

Section 3 The New Germ Showing the First Signs of Growing at the Sight of 100 Years from Now

Three types of societies have to be realized at the same to make a sustainable society; a low-carbon society by drastically reducing GHG emissions, a sound material-cycle society - where 3Rs and proper waste treatment have been advanced - and a society in harmony with nature that can enjoy and pass the blessing of nature on to future.

In this section, first we will focus on technical aspects of environmental measures that will demonstrate multiple conservation efforts, and will consider how environmental technologies for the future should be. Secondly we will focus on the aspect of the great effect, demonstrated by combining the power of individuals and the whole of society, and will consider our future direction from environmental measures that are conducted by mutual cooperation.

1 Technological Synergetic Effects of Environmental Measures

(1)Wastes and CO₂ emissions reduced by methanization

Japan’s waste biomass (animal manure, sewage sludge, black liquor, waste paper, food wastes, construction waste woods and waste from sawmills) in 2008 is expected to be about 300 million tons. Among the waste biomass, the amount of food wastes generated is about 19 million tons annually, and about 14 million tons of this is incinerated or disposed in landfills. The amount of food disposed of before expiration date is considered to have reached 5 to 9 million tons.

It is desirable to recycle food wastes as resources for recycling, since they are generated in spite of the efforts being made to reduce them. Specific ways of recycling them include eco-feeding and composting or using them as energy resources. The three main methods of using them as energy resources are fermentation, gasification and direct combustion. In this white paper, we will introduce methane fermentation, which is suitable for treating food wastes such as raw garbage containing high percentage of moisture.

Methane fermentation (methane gasification) is a method of producing methane, etc. by methane fermentation of organic materials, such as raw garbage, by the action of micro organisms including methanogen and collecting the generated biogas (Figure3-3-1).

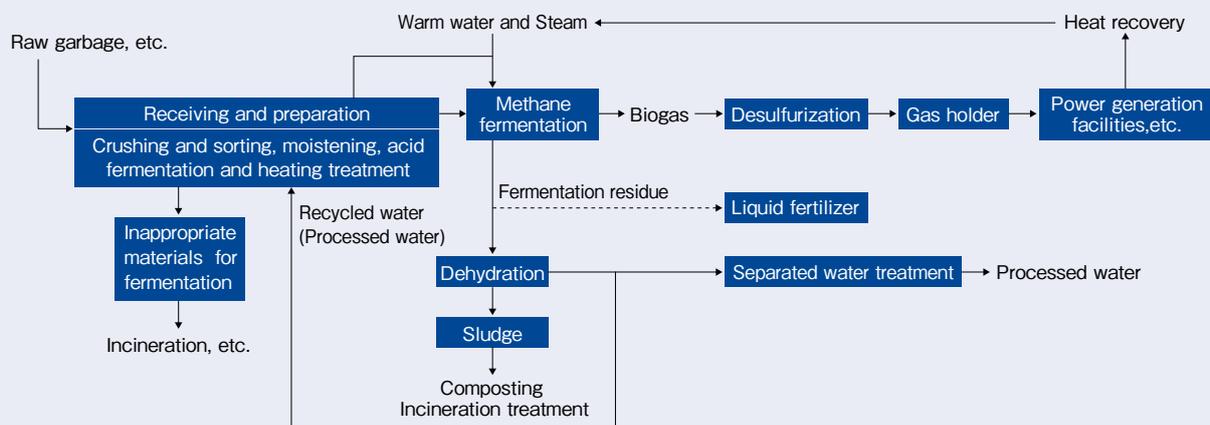
The government is promoting the maintenance of methane gasification facilities by backing “financial support for establishing a Sound Material-cycle Society,” targeted at municipalities, and by drafting the “methane gasification (methane from raw garbage) facilities maintenance manual (January 2008).”

(2)Approaches for a society in harmony and the reduction of CO₂ emissions

Japan is endowed with an abundance of unused biomass (non-edible portions of farming crops and forestry waste) estimated to be about 22 million tons as of 2008. Utilization of such biomass contribute to measures against global warming, since utilization of biomass does not emit additional CO₂ into the atmosphere.

Omotetanzawa outdoor activity center in Hadano City, Kanagawa Prefecture, is performing maintenance of the surrounding Satoyama - the border zone or area between mountain foothills and arable flat land - in collaboration with volunteers, and is using the logged wood, which is produced during maintenance activities, as the fuel for wood biomass boilers for heating and to supply hot water to the surrounding facilities. Around 1,000 m³ of wood chips are used annually from these activities, and the reduction effect is expected to be about 20,000 liters of kerosene (Photo3-3-1).

Figure3-3-1 Management Flow of a Methane Fermentation Facility



Source : Japan Waste Management Association’s publication the Guidelines for Program Design on WasteTreatment Facilities, 2006 revised edition published in June, 2006 (partially arranged)

Methane Fermentation Treatment Facilities

A company that gasifies methane from food waste is collecting biogas by operating methane fermentation of about 110 tons of food waste accepted daily from food manufacturing and processing industries, restaurants, department stores, convenience stores and so on. The methane gas extracted from biogas is used in fuel cells and gas engines and generate about 24,000kWh electricity (equivalent to electricity for about 2,400 households) per day. About 60% of the electricity generated is sold to external users. The effect of CO₂ reduction due to this power generation is about 14 tons per day.

When conducting methane fermentation, reducing the amount of foreign substances, such as plastics which are not suitable for methane fermentation, as much as possible is desirable. The company that gasifies methane crushes food wastes with three

receivers and crushing and sorting machines, and sorts inappropriate materials from raw garbage, so the separation process while emitting food waste at restaurants and others only requires simple tasks.

Example of Leftover Foods Being Processed



Source : Bioenergy Co., Ltd.

The grassland of Aso in Kumamoto Prefecture is a vast grassland landscape of about 22,000 hectares, which are being enjoyed by about 18 million or more tourists annually. Changes in agricultural management, including the utilization of chemical fertilizer, and the decline and aging of the farming population have caused deterioration of the landscape and biodiversity in the grasslands.

Therefore, a number of collaborative entities have been taking initiatives to maintain grasslands, including the implementation of the open burning by volunteers, since 1999. In recent years, initiatives such as providing electricity and heat to existing heated pools and their ancillary facilities by collection and gasification of unused and dead autumn wild-grasses (Photo3-3-2) have also been started.

Photo3-3-1
Wood Biomass Boiler at Hadano City's
Omotetanzawa Outdoor Activity Center



Source : Hadano city

(3)Realization of a sound material-cycle society and a society in harmony with nature by the effective use of lumber, etc.

A Realization of a sound material-cycle society and a society in harmony with nature

(A) Use of thinned wood

Recently, degradation of forest function has been of concern in Japan since forest maintenance practices such as wood thinning are increasingly not being carried out. Effective use of domestic lumber, including thinned wood, enables to circulate the forest cycle of “planting – growing – harvesting,” and to reduce the use of depletable resources, including metals and fossil fuels, while also contributing to the establishment of a sound material-cycle society, a low carbon society and a society in harmony with nature.

“Cartocan” - a paper made beverage container - is

Photo3-3-2 Mowing at Aso Grassland

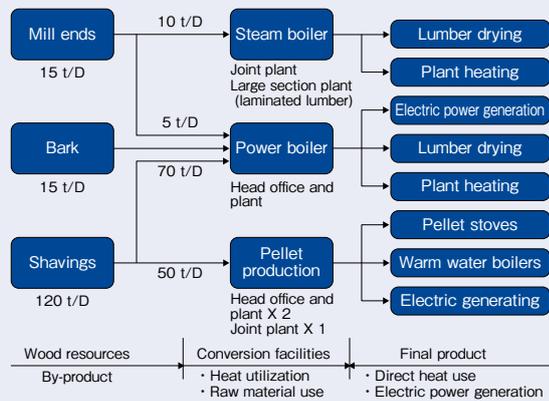


Source : Kyushu Biomass Forum

being developed, in order to effectively utilize thinned wood and mill ends produced from domestic forests. In order to inform the public of the importance “to nurture Japan’s forests,” the “Morikami Council (Council for Popularization of Paper Beverage Carton to Nurture Forest)”—centralized by beverage makers and affiliated companies—is popularizing Cartocan. Over 30% of the raw materials used in Cartocans are domestic lumber, including thinned wood, and are recyclable directly into paper products such as toilet paper because metal films are not attached to the inner surface. The volume of Cartocans produced in FY2007 was about 170 million packages, equivalent of about 0.3% of the drink containers of 500mℓ or less (according to the Morikami Council).

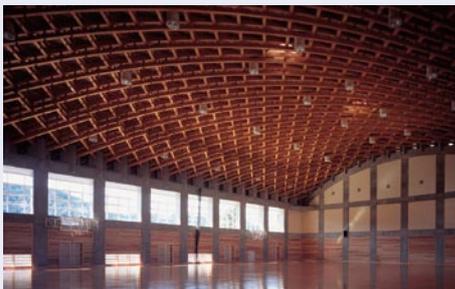
Laminated lumber makes it possible to use materials, such as young thinned wood which used to have limited purposes, for a wide range of usages, including construction materials, wall materials, and furniture

Figure3-3-2 General Outline of the Utilization of Woody Biomass by Laminated Lumber Manufacturers for Construction



Source : Meiken Lamwood Corporation Ltd.

Photo3-3-3 Example of Application of Laminated Lumber



Source : Meiken Lamwood Corporation Ltd.

(Photo3-3-3).

A laminated lumber manufacturer for construction is constructing various forms of buildings with laminated lumber made from domestic lumber. The manufacturer not only produces laminated lumber, but also produces wood pellets and generates woody biomass, using waste wood generated in the laminated lumber manufacturing process. This is an approach to contribute to the protection of nature, the reduction in consumption of fossil fuels and to reduce wastes (Figure3-3-2).

Regarding thinned wood used in copy paper, Japan has set criteria for environmentally friendly goods and is advancing approaches to prioritize procuring them, in accordance with the Law Concerning the Promotion of Procurement of Eco-Friendly Goods and Services by the State and Other Entities (Law on promoting Green Purchasing). In the past, only 100% post-consumer recycled paper pulp was purchasable; however after the revision of the criteria, copy paper partly made of thinned wood, etc., has been purchasable since FY2009, if it utilizes 70% or more recycled paper pulp. Some paper makers have succeeded in developing copy paper using thinned wood, and are supplying the market.

(B) Umi-no-Mori (Sea Forest)

The Tokyo Metropolitan Government is projecting the “Umi-no-Mori” project to rebirth Tokyo Bay’s final disposal sites into 88 hectares of green forests (reclamation area of waste and construction waste soil) through the collaborative activities of citizens, businesses and NPOs to plant trees. Forest creation will be conducted under the project with the collaboration of the private sector and public administration through seedlings, cultivated from acorns by elementary school children in Tokyo and volunteers, and planting seedlings

Figure3-3-3 Umi-no-Mori (Sea Forest) Project



Photo3-3-4 Participants Planting Trees



Source : Tokyo Metropolitan Government

purchased with funds raised by citizens and businesses. Soils used for planting trees are compost and construction waste soil, produced from pruned branches and leaves from city parks and street trees, and forest creation with

environmentally sound resource cycle is being promoted. The area is about to revive as a place that contributes to harmony with nature and recycling (Photo3-3-4).

