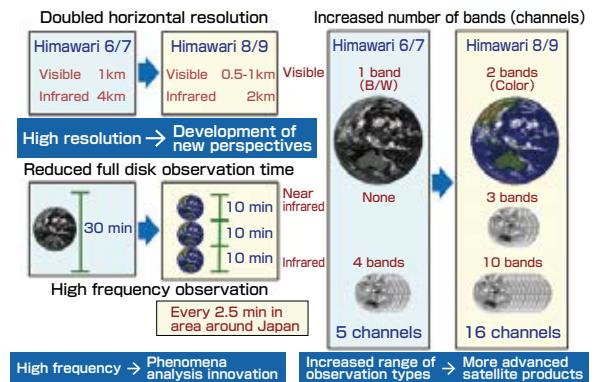


Source: JMA (Tentative Translated by Eco-Mo Foundation)

(2) Himawari 8 and 9

Himawari 8 and 9 are the successors to the Himawari 7 (MTSAT-2) satellite, a multipurpose transport satellite currently in operation. Himawari 8 was launched in October 7, 2014, and after performing confirmation testing of its functionality while it orbited, full-fledged operation began on July 7, 2015, taking over from Himawari 7. Himawari 9 will be launched in 2016, and will remain in orbit in standby until 2022. Himawari 8 and 9 have radiometers (AHI) which use cutting edge observation technologies, and their deployment ahead of other US and European next generation still imaging satellites has drawn international attention.

● Monitoring capability improvements provided by Himawari 8/9



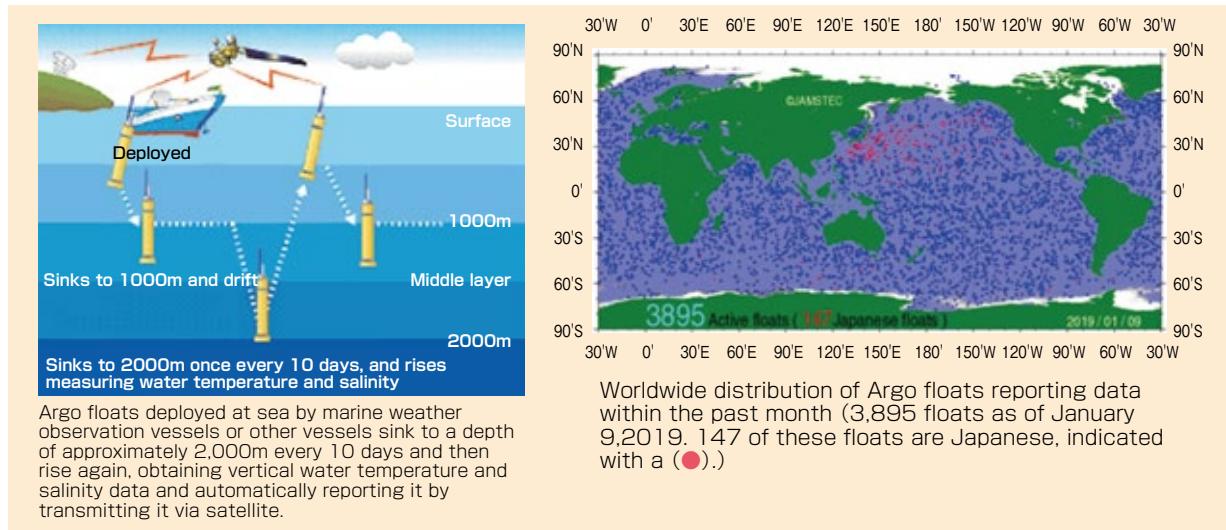
Source: JMA (Tentative Translated by Eco-Mo Foundation)

(3) Sea observation and monitoring

The sea absorbs CO₂, a greenhouse gas, and retains heat, moderating global warming. Sea changes are intrinsically linked to typhoons and anomalous weather conditions, so accurately assessing sea conditions is an important part of responding to global environmental problems.

In order to immediately monitor and assess sea changes throughout the world the MLIT is coordinating with other related ministries and agencies, engaging in international collaboration with organizations such as the World Meteorological Organization (WMO) to carry out the Argo project, deploying devices (Argo floats) around the world to automatically observe conditions within the sea.

