Study on Climate Change Mitigation Measures of Local Governments in Japan

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Final Report

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ALMEC Corporation

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Chapter 1 Outline of Climate Change Mitigation in Japan

The Government of Japan has promoted climate change countermeasures mainly based on the Law Concerning the Promotion of the Measures to Cope with Global Warming (Global Warming Measures Promotion Law).

Global Warming Measures Promotion Law

In keeping with the spirit of climate change mitigation policies in the international community, the Government of Japanese enacted the Global Warming Measures Promotion Law in April 1999. The law stipulates responsibilities of the major sectors of Japanese society such as the central government, local governments, business, and industry, as well as its citizenry. The law likewise established a legal framework, which encourages and mandates each actor to formulate both national and local government action plan (e.g. action plans on climate change mitigation measures on national and local government activities). It also allows the estimation of greenhouse gas (GHG) emissions and the reporting and publication of such emissions by concerned industries or enterprises. And to aid in meeting the commitments of Japan to the Kyoto Protocol, the law also stipulates the formulation by the central government of the Kyoto Protocol Target Achievement Plan.

Kyoto Protocol Target Achievement Plan

The Cabinet of Japan approved the Kyoto Protocol Target Achievement Plan after the Kyoto Protocol took effect. This plan lays down the necessary policies and countermeasures needed to reliably achieve 6% reduction target under the Kyoto Protocol. The plan, which was revised on March 2008, also lays down the role of the local governments in achieving this overall goal.

Estimation, reporting, and publishing of greenhouse gas emissions by enterprises

Industries or enterprises that emit 3,000 tons of CO_2e annually, which are within the regulatory ambit of the law concerning the rational use of energy (Energy Conservation Law), shall estimate the GHG emissions they emit and report the results to the Central Government, which in turn provides the results to the public.

Action plans on climate change mitigation by national and local governments

The Global Warming Measures Promotion Law directs both the central and local governments to formulate a plan on climate change mitigation on any public activity that causes GHG emission or other adverse impacts. The law says that governments have to follow up on this obligation and conduct implementations assessments and submit GHG emission reports which should be made available to the public.

Chapter 2 Roles of Local Governments on Climate Change Mitigation in Japan

2.1 Legal framework for local government roles in climate change mitigation

To promote climate change mitigation, the local governments of Japan are expected to undertake the following activities and obligations under the Global Warming Measures Promotion Law and the Kyoto Protocol Target Achievement Plan.

Major roles

- Implementation of measures tailored to unique regional characteristics

  Local governments are directed to formulate and implement comprehensive policies tailored to fit their respective natural and social characteristics to reduce GHG emissions, etc. For example, local governments are encouraged to develop pioneering, highly original, and ingenious countermeasures tailored to the natural and social conditions in their specific regions such as CO_2-saving town planning, promotion of public transportation systems, encouragement of bicycle use, introduction of new energy sources like biomass, etc.

- Implementation of measures taken upon local government initiatives

  Local governments themselves are expected to be a model for the regions by carrying out measures on their own initiative. To this end they are expected to formulate and implement a plan of action and other projects based on the Global Warming Measures Promotion Law.

- Provision of information and promotion of activities for local residents, etc.

  When prefectural centers for the promotion of activities to stop global warming, volunteers to promote activities to mitigate global warming, and global warming countermeasures regional councils have been designated, commissioned, and organized, local governments shall utilize them to educate and support private organizations, as well as introduce pioneering measures and provide advice.

Legal obligations

- Formulation and implementation of the "Action plan on climate change mitigation measures on local government activities"

  The action plan covers measures on reducing greenhouse gas emissions, conserving and enhancing projects on CO_2 sinks by the prefectures and municipalities in line with

the Kyoto Protocol Target Achievement Plan. It also directs local governments to update the public on the progress of implementation of GHG emissions reduction measures. The plan does not cover related measures initiated by the citizenry or the private sector.

- Planning and implementation of the "Regional plan on promoting global warming countermeasures"

  The plan covers measures tailored to fit the natural and social conditions as well as the industrial characteristics of a respective region, and includes the public sector, private sector, and the citizenry.