2 Environmental Measures that Mobilize Individuals and Social Powers

(1) Individual and local initiatives aiming at a low-carbon society

For the realization of a low-carbon society, it is necessary to understand about the energy consumption of our own daily life and to convert energy-intensive life into energy-saving life. Changing consumers demand types and quantities will be a great power to urge suppliers initiatives.

A Combining the team's overall power

The "Team Minus 6%," a national campaign for global warming prevention, is accepting citizens "my challenge declaration" as the "I declare CO₂ reduction of 1 kg 1 day 1 person" campaign. In this approach, each individual will choose items which "they want to put into practice" from the list on the global warming prevention menu that can be conducted in daily lives, aiming at reducing 1kg of CO₂ per day per person. According to the participants questionnaire conducted by the office of this campaign, the average number of eco activities being practiced per person was 17 items, and the average reduction amount of CO₂ was 1,023g per day. Since the number of participants is about 1.005 million as of the end of April 2009, the annual reduction amount of CO₂ that the participants achieved is estimated to be about 37,500 tons, if the actual results were the same as the survey.

While practices such as to "Set air conditioners to 28°C in summer, 2°C higher from 26°C" (76.0%) and to "Thoroughly sort waste, and recycle plastic waste," (71.8%), tend to be well practiced (Figure3-3-4), eco activities that arise from replacement or new purchases including, to "Replace incandescent light bulbs with compact fluorescent lamp"

(43.2%) and to "Replace old type of air conditioners with energy saving ones" (16.0%) tend to be less well-practiced.

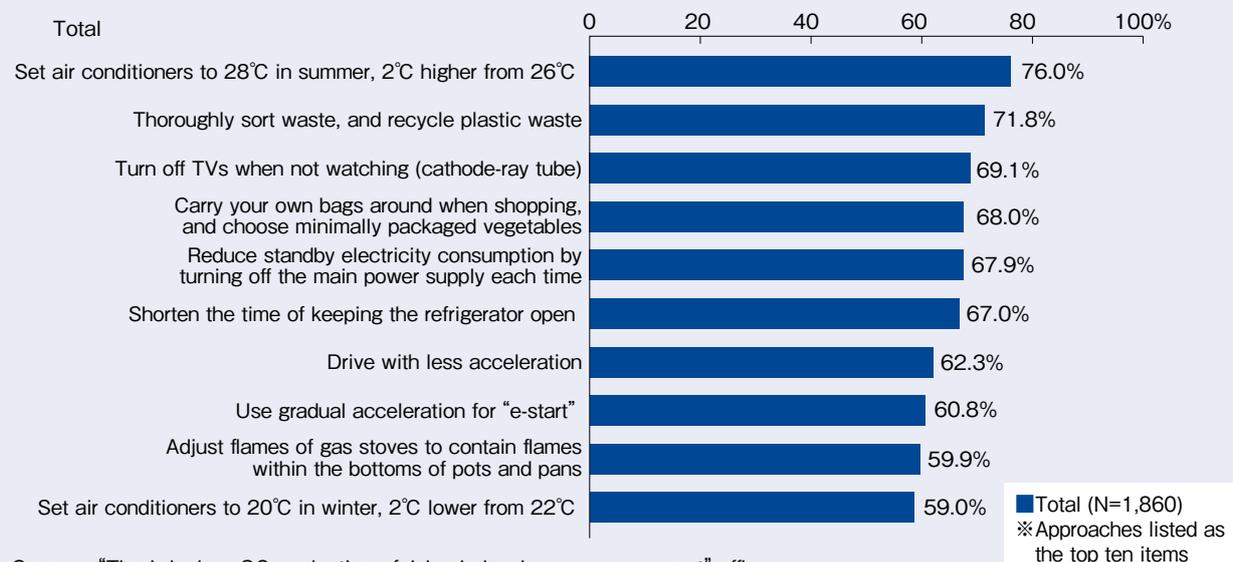
B Approaches activating Environmental Labeling, such as certified products

(A) Biodiversity-oriented certified products, etc.

In Japan's agriculture, forestry and fisheries, each local region began promoting activation of the certified system on forestry and agricultural products which were produced in biodiversity-oriented sustainable forestry and agricultural managements. The "Sustainable Green Ecosystem Council (SGEC)," which operates the forest certification system that meets Japan's actual conditions - a high proportion of forest plantations with a majority of forests owned by small-scale owners - was established in 2003. Certified forests in Japan by these certificate systems are increasing in area since an establishment of the Forest Stewardship Council (FSC) in 2000, reaching 107 certificates and about 1.2 million hectares as of the end of March 2009. This is equivalent to about 10% of the area of Japan's forest plantation.

The Marine Stewardship Council (MSC) which was established in 1997 sets certain rules on fish catches, species, fishing periods and fishing methods and internationally certifies to use sustainable fishing methods which do not deplete fish stocks. As of the end of March 2009, the MSC has certified 41 fisheries, reaching about 5 million tons of certified fishery products, equivalent to about 7% of the world's catch of edible fishery products. In Japan, the Kyoto Danish Seine Fishery Federation obtained MSC fishery certification in 2008 for the first time in Asia, by trawl fishing on *Chionoectes opilio* and *Hippoglossoides dubius*,

Figure3-3-4 The I Declare CO₂ Reduction of 1 kg 1 Day 1 Person "A Schedule Practiced by Many Participants"



using trawl nets. As for the domestic fishery certification system, “Marine Eco-Label Japan,” established by the Japan Fisheries Association in 2007, received certification on *Chionoecetes japonicus* Rathbun in 2008 (Table3-3-1).

(B) Environmental considerations in promoting green purchasing

According to the “results of the FY2007 questionnaire concerning green purchasing in local government” implemented targeting 1,874 local governments nation-wide, 87.1% of them responded that they are “taking a systematic approach” to green purchasing in some way, if the consideration includes the level of the persons in charge. This resulted in almost all local governments approaching green purchasing in some way.

“Systems which certify eco-friendly products and display marks” was chosen as the most necessary system for enrichment of information on selecting products, followed by “Standardized and uniformed methods for product information comparison and expression,” ranking second (Figure3-3-5). Environmental labeling is considered to play an important role in selecting products from this result.

C Supply and demand nodes for CO₂ reduction

Recently, carbon offset is drawing attention as a positive voluntary approach toward achieving a low-carbon society. Carbon offsets reduce CO₂ by cooperation between entities. The members of society, including citizens, enterprises, NPOs/NGOs, local governments and the government will first recognize the amount of their own greenhouse gas emissions, and make efforts to proactively reduce them. Then, entities will purchase a portion of emissions, which are difficult to reduce or remove from other places where GHG reduction has seen fulfilled offsetting all or part of emissions in this way.

Carbon offsets products and services and approaches have been extended into various situations. The carbon offset approach for the G8 Environment Ministers meeting held in Kobe, has offset about 512 tons of CO₂ emissions by purchasing Green Power Certificates and CDM credits for wind power generation projects in South Korea and India. New year’s cards (carbon offset new year’s cards) which the purchasers pay 5 yen of the sales price (55 yen) as a donation, earmarked for purchasing CDN credits and others, also sold

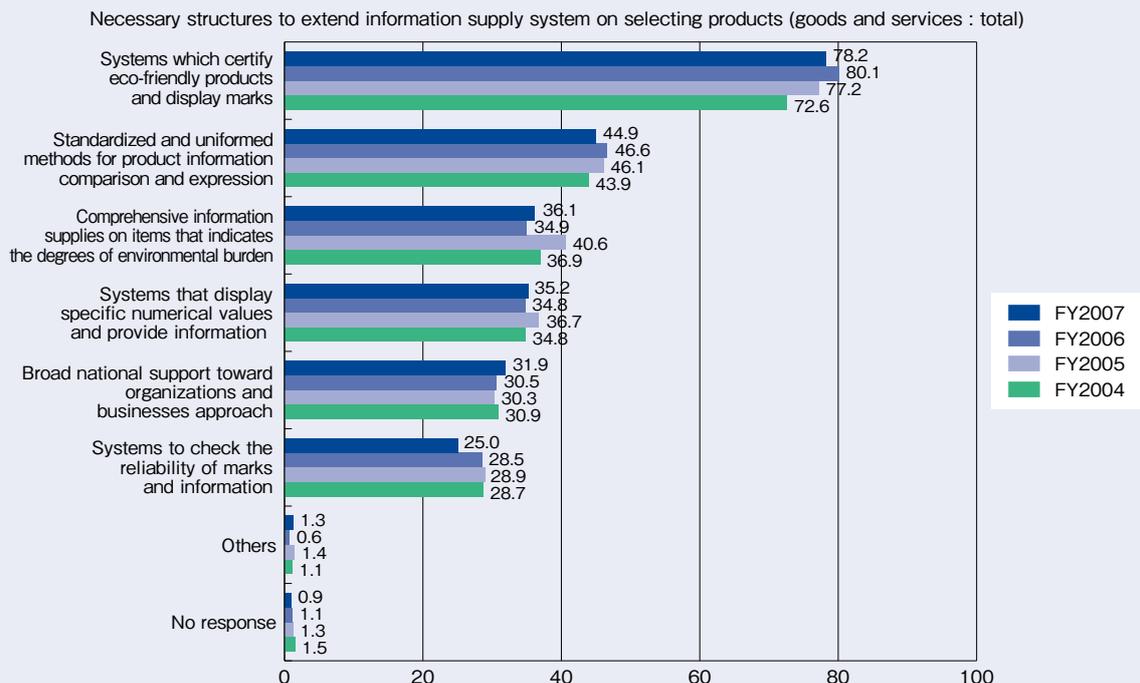
Table3-3-1 Japan’s Fishery Certification Status

As of the end of March 2009

No.	Fish species	Certification holder	Certification system	Certified date
1	<i>Chionoecetes opilio</i>	Kyoto Danish Seine Fishery Federation	Marine Stewardship Council (MSC)	September 19, 2008
2	<i>Hippoglossoides dubius</i>	Kyoto Danish Seine Fishery Federation	Marine Stewardship Council (MSC)	September 19, 2008
3	<i>Chionoecetes japonicus</i> Rathbun	Sea of Japan Crab Pot Fishery Association	Marine Eco-Label Japan	December 10, 2008

Source : Compiled by the Ministry of the Environment based on the data of the offices of the Marine Stewardship Council and Marine Eco-Label Japan

Figure3-3-5 Necessary Structures for Selecting Products to Promote Green Purchasing of Goods and Services



Source : Compiled by the Ministry of the Environment from the “results of the FY2007 questionnaire concerning green purchasing in local government”

about 15 million units in 2008.

Besides such approaches, approaches combining credit and other purchasing with GHG reduction in various products and services have been started.