● Overview of Argo project monitoring and Argo float distribution



Source: MLIT and Japan Agency for Marine-Earth Science and Technology (Tentative Translated by Eco-Mo Foundation)

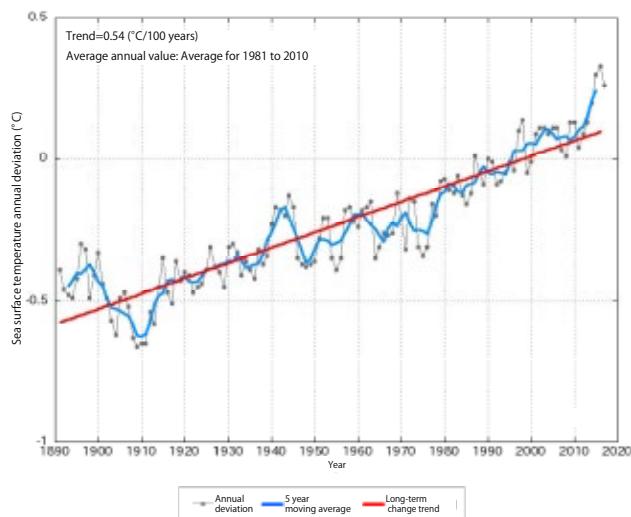
The JMA collects and analyzes data from various sources, such as observation vessels, Argo floats, and satellites, and releases "Marine Health Diagnosis Tables", comprehensive diagnoses and future predictions regarding sea change conditions related to the global environment.

The Japan Coast Guard constantly monitors and assesses Japan Current changes in the area around the Izu Islands using marine short-wave radar. It publishes observation data to supplement the data obtained from Argo floats. The Japan Oceanographic Data Center collects and manages sea data from Japanese oceanic research organizations, and provides it to related organizations and the general public.

● "Marine Health Diagnosis Table" Yearly average sea surface temperature (global average) annual deviation trend

■ Diagnosis (2017)

- In 2017 the sea surface temperature was 0.26°C higher than the average annual sea surface temperature (global average). This was third highest value since 1891 when the first statistics was obtained.
- The average annual sea surface temperature (global average) is changing due to marine and atmospheric changes, global warming, etc., on a scale of several years to several decades. The long-term trend has been an increase of 0.54°C per century.



Average annual sea surface temperature (global average) annual deviation trend
Values for individual years are connected with a black line. 5 year moving average values are connected with a blue line. The long-term change trend is indicated with a red line.
The average annual value is the average value for the 30 year period from 1981 to 2010.

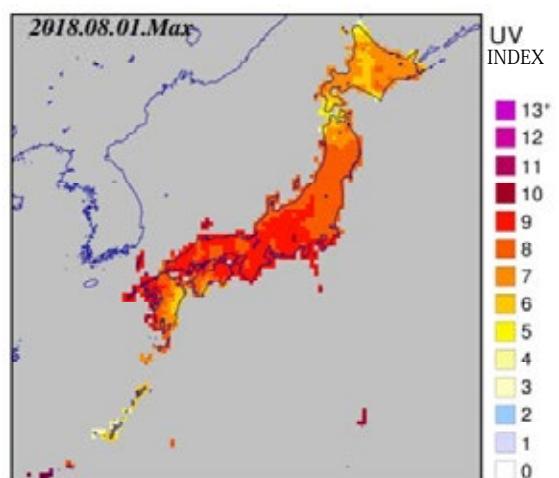
Source: JMA (Tentative Translated by Eco-Mo Foundation)

(4) Ozone layer observation and monitoring

● UV index (max daily values)

In order to protect the ozone layer, which absorbs harmful ultraviolet radiation from the sun, the production, use, and trading of fluorocarbons and other ozone layer destroying substances is internationally regulated by the Montreal Protocol and other agreements and conventions.

The JMA releases the results of ozone and ultraviolet radiation observation on a yearly basis. It also provides daily data regarding ultraviolet radiation in the form of a UV index, easy-to-understand numerical data indicating the strength of ultraviolet radiation.



Source: JMA

(5) Promotion of regular observation at the south pole

The Geospatial Information Authority creates topographical and other maps based on reference point measurements, gravity measurements, continuous GPS observation, bare rock area change measurements, and photographic measurements. The results contribute to research regarding global environmental changes in the south pole area, etc., and international activities focusing on land measurement and geographical information.

At the Showa Base the JMA is performing continuous sunlight, radiation, and land and high altitude meteorological observation. This observation is effectively utilized in international measures, contributing to climate change research and monitoring of the south pole ozone hole.