2.2 Local government's climate mitigation plans

In promoting climate change mitigation, the local governments of Japan implement and follow two major master plans: the "Regional plan on promoting global warming countermeasures" and the "Action plan on climate change mitigation measures on local government activities" which are in line with the Global Warming Measures Promotion Law and the Kyoto Protocol Target Achievement Plan.

2.2-1 Regional plan on promoting global warming countermeasures

The Global Warming Measures Promotion Law outlines the legal obligations of local governments to plan and implement the "Regional plan on promoting global warming countermeasures." The plan includes measures tailored to the unique natural, social and industrial conditions prevailing in a respective region and includes the public sector, private sector, and the citizenry. Forty-seven (47) prefectures and 60 municipalities have formulated such a plan as of April 1, 2006.

The following are the general contents of the plan:

Table 2-1 Contents of the “Regional plan on promoting global warming countermeasures”

1. Basic issues - Objectives - Target period - Target activities and sectors 2. GHG emissions - Base year, present year, target year 3. Targets - Total GHG emission, sectoral emissions, etc. 4. Measures - Industries, Commercial, Residential, Transportation, etc. 5. Implementation framework - Implementation body - Time frame

2.2-2 Action plan on climate change mitigation measures on local government activities

The Global Warming Measures Promotion Law allows prefectures and municipalities to formulate an “Action plan on climate change mitigation measures on local government activities.”

The action plan covers measures to reduce GHGs and enhance projects on CO_2 sinks of prefectures or municipalities in line with the Kyoto Protocol Target Achievement Plan. The private sector and the citizenry are not included in the action plan. The plan likewise underscores the need for local governments to inform the public on the status of the implementing program and GHG emissions. The plan does not require similar mitigating measures from the citizenry and from the private sector.

Six hundred sixty-three (663) municipalities and 176 associations have formulated the plan as of April 1, 2006.

The following are the general contents of the action plan:

Table2-2 Contents of the “Action plan on climate change mitigation on local government activities”

1. Basic issues
- Objectives
- Target period
- Target activities within the public sector
2. Target
- Target of actions
- Target of GHG emissions
3. Actions
- Purchase and use of goods and services
- Construction and management of buildings
- Other activities
4. Promotion, follow-up, and assessment
- Implementation and follow-up framework
- Training for officials, etc

2.2-3 Long-term plan to establish low-carbon societies

Both the “Regional plan on promoting global warming countermeasures” and the “Action plan on climate change mitigation on local government activities,” legally underpin Japan’s aim to achieve its 6% reduction commitment under the Kyoto Protocol.

Recently, several local governments, including the Tokyo Metropolitan Government and the City of Yokohama, voluntarily formulated and implemented long-term plans on the establishment of low-carbon societies.

2.2-4 Environmental Model Cities

In April 2008, the Cabinet Secretary invited entries to its “Environmental Model Cities” project; five local governments from a field of 82 proposals (Table 2-3) were adopted as models.

The “Environmental Model Cities” project encourages advances and innovations in climate change mitigation programs and was designed by the Central Government to address ecological concerns in greater cooperation with local governments to realize dramatic GHG reductions and establish low-carbon societies.

Each of the cited model cities has prepared an action plan and roadmap based on the proposals in the “Environmental Model Cities” project.

Table 2-3 Environmental Model Cities

Large cities	Yokohama City Kitakyushu City
Local cities	Obihiro City Toyama City
Small municipalities	Shimokawa town Minamata City

2.2-5 Other related plans

Various local governments have formulated and implemented plans relative to climate change mitigation. They also have implemented regional plans and action plans which include the following:

- Environmental master plan;
- Master plan on renewable energy utilization;
- Master plan on city planning;
- Master plan on transportation; and
- Waste management master plan.

Although the main objectives of these related plans are not specifically on climate change, their implementation can potentially reduce GHGs. Thus it can be assumed that the local governments who recently formulated these plans have included climate mitigation aspects into their plans.