A regional bank will purchase emission quotas equal to certain percentage of the deposit amount (0.1%) over 5 years, if they receive time deposits from customers, and have transferred this to the Japanese government without charge. The deposit was 6.23 billion yen, exceeding the initial offering amount of 6 billion yen and 2,000 tons of emission quotas were transferred to the government without charge as for the first fiscal year. Furthermore, this bank is promoting its environmentally friendly loans, such as to provide financing the deposits to businesses which conduct GHG reductions. Besides this, various products and services are being created, including the followings: a home delivery service where the product purchasers bear the partial burden of CDM credits when using a certain mail order business; a member card of a certain convenience store with a system in which the convenience store transfers the amount of emission quotas to the government by trading the CDM credits created by wind power generation projects with their points.

(2) Highly effective environmental load reduction approaches in cooperation with regional development

Some environmental measures can be approached by individual entities, while for other measures, it is essential to change them by community and regional development with medium and long term perspectives. Each entity's effort on environmental conservation will bear great fruits, by structuring the community itself for less environmental load. Community development for less environmental load is also expected to revitalize regions.

A Compact city created in cooperation with each entity

Aomori City formulated the basic concept for its compact city forms, under the banner of the Aomori Urban Master Plan in 1999, triggered by the forced volume expansion of its administrative expenditures, including snow removal expenses, due to the expansion of its urban area. The city is promoting urban development and curbing suburban development and set down a transportation system classified by area, from the basis that enables to transport by foot and public

Column

More Stars Should Be Visible

The Ministry of the Environment is calling for the “CO₂ Reduction/Lights-Down Campaign” every year to turn off the lights at illuminated facilities and others. The ministry called for a nationwide blackout on illuminated facilities and others on the first and last days of the campaign (June 21 and July 7) in 2008. Especially July 7 was chosen as the “Cool Earth Day” in the Action Plan for Achieving a Low-carbon Society, since it was the opening date of the 2008 Toyako Summit in Hokkaido, and various nationwide events, including the “TANABATA LIGHTDOWN” were addressed. Light downs will lead to prevention of light pollution, in addition to global warming prevention and energy saving. Although the direct effects of global warming prevention and energy saving can not be seen easily, the starry skies may shine brighter than usual on the nights where unnecessary lights are eliminated. Even if the campaign itself ended after a short time, these approaches are expected to encourage further actions, such as refraining from



Night view of Kofu basin before the Light-down

electricity use in one's daily life.

The “Light-down Kofu-valley 2008” was held in Kofu basin, Yamanashi Prefecture in October 2008. The event has been held for ten years to “restore the beautiful starry sky by eliminating street lights,” and the night view of Kofu basin turned pretty dark in the hour between 8pm and 9pm.

The lights-down can contribute to global warming prevention and other issues, and will lead each individual to consider global issues, while looking at the night sky. Region-wide approval and actions are essential for conducting lights-down, and the darkness of the night sky where stars can be seen is the expression of the region's will. There should not be unnecessary illumination in our surroundings. The year 2009 is the International Year of Astronomy, and with such nationwide efforts at the same time, Japan's night sky will be more beautiful. CO₂ emission reduction is also expected from such approaches.



Night view of Kofu basin during the Light-down

transportation in the central area (Table3-3-2).

Comparing the environmental effects of Aomori City's compact city forms with the effects of other nationwide core cities, Aomori City, which has reduced carbon dioxide emissions from passenger vehicles by 25% between 1999 and 2005, has realized a more effective reduction rate than other core cities (Table3-3-3). During this period, although the number of journeys (movements) per person has increased, the mileage per trip has greatly decreased (Table3-3-4), suggesting that the formation of the compact city has shown positive results. Furthermore, for the purpose of decreasing the number of trips per person, enhancement of public transportation, which can replace the vehicles-oriented transportation, is important.

Thus, expanding movements based on community's interests

with a wide range of concerned parties is expected to promote the development of local communities. There, people can enjoy active community with less environmental burden.

B Environmental load reduction with community block reconstruction

(A) CO₂ emission reduction and amenity improvement by improving the heat environment of residential areas

Let's see the effect of the environmental improvement per community block unit, which is a smaller section of a whole city. Specifically, we will examine the methods and effects of improving the heat environment in dense residential areas, in order to balance the GHG reduction and the improvement of city amenities and life quality.

The overall city blocks prevent heat from accumulating, in this simulation. Green coverage rate is improved with greenery areas and greening of the rooftops, a creek was regenerated and its water is used and improvement of building's insulation performance and structures for shielding sunlight were adopted. In addition, life quality has improved by increasing living space - privates and commodities combined—by 20% compared to the existing city blocks. The distinctive characteristics of the new city blocks are the balance of the drastic CO₂ reduction, due to the heat environment improvement and the introduction of advanced facilities and equipments, and the richness of the living space.

The simulation was also conducted under the conditions of a sunny summer day's electricity consumption will reach a peak on the new city block which indicates overall image and improvement points. Due to the measures taken against the heat environment outdoors and response to the next generation energy saving standards for housing, the electricity on air conditioning for each housing unit has been reduced, and the CO₂ reduction has been reduced by about 85%, combining the effect of the state-of-the-art equipment, may be introduced in 2010. Simulation made using the equipment—which could be disseminated around 2030—showed reduction of 100%, adding the effect of highly efficient solar power generation, and even 20% surplus power would be generated (Figure3-3-13). The value of HIP (Heat Island Potential), an index of sensible heat in the atmosphere,

Table3-3-3 Changes in CO₂ Emissions from Vehicles from 1999 to 2005 in Core Cities

	Emissions in 2005	Emission in 1999	Changes in CO ₂ emissions
H City	0.35	0.61	- 43.4%
T City	0.44	0.68	- 35.0%
F City	0.56	0.79	- 29.3%
M City	0.84	1.15	- 27.3%
Aomori City	0.77	1.03	- 25.0%
N City	0.47	0.62	- 24.2%
K City	0.86	1.09	- 21.0%
Omitted			
Y City	1.30	1.24	4.6%
G City	0.80	0.76	5.2%
S City	0.96	0.89	7.8%
I City	1.33	1.22	8.7%
A City	0.92	0.79	16.1%
B City	0.92	0.79	17.0%
O City	1.17	0.86	36.0%

Note : Comparison of core cities. Local governments except for the top seven and bottom seven have been omitted.
 Source : Compiled by the Ministry of the Environment from the data of the National Institute for Environmental Studies

Table3-3-2 Aomori City's Compact City Forms Being Aware of the Differences in Transportation System

Inner-city	Zone for enjoying highly convenient urban lives Establishment of a transportation system to support movements on foot and public transportation
Mid-city	Zone for keeping the balance between compact cities and urban vitality by residential functions with latitude and its vicinity functions Establishment of a transportation system to support movements by public transportation in principle
Outer-city	Zone for backing up the formation of compact cities by maintaining the abundant natural environment Establishment of a transportation system to balance the traffic of public transportation and private vehicles

Source : Compiled by the Aomori Urban Master Plan

Table3-3-4 Status of Vehicle Flow in Aomori City in 2005 and 1999

	Population (thousand people)	Number of vehicles per population (units/thousand people)	Distance per trip (km/Trip)	Annual number of trips per person	Annual number of trips per unit	Annual mileage per person (10km)	Annual mileage per unit (10km)	Total annual number of trips (million trip)	Annual total mileage (million km)	Total emissions from vehicles (per person)	Total emissions from vehicle (thousand ton)	Total number of vehicles (thousand unit)
2005	312	450	9.0	324	719	291	646	101	905	0.77	241	140
1999	319	379	12.2	268	708	328	866	85	1,046	1.05	335	121
	- 7	71	- 3.3	56	11	- 37	- 220	16	- 141	- 0.28	- 94	19
	- 2%	19%	- 27%	21%	2%	- 11%	- 25%	19%	- 13%	- 26%	- 28%	16%

Source : Compiled by the Ministry of the Environment from the data of the National Institute for Environmental Studies

decreased from 30°C to 15°C during daytime and its emissions after sunset was almost zero, reaching around 0°C (Figure3-3-12). That means, the city block has very little accumulation of heat at night that could cause the heat island phenomenon. Not only introducing highly efficient equipment, but also examining the structure of the city is important for energy saving measures from the long-term perspective.

(B) Community development aiming to reduce greenhouse gas emissions

Looking at the approaches aimed at reducing GHG emissions, developed in actual communities, it is especially important not only to urge each relevant approach, but also to pursue collaboration and cooperation of those involved led by local governments, in community development where the region as a whole makes efforts. Achievement of environmental targets, which the region share, will progress as projected with this, and regional vitalization can be expected at the same time.

a Consideration of community development in regions

—Community development of Iidabashi Station West Exit area, which incorporates target of reducing CO₂ emission intensity—

Chiyoda ward in Tokyo established the “Chiyoda ward global warming mitigation ordinance” in December 2007, and set a mid-term goal to reduce CO₂ emissions within the ward by 25% by 2020 compared to 1990. The ward is to accomplish this goal by intensively focusing on energy savings measures in existing small and medium buildings, area measures on city blocks and areas and to promote the introduction of renewable energy, in addition to measures by electric power companies to reduce CO₂ emissions intensity. Especially, strategies to stock green energy—utilizing know-how of large corporations, such as energy saving methods and information on their cost-benefits to small and medium buildings—should be deployed, in order to advance energy savings in existing buildings. The ward was selected as an eco-friendly model city by the Regional Revitalization Bureau Cabinet Secretariat in January 2009.

In March 2009, the ward formulated and announced the eco-model city action plan to achieve the target of reducing GHG emissions as an eco-friendly model city, by 25% by 2020, and 50% by 2050, compared to 1990.

In 2008, the Law Concerning the Promotion of the Measures to Cope with Global Warming was revised. The revised law stipulated that prefectures, designated cities, core cities and special cities should establish items related to the measures to curb GHG emissions as needed in the Action plans of local governments, depending on the area’s natural and social conditions. Regarding the measures related to curb GHG emissions of city plans and others, the governments were made to take GHG emission curb in collaboration with the Action plans of local governments into account, while balancing with the achievement of goals of such measures. Other municipalities are also expected to reduce GHG emissions in collaboration with the Action plans of local governments and others.

Iidabashi Station West Exit area of Chiyoda ward is located in front of Iidabashi station and is one of the most important transportation hubs in the urban center where five railroads converge, and is an area where new businesses and residential functions are accumulating. The ward is aiming to develop the infrastructures of this area in order to improve its attractiveness, and has agreed upon the “Iidabashi Station West Exit Area Development Project” based on the City

Planning Act (Act No.100 of 1968) in June 2008.

In the project, the energy savings and CO₂ reduction in buildings, and total reduction of environmental load in collaboration with buildings in the region should be progressed as the approach driving the measures against global warming of the entire ward. The plan is also aiming to promote environmental measures in collaboration with surrounding areas.