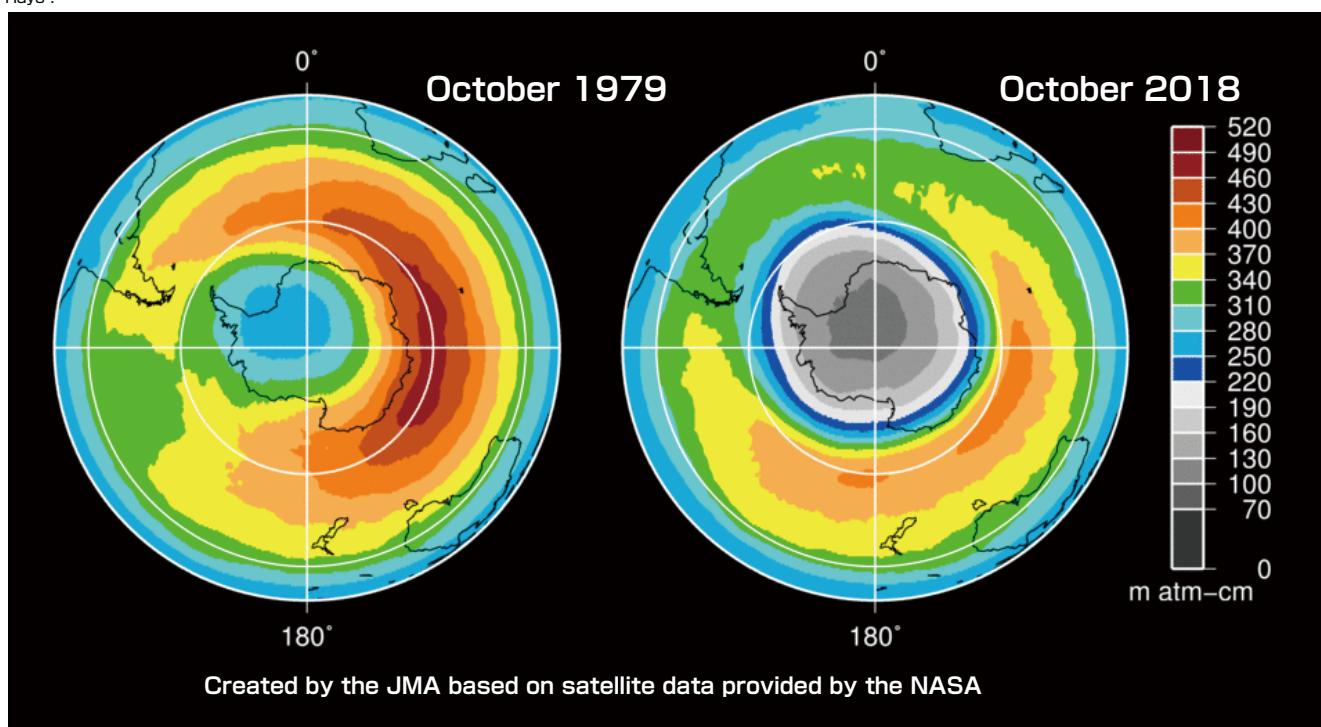
The Japan Coast Guard carries out sea floor topological surveys. It also performs tidal observation, which contributes to monitoring of sea level changes, which are closely linked to global warming.

● Total ozone distribution map in the southern hemisphere (October) 1979 to 2018

Distribution of average ozone levels in October in the southern hemisphere in 1979, before the southern hemisphere ozone hole appeared, and in 2018. The region with a concentration of 220m atm-cm or less is the ozone hole.

Created by the JMA based on satellite data provided by the NASA

For details on the satellite data used, please refer to Attachment 1 "Observation Material used in Analysis" of "Yearly Summary of the Ozone Layer and Ultraviolet Rays".



Source: JMA and NASA (Tentative Translated by Eco-Mo Foundation)

7 Adaptation Measures for Climate Change in the Land, Infrastructure and Transport Sectors

In order to deal with the effects from climate change that accompany global warming, we must not only “mitigate” by restraining greenhouse gas emissions, we must also “adapt” to the already appearing effects and the long-term effects that cannot be avoided.

The MLIT, which controls various sectors including territory preservation and is responsible for making territories and regions safe and secure, established the “MLIT Climate Change Adaptation Plan” in November 2015, and afterwards in November 2018 carried out a revision that takes into account the latest policies.

The transport and infrastructure sector is already experiencing subway flooding and pavement collapses caused by record rainfalls and typhoons, transport interruptions due to snowfall, and other problems. In the future heavy rains, strong typhoons, and violent weather phenomena such as tornados are expected to occur more frequently, and there are concerns of growing climate risks.

Given these situation, there is a strong need to smoothly secure infrastructures and personnel.