2.3 Implementation body

Climate change mitigation is promoted in the local level either by the “Prefectural Centers for Climate Change Actions,” the “Global Warming Prevention Activities Advisors,” or the “Regional councils on global warming countermeasures” as well as various local government offices. The roles of these actors are stipulated in the Global Warming Measures Promotion Law.

2.3-1 Local Government Offices

The respective local government offices play a primary role in promoting local governments’ climate change mitigation initiatives. They promote measures with the cooperation of the local citizens, the private sector, and other participants.

2.3-2 Prefectural Centers for Climate Change Actions

“Prefectural Centers for Climate Change Actions” promote climate change mitigation measures in their respective prefectures and are designated by the governors according to

the guidelines of the Global Warming Measures Promotion Law. These centers conduct education and public information activities on global warming and the importance of global warming countermeasures; they also investigate the actual state of greenhouse gas emissions in relation to local daily life, local activities, etc.

2.3-3 Global Warming Prevention Activities Advisors

In accordance with the Global Warming Measures Promotion Law, activities to control GHG emissions in daily life are carried out by global warming prevention activities advisors who are designated by prefectural governors with the aim of helping improve public awareness on the effects of global warming.

2.3-4 Regional councils on global warming countermeasures

In accordance with the Global Warming Measures Promotion Law, local governments, prefectural centers for climate change action, climate change action officers, business operators, the public, and other entities engaged in mitigation measures are encouraged to organize regional councils on global warming countermeasures to help sustain and improve the discourse or debate on the control of GHG emissions in common daily activities.

Chapter 3 Climate change mitigation measures of local governments in Japan

3.1 General description

3.1-1 Steps to implement measures

"Planning" is the basis of climate change mitigation measures in Japanese local governments, as is the case in other sectors.

Local governments implement the "Action plan on climate change mitigation on local government activities" and the "Regional plan on promoting global warming countermeasures."

In the promotion of climate change mitigation measures, Japanese local governments follow the general guidelines shown below.

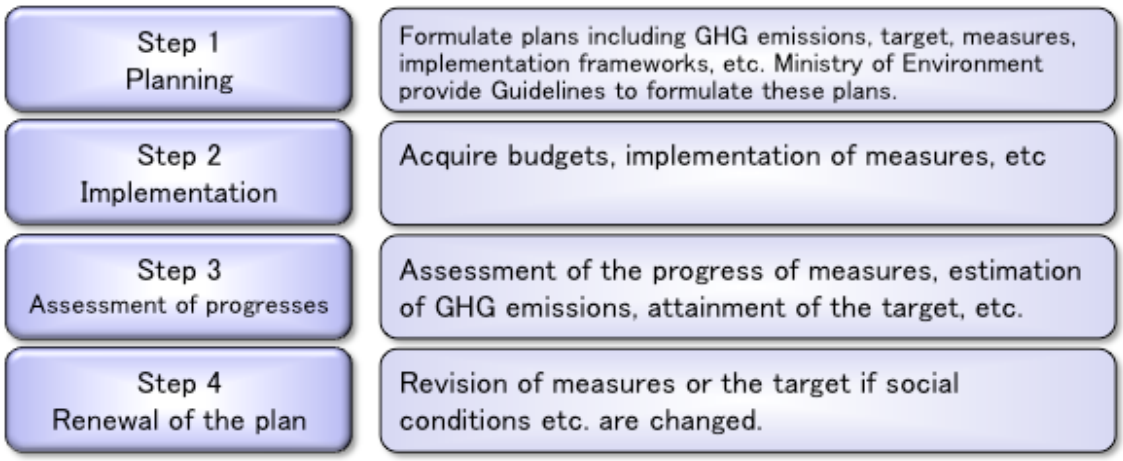

Figure 3-1 Major steps to promote climate change mitigation among Japanese local governments

3.1-2 Planning

(1) Major plans

As described in 2.2, the primary policies on climate change mitigation among local governments are the following two plans:

Table 3-1 Major local government plans on climate change mitigation

Name of the plan	Target
Regional plan on promoting global warming countermeasures	All the actors within the regions, including the private sector and the citizenry.
Action plan on climate change mitigation measures on local government activities	Local government activities. Public sector only and does not include the private sector and the citizenry.