In addition, when the building functions are renewed during the redevelopment of Iidabashi Station West Exit area in the future, under protection ordinance against global warming, eco-model city action plans and Iidabashi Station West Exit Area Development Project, the Chiyoda ward will streamline energy use, while promoting approaches towards improving the environment, such as appropriate use of resources systematically. Especially, the project stipulates that the average CO₂ intensity within the area to be less than 60% of those related to the operational division in the ward in principle.

As for energy-saving measures, the ward will implement heat load reduction by using super insulating glass and using energy-saving lighting, as well as implementing greening and water retention pavements in the area. The reduction of CO₂ intensity in the above business division are to be realized, and in 2012, although expecting the increase of total square meters of building floor area, due to the mitigation of floor-area ratio, the ward is aiming to contain the increase of the total CO₂ emissions from buildings in the area to within 5% of current levels.

Furthermore, Chiyoda ward is seeking to keep collaborate with businesses, aiming to reduce the total amount of CO₂ emissions from buildings in the area by about 25% in 2020, compared to the 1990 level. Other intended measures are as follows: the use of heat waste in surrounding areas which was produced within the area; the use of electricity in the area which was generated with solar power generation devices, intensively installed in surrounding areas; the introduction of an area energy management system, which will collect the energy consumption data of the buildings within the area and surroundings by computer systems, and then specialists will give energy-saving advice, based on the collected data.

b Redevelopment of old factory sites, in cooperation with private developers and city hall

—Redevelopment of Settsu city’s Minamisenrioka area, aiming to reduce CO₂ emissions and the heat island load at night—

In Settsu city, Osaka prefecture, a trilateral agreement called “The memorandum of Minamisenrioka community building, a model area against global warming” was concluded between a private railroad company, which will establish the new station, a private business, which proposed community development on introducing private revitalization, and city hall. In order to realize countermeasures against global warming, the parties concerned are advancing community development through cooperation. The area aims to reduce the amount of CO₂ emissions by 25% by around spring of 2013, at the time of the opening of the community, compared to the current estimated CO₂ volume on the assumption that average residential and business facilities in the Osaka area will be as simulated (Figure3-3-15). As for the countermeasures against heat island, the city is aiming to reduce heat load by 12W/m² at night.

As for the approaches towards achieving the target, the following are planned: private businesses to replace

Figure3-3-6 An Image of Existing City Block



Figure3-3-7 Overall Image of the New City Block and Improved Points

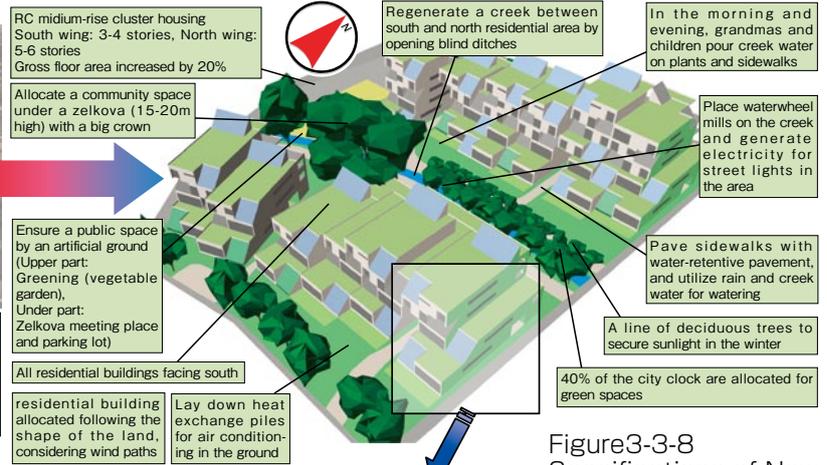


Table3-3-5 Building Performance Scheduled for Introduction (equipment items)

Building performance	Present	Year of 2010	Year of 2030
Insulation and air proof performance	Before the Energy Efficiency Standards (year of 1980), partly the Energy Efficiency Standards (year of 2001)	The next-generation energy efficiency standards (year of 2001)	same as on the left
Utilization of heat storage	N/A	Direct heat gain	same as on the left
Specification of apertural area	Normal aluminium sash	Wooden sash + Low-E Glass	same as on the left

Table3-3-6 Family Structure of All Houses

Family structure	Percentage
Type A: Family of four (Husband, non-working wife, 2 children)	20 percent
Type B: Family of four (Husband, working wife, 2 children)	30 percent
Type C: Family of two (Husband, working wife)	20 percent
Type D: Family of two (Elderly couple)	30 percent
Total: Approximately 60 houses, 180 people	

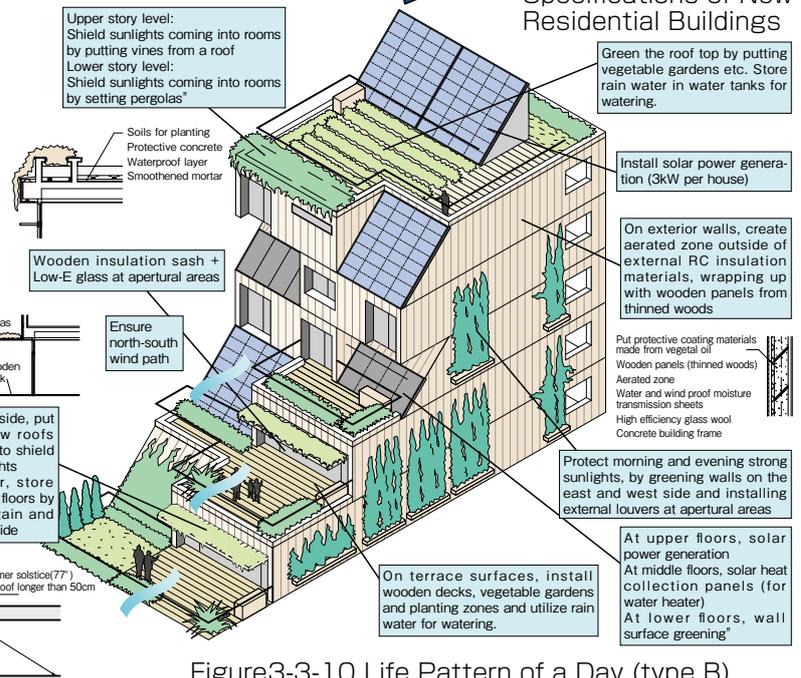
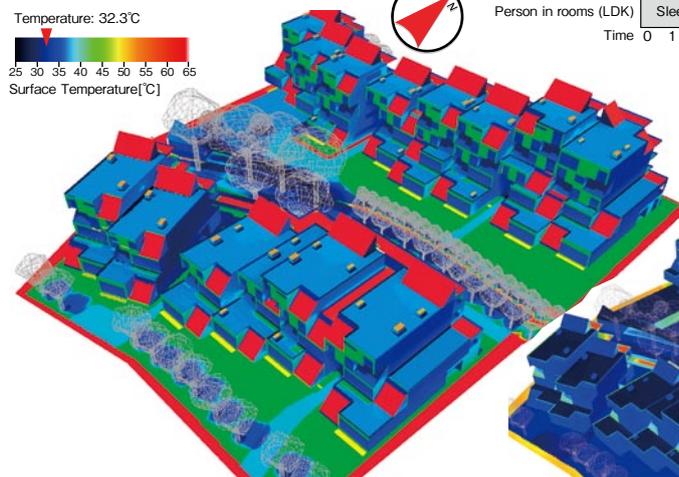


Figure3-3-8 Specifications of New Residential Buildings

Figure3-3-10 Life Pattern of a Day (type B)

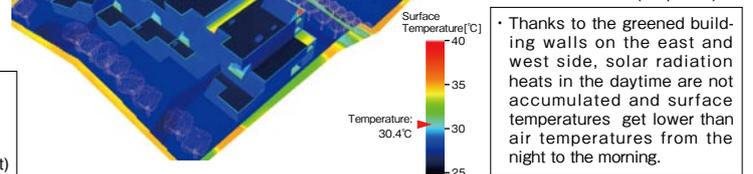
	Little Usage		Little Usage		Large Usage																			
Hot water supply	Refrigerator, standby electricity, etc.	TV, etc.	Refrigerator, standby electricity, etc.	TV, lighting, refrigerator, standby electricity, etc.																				
Lighting and electrical appliances		ON		ON																				
Air conditioning																								
Person in rooms (LDK)	Sleep in a bedroom	1	4	2	Away from home	2	3	4	1															
Time	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23

Figure3-3-9 Surface Temperature Distribution During Summer Daytime (12 p.m.)



- Buildings do not get high surface temperature by the effects of rooftop vegetable gardens, wall surface greening, etc., except for panels for solar power generation in the daytime.
- Surface temperature of the rooftop vegetable gardens watered in the morning and water-retentive pavement are kept at a low temperature, 38°C, even at noon.
- At the surfaces of the tree-shaded water-retentive pavement and grasses, surface temperatures are kept lower, which is equal to or lower than air temperature.

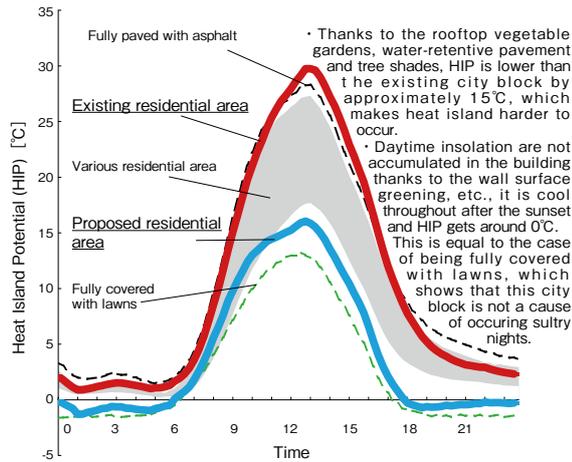
Figure3-3-11 Surface Temperature Distribution after Sunset in the Summer (8 p.m.)



- Thanks to the greened building walls on the east and west side, solar radiation heats in the daytime are not accumulated and surface temperatures get lower than air temperatures from the night to the morning.

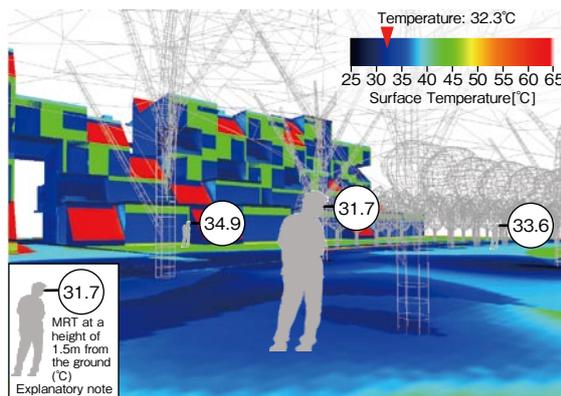
- Assumption: Tokyo, summer sunny day External temperature 32.3°C
- Wind direction: south wind in the daytime/moderate wind in the night (sultry night)

Figure3-3-12
Daily Variation of Heat Island Potential (a summer sunny day)



Heat Island Potential (HIP) [°C]
A measure to evaluate levels of possibilities for heat island to occur, which is used as an index for environmental effects to surrounding areas a site or a city block as objects for development brings.
The measure shows sensible heat load to the atmosphere and is calculated from the computation of surface temperatures.