● Overview of the MLIT Climate Change Adaptation Plan (Summary of policies by sector)

Potential impact of climate change on transport and infrastructure		
(Natural disasters)	Frequent flooding, extremely large-scale flooding, increase in landslide frequency, significant impact on harbors and coasts	
(Water resources/environment)	Greater drought frequency, water quality changes	
(Peoples' lives, industrial activity, etc.)	Increased risks to transport infrastructure, large-scale rise in temperatures in urban areas, impact of storm and flood damage on distribution and tourism	
Natural disasters		
○Flood damage	<ul style="list-style-type: none"> Use facilities to prevent disasters involving flooding and relatively frequent external forces from occurring When facilities are subject to external forces which exceed their capacity, mobilize all personnel to implement measures to minimize damage Disaster risk evaluation Disaster risk information sharing 	
1) Disaster prevention measures for external forces with relatively high disaster risks	<ul style="list-style-type: none"> Thorough facility maintenance Improvement of functionality of existing facilities Design of facilities to minimize reworking, etc. 	
2) Disaster mitigation measures for external forces which exceed facility capacities	<ul style="list-style-type: none"> Facility measures involving operation, structure, maintenance procedures, etc. Flood mitigation measures integrated with town planning and community development Evacuation, first-aid activity, business continuity, and other preparation 	
○Landslide disasters	<ul style="list-style-type: none"> Measures to address rise in landslide frequency, deep-seated landslide countermeasures Warning and evacuation for landslides with little lead time Land usage, dwelling styles, etc., that take disaster risks into consideration 	
○High tides and tidal waves, etc	<ul style="list-style-type: none"> 1) Harbors <ul style="list-style-type: none"> Sea phenomena monitoring and regular evaluation for harbors Countermeasures for external forces which exceed protection levels, etc. 2) Coasts <ul style="list-style-type: none"> Disaster risk evaluation and countermeasures for individual disaster risks Enhancement of coastal erosion countermeasures, etc. 	
Water resources/environment		
○Water resources	<ul style="list-style-type: none"> Measures for thoroughly leveraging existing facilities, using rainwater and reclaimed water, minimizing critical drought damage, etc. 	
○Water environments	<ul style="list-style-type: none"> Monitoring and forecasting related research, water quality improvement measures 	
Daily life/urban life		
○Transport infrastructure	<ul style="list-style-type: none"> (Rail) Flooding countermeasures for subway stations, etc. (Harbors) Business continuity plan (harbor BCP) formulation (Airports) Hazard maps, airport snow removal system review and revision (Roads) Safety, high reliability road network improvement, promotion of telephone pole-free design, Active use of bicycle (Distribution) Distribution BCP, improvement of disaster support + supply storage agreements, countermeasures for transport obstacles for rail cargo movement 	
○Heat islands	<ul style="list-style-type: none"> Ground surface covering improvements (promotion of installation of rooftop gardens on private land and public spaces, etc., urban park improvement, treated sewage water usage, etc.) Reduction of artificial exhaust heat (energy savings in houses and buildings, promotion of low-emission vehicles, more use of bicycle, promotion of usage houses of sewage heat, etc.) 	
Industrial/ economic activity		
○Use of Northern Sea route		
○Measures for providing information to foreign travelers and countermeasures for damages by rumors		
Infrastructure measures		
○Promotion and awareness raising, information provision	<ul style="list-style-type: none"> Promotion and awareness raising regarding disaster prevention and climate change information Provision of geospatial information, etc. 	
○Observation, research, and technical development	<ul style="list-style-type: none"> Climate, sea level, and land observation and monitoring Climate change forecasting, analysis of snow and ice environment change trends, etc. Impact of growing external forces on flooding and inland water measures and countermeasures 	
○International contributions	<ul style="list-style-type: none"> Global provision of Japanese disaster sector technologies and expertise Participation in international observation, monitoring, and research, etc. 	

Source: MLIT (Tentative Translated by Eco-Mo Foundation)

List of Abbreviations

- BRT (Bus Rapid Transit)
- CMP (Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol)
- CNG (Compressed Natural Gas)
- COP (Conference of Parties to the UNFCCC)
- EDMC (the Energy Data and Modelling Center)
- ETC (Electronic Toll Collection System)
- EU (European Union)
- GIO (The Greenhouse Gas Inventory Office of Japan)
- ICT (Information and Communication Technology)
- INDC (Intended Nationally Determined Contribution)
- IPCC (Intergovernmental Panel on Climate Change)
- ISO (International Organization for Standardization)
- ITS (Intelligent Transport Systems)
- JCM (Joint Crediting Mechanism)
- JMA (Japan Meteorological Agency)
- LED (Light Emitting Diode)
- LNG (Liquefied Natural Gas)
- LPAA (Lima-Paris Action Agenda)
- LRT (Light Rail Transit)
- METI (Ministry of Economy, Trade and Industry)
- MLIT (Ministry of Land, Infrastructure, Transport and Tourism)
- MOE (Ministry of the Environment)
- NASA (US National Aeronautics and Space Administration)
- NPA (National Police Agency)
- OECD (Organization for Economic Co-operation and Development)
- PM (Particulate Matter)
- SPM (Suspended Particulate Matter)
- UNCRD (United Nations Centre for Regional Development)
- UNFCCC (the United Nations Framework Convention on Climate Change)
- VVVF (Variable Voltage Variable Frequency)
- WDCGG (World Data Centre for Greenhouse Gases)

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