Figure3-3-14
Situations of Thermal Comforts in Living Areas (MRT)

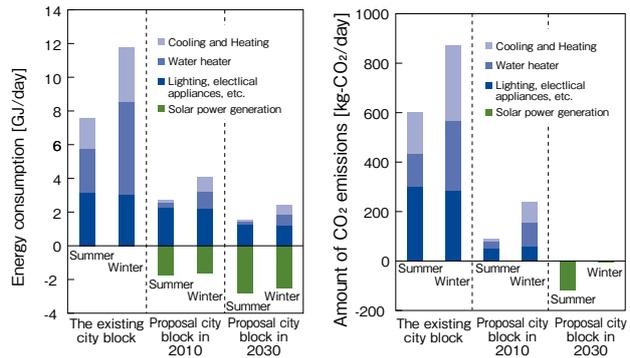


Mean Radiant Temperature (MRT) [°C]
This is an index to evaluate effects by heat radiation, which is one of major parameters to decide thermal comforts in outdoor living areas.

incandescent lighting with fluorescent lighting at residential and business facilities; residents to replace their electrical appliances to most energy efficient, to promote the utilization of public transportation by reducing the number of parking lots; the city hall to plant tree etc. along roads and sidewalks, to implement permeable asphalt pavement, to use rain water; to install energy saving lights, to install solar power generation panels for illuminating streetlights and other lights, and to secure the greening rate of at least 25% by planting plants in the building lots. Currently, the examination of setting these target values and assessment methods of the effect of countermeasures are under way.

The new station (Settsu city station), the entrance of the community, is promoting approaches towards the nation's first "carbon neutral station"—to eliminate CO₂ emissions caused by the station. The amount of CO₂ emissions emitted at the new station is estimated to be about 65 tons per year.

Figure3-3-13
Energy Consumption and Amount of CO₂ Emissions in Summer and Winter



Computation results in the cases of a sunny day in summer and winter.
Energy consumption is based on the second standard.
Amount of CO₂ emissions are based on the energy consumption of buildings in operation stage.

- In the proposal city block, energy consumption for cooling and heating is considerably reduced by adoption of the next-generation energy efficiency standards to buildings, shielding summer sunlight and direct heat gain in winter, etc.
- Energy consumption of hot-water supply is also largely cut down, thanks to introduction of solar water heaters and high-efficiency heat pump water heaters.
- The proposal city block (year of 2010) can generate about 60% of energy consumption of a sunny day in summer from solar power generation panels installed on each houses.
- The proposal city block (year of 2030) is expected to reduce further energy consumption, thanks to energy saving in lighting, electrical appliances, etc. by the Top Runner method and high-efficiency heating and cooling and hot-water systems. In addition, solar power generation enables to make amount of CO₂ emissions less than 0 at the stage of operation. electricity generated surpassing energy consumption.

- Because, under large tree crowns, sunlights are shielded and surface temperatures are kept lower than air temperatures by water-retentive pavement, MRT gets 31.7°C, lower than air temperature (32.3°C), creating living areas where breezes gives coolness.
- MRT are less than 35°C even on the tree-lined roads and the grass surface without tree shade and places with high MRT are not observed unlike above the paved road in the existing city block.

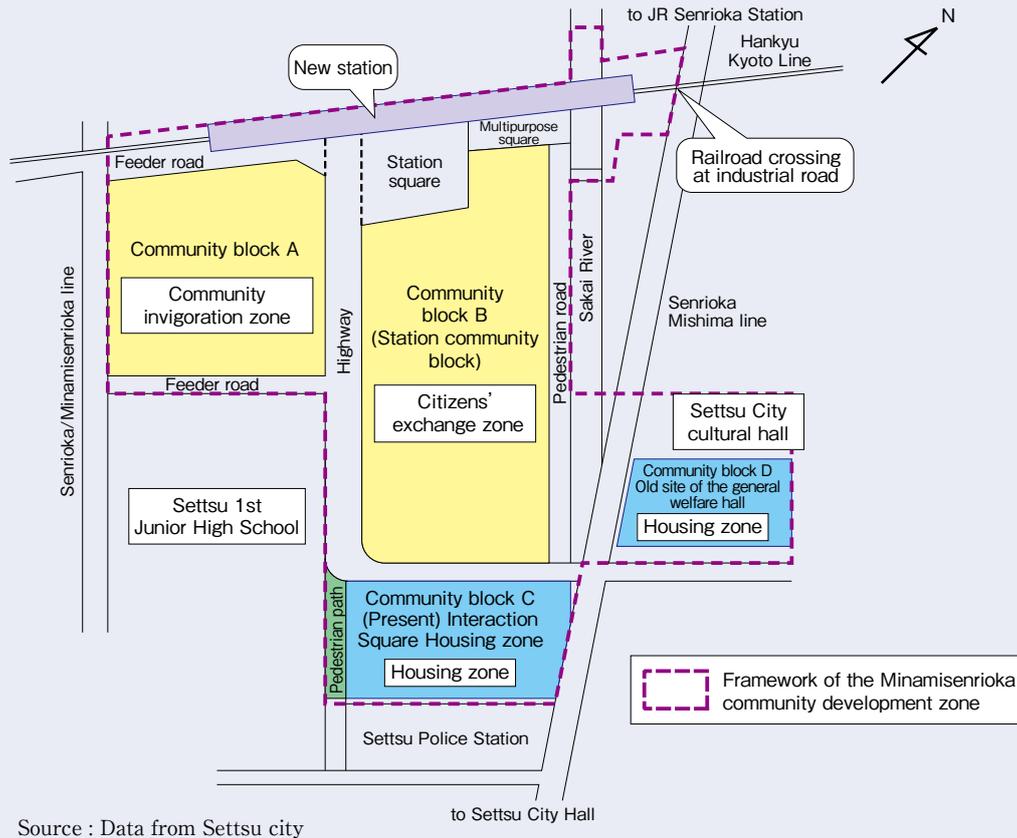
Simulations were conducted by Tokyo Institute of Technology Hoyano/Asawa laboratory

About 35 tons of this (54% of the emissions) will be by introducing solar power generation and adopting energy saving equipment, such as LED lights. About 30 tons (46% of the emissions), where direct reduction is difficult, will be offset by purchasing emission reduction credits, etc., planning to reduce CO₂ emissions from the new station to zero.

C Environmental education and practice with collaboration of administrations, civil groups, etc.

In order to advance approaches to regional environmental conservation, combining community and regional developments, participation and cooperation of people from various parties is indispensable. Each regional administration, citizens, civil groups that are practicing approaches related to developments, educational institutions, such as schools, and

Figure3-3-15 Outline of the Land Use Zone for Minamisenrioka Community Development Project (plan)



businesses should proactively cooperate with each other as partners, that mean “Collaboration” is important. In order to do so, capacity building of duty bearers of sustainable regional development by such collaboration has also become a big challenge.

(a) Environmental community development of Higashimatsuyama city, Saitama prefecture

Higashimatsuyama city, Saitama prefecture, is famous for advancing community development by concluding an “agreement” which includes contents of mutual cooperation with equal rights of the administration and civil groups. The city has concluded an agreement not only for the purpose of coming to an agreement, but also to focus each essential entity to unite with other entities to proactively play its role.

For example, the market expansion of recycled products, made in workplaces for the physically challenged, has been quite difficult to achieve only through relationship with the welfare participants, but as they participated in an environmental event, their soap made from waste oil, which had not been sold at all, flew off the shelves. Subsequently, the organization for people with disabilities has participated in the agreement after they participated in the waste food oil collection in the model area.

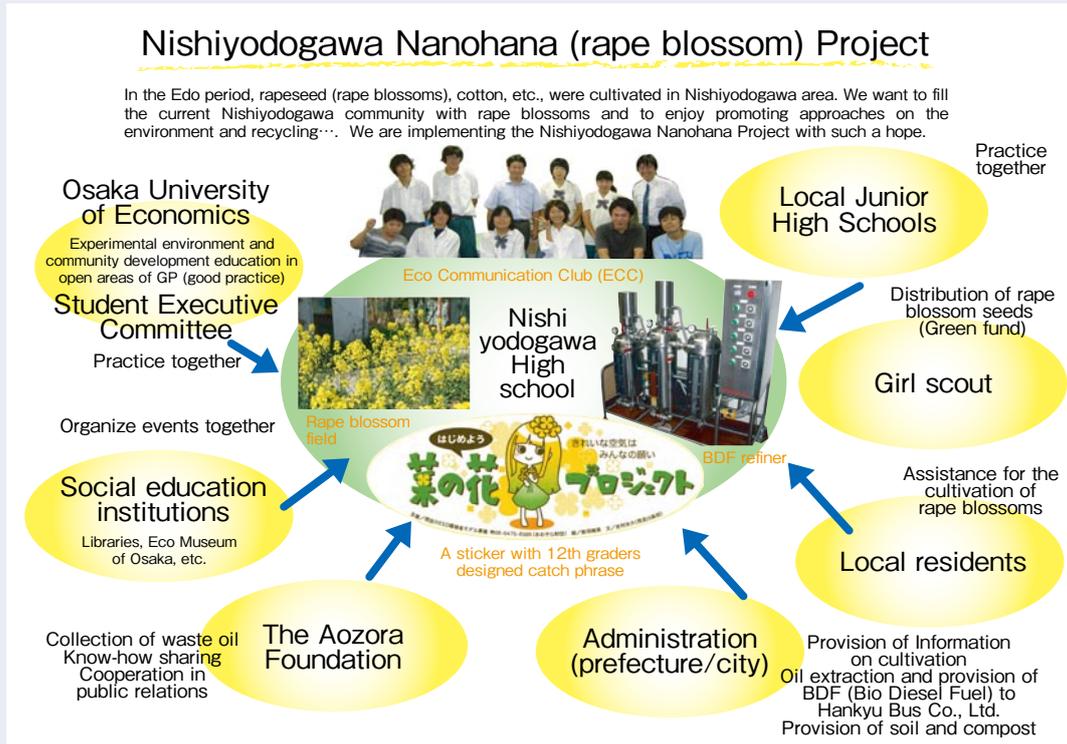
Thus, the agreement was studied as a reciprocal rule based on collaboration through actual activities, and the agreement was concluded by confirming the result of the study. It’s worth noting that the rule that should have only a weak binding force, on the basis of equal rights under the agreement, will demonstrate high strength in each area, regarding specific segregation of duties.

(b) Approaches towards a sustainable community development in Osaka prefecture’s “Nishiyodogawa ESD Commission”

Under the “United Nations Decade of Education for Sustainable Development,” initiated by Japan’s proposal, countries across the world are progressing their approaches. The Ministry of the Environment implemented the creation of practical ESD models in local communities for a period of three years starting in FY2006, and through public advertisements, the Ministry selected areas as models to engage in the implementation of ESD aimed at creating sustainable communities.

A model area, the “Nishiyodogawa ESD Commission,” in Osaka prefecture, is working on a project aiming to realize a sustainable community development. Nishiyodogawa high school in Osaka, an ESD Commission member, has made an approach to the “Nanohana Project” (a sound material-cycle project in which students cultivate rape blossoms, cook foods using the oil extracted from the plants, utilize the waste oil from the cooking for driving cars and to let rape blossoms absorb the CO₂ emitted by cars) (Figure3-3-16) in the compulsory subject classes of “The Environment.” After school, the high school students voluntarily conduct club activities, and have extended the scope of their activities by collaborating with other commission members. Members of the collaboration include the Center for the Redevelopment of Pollution-damaged Areas in Japan (The Aozora Foundation), a foundation which aims to redevelop pollution-damaged areas and plays a central role, local universities and junior high schools, the local administration, social education facilities, community associations and Girl Scouts. In this way, synergetic effects have been created that community

Figure3-3-16 Nanohana Project



Source : Center for the Redevelopment of Pollution-damaged Areas in Japan (The Aozora Foundation)

development will progress, as well as advancing living environment education, under the cooperation of the region and educational institutions with the key word of “sustainable regional development with ESD.”

The Ministry of the Environment has combined “39 key ideas for ESD, learning from the Japanese 14 model areas’ experience” which introduces the detailed approaches of these model areas, and key ideas for advancing ESD in model projects.

D Energy supply in collaboration with agricultural groups

The Act on the Promotion of New Energy Usage (Act No.37 of 1997) was revised in 2007 and the micro-hydroelectric power generation with the maximum output power of 1,000kW was newly included as a new energy. Accordingly, local governments and others are showing a trend towards introducing the new energy. Major distinctive feature of the micro-hydroelectric power generation is that environmental impacts, such as environmental modification during construction is low, installation can be completed in a short period of time, and suitable for localized use low volume power demand.

Omachi city, Nagano prefecture started businesses to maintain micro-hydroelectric power generation facilities in 2007, subsidized by the New Energy Foundation and NEDO (New Energy and Industrial Technology Development Organization). This business is to effectively use the unused head in the Machikawa irrigation canal, and the run-of-river type power plant will release all of the used water in the Machikawa. The Machikawa has an abundant volume of water, enabling water sampling stability at maximum of 1.1m³/s and the utilization of the steep terrain (available head of 16.0m,

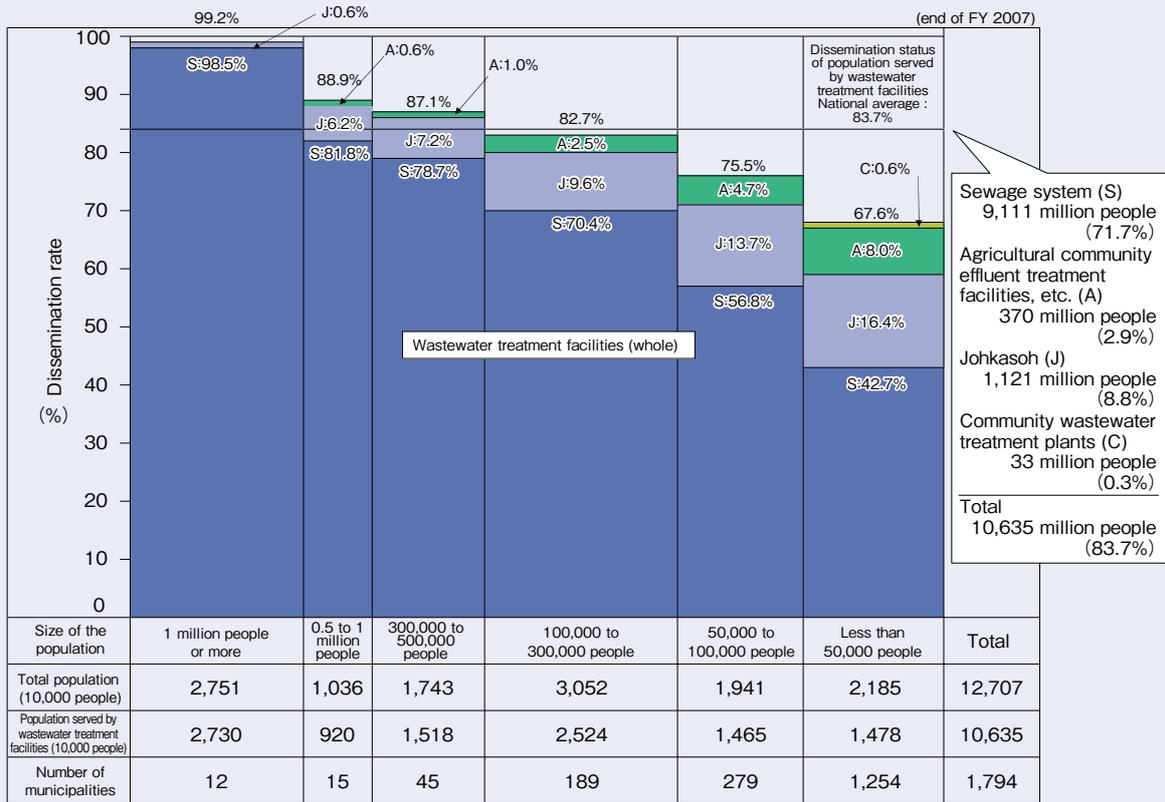
and penstock extension of 83.7m) makes it possible to generate maximum output of 140kW of electricity. The generated electricity will be self-consumed at the nearby night soil treatment facilities, which is also expected to be a place for learning about environment and energy, since 550 tons of CO₂ emissions will be saved annually. The Omachi city based “Workshop for Sustainable Community” has also established experimental facilities of micro-hydroelectric power generation facilities in two locations of the city and is maintaining the micro-hydroelectric power generation facilities with a contract with local fishery cooperatives.

These Omachi city approaches have drawn attention nationwide, and many people from many areas are visiting the city for eco-touring and inspection training, leading to invigoration of the area.

E Conservation and creation of sound water environment by developing municipal wastewater treatment facilities, taking regional characteristics into consideration

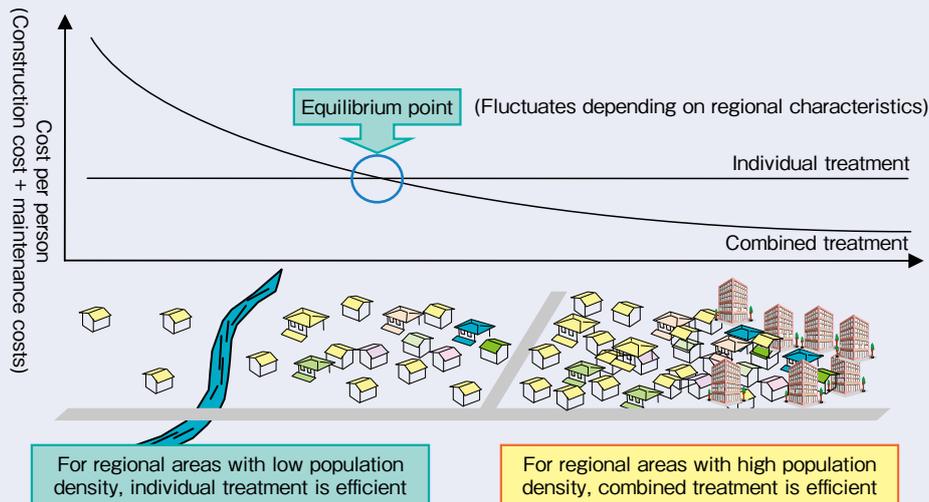
For the purpose of conserving a sound water environment in rivers and lakes, as well as improving public health and living environment, it is important to develop municipal wastewater treatment facilities, which are essential for a healthy environment, and to appropriately treat the wastewater emitted from households and plants. The dissemination status of population served by wastewater treatment facilities as of the end of FY2007 (Figure3-3-17) has reached about 84% at the national average, with the sewage system covering about 70% and johkasoh-on-site systems for domestic effluent - and rural community sewerage systems covering about 10% of the total population’s burden. However, suburban areas of provincial cities and small or middle sized municipalities, etc.,

Figure3-3-17 Dissemination Status of Population Served by Wastewater Treatment Facilities by Regional Scale (end of FY2007)



Note 1 : The total number of municipalities, 1,794, is comprised of cities 784, towns 815, and villages 195 (Tokyo metropolitan wards are included in cities) (as of March 31, 2008)
 2 : The values of total population and population served by wastewater treatment facilities were rounded to the nearest ten thousand people.
 3 : The total value and breakdown may not match, since the values less than 0.5% of the dissemination status of each wastewater treatment facility by regional scale are not listed.

Figure3-3-18 The Concept of Zoning Combined Treatment and Individual Treatment



Source : Ministry of the Environment

with a total of population of 20 million people are unserved by such facilities, and urgent development of municipal wastewater treatment facilities is desirable.

In enclosed water areas such as rivers and lakes which are essential for water quality conservation, focusing promotion of dissemination of wastewater treatment facilities, as well as the introduction of advanced treatment are necessary, in

order to remove nitrogen and phosphorus, which are the cause of red tide and blue tide, due to eutrophication.

Regarding the development of municipal wastewater treatment facilities, johkasoh—an per household treatment—is economic in sparse population distribution areas. Combined treatment, such as sewage system and rural community sewerage systems, becomes economic as the population

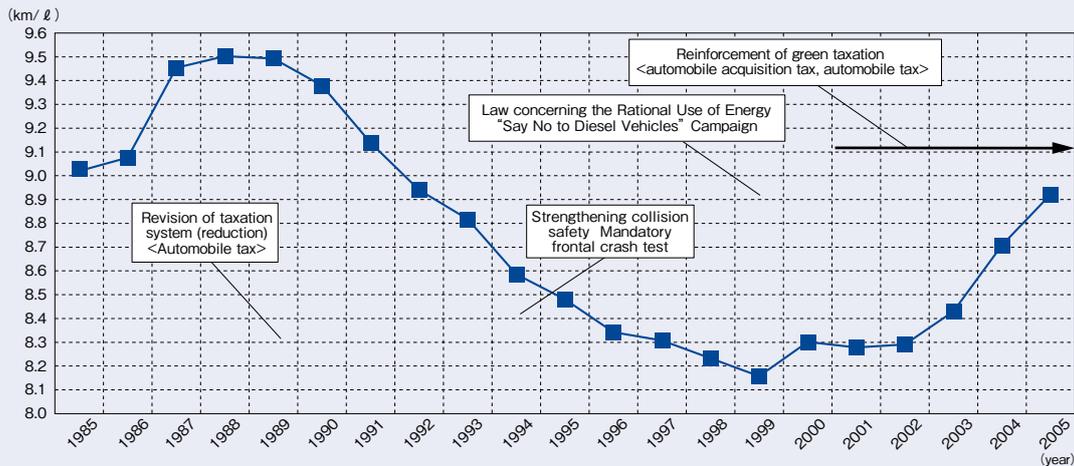


Reduce CO₂ Emissions from Automobiles—Conversion towards Fuel-Efficient Vehicles and Public Transportation

The transport sector accounts for about 20% of CO₂ emissions resulting from energy use, with vehicles accounting for about 90% of these emissions, of which about 60% are private vehicles (hereinafter referred to as automobiles). That means automobiles emit about half of the CO₂ emissions of the transport sector. Looking back several

years, upsizing of automobiles and increase in the number of units has continued to grow in the 1990s, and in increased CO₂ emissions of the entire transport sector, due to decreased per kilometer fuel consumption. In the 2000s, CO₂ emissions have peaked, since the number of fuel-efficient vehicles and per kilometer fuel consumption have increased.

Relationships between CO₂ Emissions Resulting from Private Vehicles and Passenger Transportation Volume



Source : Compiled by the Ministry of the Environment from the data of the Ministry of Transport's "Handbook on Transportation-Related Energy Consumption" and the Ministry of Land, Infrastructure, Transport and Tourism's "The Survey on Transport Energy"

Various factors, as listed in the above chart, are the likely cause of this. For example, the automobile tax reduction (1989) has become a factor to increase the number of mid-size cars (the so called three numbers plates) The strengthening of green taxation (implemented at a full-scale from 2001) has also become a factor to progress the dissemination of fuel-efficient vehicles and the taxation system is considered to be related as this factor.

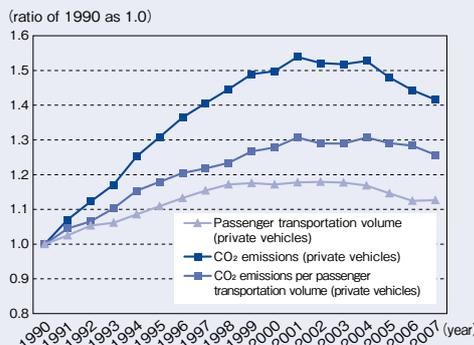
CO₂ emissions resulting from automobile use have shown an increasing trend until about a decade ago, but since the passenger

transportation volume leveled off in the 2000s, the emissions have shown a decreasing trend. In order to keep reducing emissions, improvement of transportation efficiency and promotion of modal shift (conversion of transportation means) are necessary, in addition to improvement of per kilometer fuel consumption, low carbonization of fuels and the reduction of automobile mileage. Promotion of decoupling—to increase convenience and productivity, while reducing CO₂ emissions—are also required to curb passenger transportation volume itself by utilizing intensive land use and IT.

Conversion towards fuel-efficient vehicles and public transportation is a way to reduce CO₂ emissions from automobiles.

First, we will look at the effect of reducing CO₂ emissions of automobiles used for short journeys, such as local commuting and shopping. According to the "Research on reduction of environmental load by a review of daily use transportation," conducted by the National Institute for Environmental Studies (NIES), on-road tests on next generation electric vehicles showed that about a 60% to 70% reduction in CO₂ emissions can be expected by switching automobiles from gasoline minivans (4AT) to electric vehicles (seating capacity of 2). On the other hand about 50% to 60% reduction of CO₂ emissions can be expected by switching automobiles from gasoline minivans (CVT) to electric vehicles (seating capacity of 2).

Relationships between CO₂ Emissions Resulting from Private Vehicles and Passenger Transportation Volume



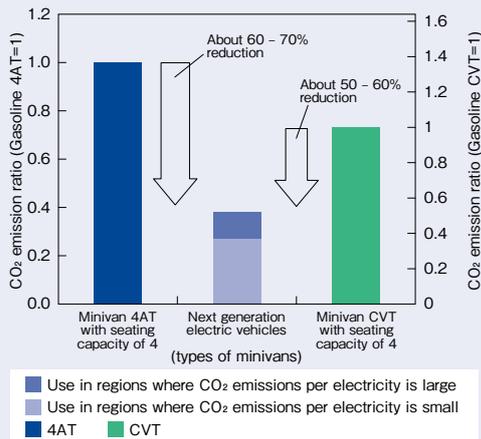
Source : Compiled by the Ministry of the Environment from the Energy Data and Modelling Center (EDMC), the Institute of Energy Economics, Japan's Transportation Sector's Volume of Transportation by Mode from the "GHGs Inventory"

The Action Plan for Achieving a Low-carbon Society is aiming automakers to sell one unit of next generation vehicle out of every two new vehicles by 2020, and the NIES has made a trial calculation in the case that the promotion of hybrid vehicles will spread rapidly. The trial calculation estimated that if all new automobiles sold were hybrid vehicles by 2020 with their diffusion rate reaching 40%, CO₂ emissions of the transport sector would be reduced by 3%, compared to the base year.

Next, we will look at a case where conversion from automobiles to public transportation is progressing. Toyama city in Toyama prefecture projected a full-scale LRT (Light Rail Transit) by launching a new route (1.1 km) converting to a street car with the relevant route (6.5 km), in order to stop the vicious circle, including the motorization in which the decreasing number of Toyama-ko line users reduces the number of trains operated which further reduces the number of users. Toyama city's dependency on vehicles is high compared to the national average, and transport share by

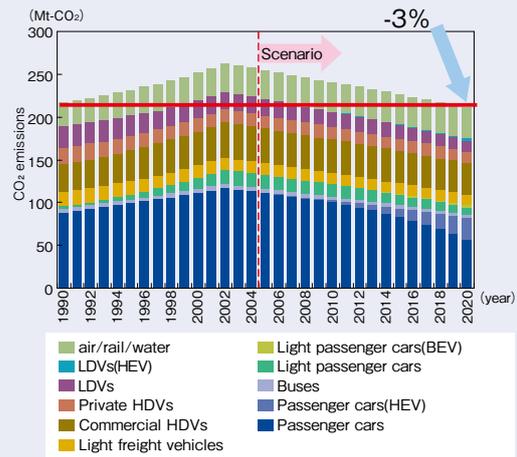
means of transport for public transportation has remained at 4.2% with vehicles having about 72% share. The average number of users using the Toyama-ko line after its conversion to LRT on weekdays jumped to about 4,900 in 2006, from about 2,200 (2.2 folds) during the period operated by the West Japan Railway Company. The average number of users during weekends has also increased by 5.3 fold and especially the percentage use among the aged has been high. Passengers transferring from buses and automobiles have reached about 25% and 22% on weekdays and weekends respectively, and CO₂ emissions from vehicle use are considered to be reduced. Toyama city's LRT introduction has affected many fields, including the formation of a barrier-free city in the age of aging society with fewer children, and economic effects such as an increase in tourists and residential construction numbers, in addition to the development of a compact community focusing public transportation and the formation of a low-carbon society without depending on vehicle traffic.

CO₂ Reduction Effects by Switching from Minivans to Next Generation Electric Vehicles



Source: National Institute for Environmental Studies "Research on reduction of environmental load by a review of daily use transportation"

CO₂ Reduction Scenario of Transport Sector



Source: National Institute for Environmental Studies "Transportation in Low Carbon Society"

density becomes higher (Figure3-3-18). Therefore, urgent review to develop proper wastewater treatment facilities by sufficiently reflecting regional characteristics, including the importance of economic efficiency and water quality, taking changes of social conditions into account, such as the recent trend of population decline is being promoted in the "Prefectural Plan"—a comprehensive plan on wastewater treatment formulated by each prefecture. The dissemination of wastewater facilities will contribute to regional invigoration, including the promotion of settlement, industrial development and improvement of sightseeing attractiveness—due to the development of regional living and social infrastructure—in addition to water environment improvement, such as the reduction of bubbles and foul odor from smell floating on rivers and lakes, for example.

Furthermore, biomass such as biogas and sludge generated during the process of wastewater treatment is planned to be effectively used, and treated water is utilized to maintain the

water volume of chatter water and rivers. In addition the usage of flush toilet water, is to be used cyclically valuable resource.

(3)Regional approaches of the local consumption of locally produced products

A The status of Japan's food mileage

Japan's self-sufficiency rate of food supply is about 40% on a calorie basis, and self-sufficient rate of timber is only about 20%. The majority of our lives being supported by imported products.

"Food mileage" is an index which represents environmental load that arises from food transportation, multiplying the transported food (ton) by the mileage (km). It shows that the longer the distance between a production site and a

Figure3-3-19 Comparison of Each Country's Food Mileages of Imported Foods

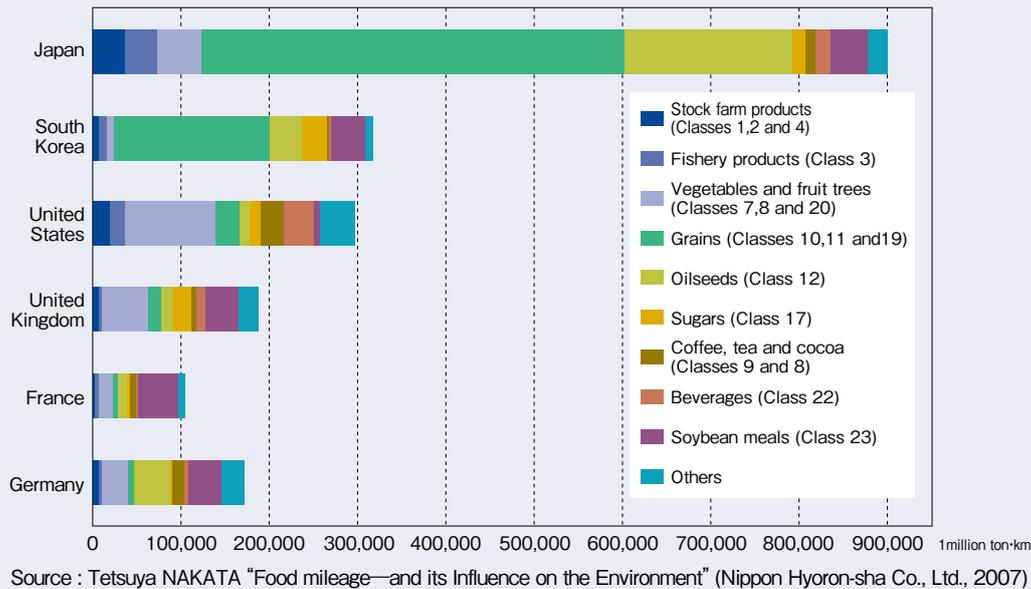
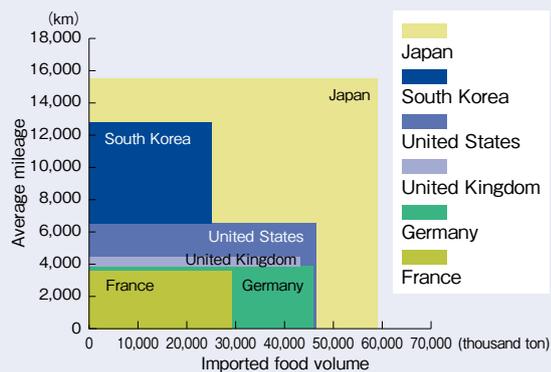


Figure3-3-20 Imported Food Products and Average Mileage of Each Country



consumption site is, the more the global burden will be with more energy required. According to a provisional estimate by the Ministry of Agriculture, Forestry and Fisheries in 2000, Japan's total food mileage is exceptional in the world (Figure3-3-19). Japan's imported food volume was at the level of 70 to 80% of those volumes in each western country excluding France, considering the total imported volume. However, considering the average mileage, each western country remains at the level of 20 to 40% of Japan's average mileage. That means that Japan's food imports are imported from quite long distances, compared to other countries, in addition to their large quantity (Figure3-3-20).

The trend of four typical item's food mileage among Japan's major fresh vegetables is shown in the Figure3-3-21. If all four items were to be replaced with domestic products, CO₂ that arises from overseas transportation would be reduced by 3,000 tons.

B Energy supply with locally produced wood biomass

Wood biomass is expected to be increasingly used as a renewable energy. Here, we will calculate the reduction effect

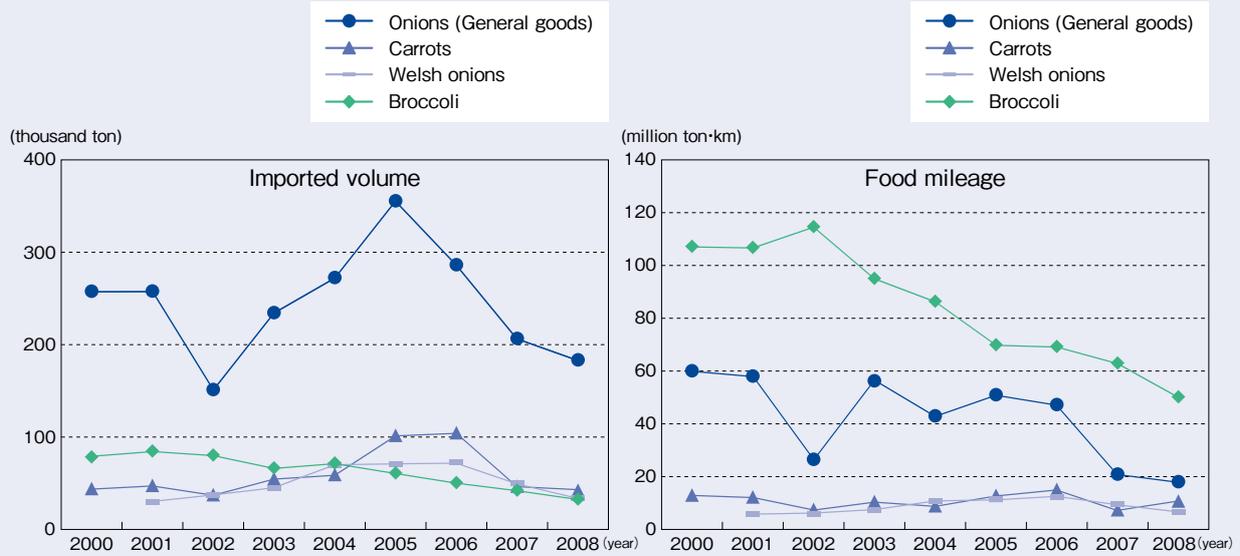
of greenhouse gases hypothetically, in the case that about 2.4 million tons, equivalent to about 40% of about 6 million tons of domestic unused biomass (leftover at saw mills, lumber at construction sites and forest leftovers) as of 2005, were used. If 2.4 million tons of unused biomass were used as fuel by processing it into wood pellets, the volume is equivalent to 1.14 million kℓ in kerosene. Since the amount of annual kerosene consumption is about 5.65 million kℓ (2007), in about 6.1 million households in Hokkaido and Tohoku region, if this were to be replaced by wood pellets, the volume would be equivalent to about 20% of the kerosene stoves used in households. Since the calculation is based on the allocation of Hokkaido and Tohoku region, where kerosene consumptions are heavy, if wood pellet becomes widely used in these regions, energy is considered to be able to be replaced in many households. Comparing the initial and operational costs between pellet stoves and kerosene stoves (Table3-3-7), pellet stoves contribute to reduce greenhouse gases, while measures such as reducing the cost through dissemination are considered to be necessary.

C Approaches to make the most of regional lives

(a) Regional invigoration brought about by Oriental storks

In September 2005, artificially bred storks were experimentally released in Toyooka city, Hyogo prefecture. It was the first time in 34 years to experimentally release storks after the death of the last wild stork in Japan in 1971. This was the first attempt in Japan to release a wild animal, once extinct in the wild, back in to the wild. Toyooka city had formulated the "Toyooka City Sustainable Strategy for Environment and Economy" in March 2005, before the experimental release. The strategy aimed at developing the environment along with economy, symbolizing a stork, is composed of the following five pillars: the "Promoting Local produce, Local consumption," "Promoting the Organic agriculture," "Developing the Stork tourism," "Accumulating environmental and economical companies" and "Promoting Eco-energy."

Figure3-3-21 Changes in Imported Volume and Food Mileage of 4 Major Fresh Vegetables



Source : Compiled by the Ministry of the Environment from the data of the National Institute for Environmental Studies

Table3-3-7 Cost Comparison of Pellet Stoves and Kerosene Stoves

	Purchase price	Operational costs
Pellet stoves	About 350 thousand yen	Necessary fuels: 2,832kg (1.3kg × 12h × 180 days) Fuel price: 118,944 yen (42 yen/kg) (Heating output 1.7-13.9kW, Fuel consumption : 0.6 - 2.25kg/h)
Kerosene stoves	About 130 thousand yen	Necessary fuels: 1,518 l (0.703 l × 12h × 180 days) Fuel price: 124,223 yen (1,473 yen/18 l) (Heating output 1.75kW-18.7kW, Fuel consumption : 0.49-1.2 l /h)

Note 1 : Purchase price, necessary fuels, heating output and fuel consumption for both pellet and kerosene stoves represent the average of 10 models.
 2 : Fuel price of pellets represents the average price of 4 companies in the Tohoku district.
 3 : Kerosene price is the average during six months from October, 2008 to March, 2009 in the Hokkaido and Tohoku Bureaus based on monthly surveys by the Oil Information Center of the Institute of Energy Economics, Japan
 Source : Ministry of the Environment

One of the specific approaches is wet rice cultivation by pesticide-free or reduced amount of agricultural chemicals to nurture various animals that will feed on the storks.

The city established the “Agricultural Method that Helps the Oriental White Stork Survive” by (1) pesticide-free or reduced amount of agricultural chemicals, (2) reduction of chemical fertilizers and (3) such as to extend the period during which rice paddies are filled with water. The rice produced with these agricultural methods is sold as “Rice made from rice paddy field where storks can live.” The rice is sold at a price about 30% to 60% higher than that of ordinary rice, in troublesome managing weeds and water, sales are going well with some major mass retailers in other regions selling them. The crop areas by this agricultural method has been extended from 16 hectares in FY2004 to 183 hectares in FY2008.

There are also effects on tourism and the number of visitors to the Toyooka municipal museum of the oriental white storks has increased from about 120 thousand in FY2004 to about 420 thousand in FY2008 (Figure3-3-22). Professor Onuma’s group at Faculty of Economics, Keio University, made a trial calculation that the annual total expenditure by stork tourists on travel and souvenirs, has reached 1.2 to 3 billion yen.

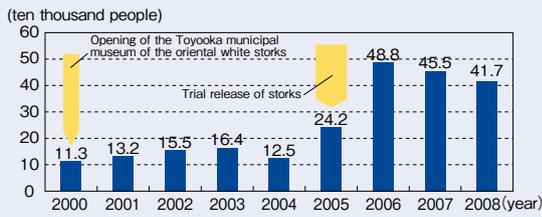
(b) Approaches to make the most of harmful wildlife and alien species as resources

The damages on agriculture, forestry and fisheries and the

ecosystem caused by wild birds and mammals such as deer and wild boar, which have increased locally, and fish of foreign origin, such as largemouth bass and bluegill still remains serious. In each region, wild birds and mammals and fish of foreign origin are being controlled, in order to prevent such damages. Approaches to effectively use these animals as food, pet food and feed in each region is recently progressing. According to the recent distribution area of deer and wild boars in intermediate and mountainous areas, the distribution has been extended, heavily damaging agriculture, forestry and fisheries and eco systems. The amount of damage to farm products caused by wild birds and mammals has reached 18.5 billion yen annually (FY2007), and although the development of habitat and harmful wildlife control are under way towards the reduction of damage, the number of captured birds and mammals has been increasing year by year. The number of deer and wild boars captured nationwide in FY2005 was about 190 thousand and about 220 thousand, respectively (Figure3-3-23).

In Hokkaido, around 3 billion yen in damage was reported, due to the surge in agricultural and forestry damages caused by the extension of distribution areas and the increased population of Yezo sika deer. Under these circumstances, Hokkaido positioned the effective use of the captured Yezo sika deer as a part of conservation management, and drafted a manual for hygienically processing Yezo sika deer. In

Figure3-3-22 Number of Visitors to the Toyooka Municipal Museum of the Oriental White Storks



Source : Compiled by the Ministry of the Environment from the data of Toyooka city

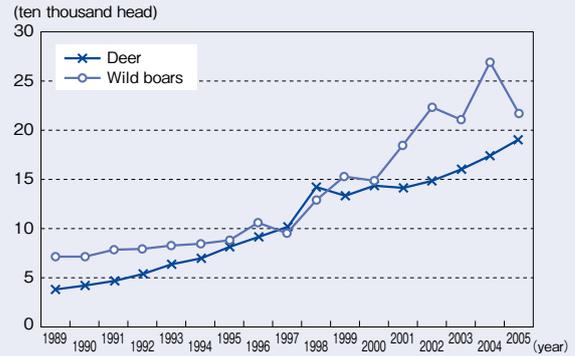
Photo3-3-5 Oriental White Stork Pecking Food in a Rice Field



Source : Toyooka city

FY2007, about 12,000 of Yezo sika deer were slaughtered. In Misato town, Shimane prefecture, the recycling of wild boar meat has been promoted since 2000 with the town's leadership. They have established a community brand,

Figure3-3-23 Changes of the Number of Deer and Wild Boars Captured Nationwide



Source : Ministry of the Environment

“Oochiyamakujira” —meat produced from captured wild boars—and are selling foods, such as processed foods and pet foods, by establishing a processing system from capturing to meatpacking. As for the efficient use of alien species, efforts to control largemouth bass and blue gills are conducted in each region. In some regions, where the controlled amount is huge, several hundred tons of culled alien species are disposed of annually in landfills. Usage of such as fertilizers and feeds will reduce the amount of fertilizers and feeds from outside the region, leading to approaches to prevent the water area from eutrophication. In Shiga prefecture, about 440 to 570 tons of fish of foreign origins in Lake Biwa have been exterminated annually since FY2002. These are used as food for human consumption, or in a variety of other ways such as being processed into fish meal.