The Japanese Ministry of Environment provides the guidelines, or manuals, to formulate and implement the two plans so that the various local governments can easily formulate the said plans.

However, in addition to the two general plans, it should be noted that several local governments have already formulated and are implementing long-term climate change mitigation strategies targeted for 2030 or 2050.

As described in 2.2-4, some local governments have been certified by the central government as “Environmental Model Cities” and have promoted the establishment of low-carbon societies.

Cases also exist wherein climate change mitigation is realized through cross-sectoral measures, or is an indirect or ancillary benefit from other projects or measures. Therefore, in the formulation and implementation of climate change mitigation plans, it is important to assess plans or measures implemented by other divisions or sections within the local government.

Table 3-2 Plans that may have climate change mitigation aspects

- Environmental master plan;
- Master plan on renewable energy utilization;
- Master plan on city planning;
- Master plan on transportation;
- Waste management master plan, etc.

(2) General contents of major plans

The general contents of the “Regional plan on promoting global warming countermeasures” and the “Action plan on climate change mitigation measures on local government activities” are described below.

Target periods

Most local governments have set their target periods on the first commitment period (i.e. 2008 to 2012) of the Kyoto Protocol, or for 2010 which is the intermediate year of the period.

However, some local governments have formulated plans with long-term targets such as for 2030 or 2050.

Greenhouse gas emissions

To assess the current state of emissions and set targets for GHG reductions, as well as manage the effectiveness of the measures, it is necessary to estimate GHG emissions emitted from the regions.

Emissions are estimated for “Base year”, “Recent year” and “Target year”. Base year is generally set in 1990, which is the reference year of the Kyoto Protocol. Target year is set for 2010, the intermediate year of the first commitment period of the Protocol.

It is comparatively difficult to estimate total GHG emissions of municipalities than of prefectures these have more complete statistics to calculate emissions. In such cases, it is more realistic to focus on project promotion, and to estimate and assess project-based emissions, rather than to estimate total emissions within a region.

Targets

There are several types of GHG emission reduction targets as shown in Table 3-3. Local governments can choose from among these options with the proper consideration of the characteristics of the regions or relevant local government policies.

Table 3-3 Examples of GHG emission reduction target

Type	Target
Total GHG emission	Total GHG emissions from the regions.
Sectoral emissions	Sectoral GHG emissions such as from the transportation sector, household sector, public sector, etc.
Specific emissions	GHG emissions per unit such as emission per person or emission per motor vehicle, etc.
Project base emissions	Targets for each project. This approach can be used when it is difficult to estimate and follow up on the total or sectoral GHG emissions of the regions.

Measures

What is the viewpoint in considering and deciding on the types of measures?

- Consistency with existing plans and measures;
- Characteristics of natural and social conditions, industrial structures, GHG emissions of the region;
- Implementing capacity of the implementing body;
- Feasibility of the measure, etc.

One of the most important factors in considering and deciding on the measures is taking careful account of the local conditions, as specified in Table 3-4.

Table 3-4 Analysis of local conditions

Category	Outline
Natural, social and economical conditions	Analyze the weather, area, population, and industrial structure, and grasp the basic characteristic of the local governments.
Characteristics on energy consumptions, GHG emissions	Estimate energy consumptions and GHG emissions, and grasp characteristics of structures of these consumptions and emissions. Analyze and find out which sector or energy sources should be set on priority to promote climate change mitigation effectively.
Utilization potential of renewable energy	The major renewable energies that can be utilized within local governments are: - Solar energy - Wind energy - Hydro power - Biomass energy such as agricultural waste, forestry products, livestock wastes, biodiesel, bioethanol, etc. - Geothermal energy. Utilization potentials of these renewable energies are dependent on prefectures or municipalities. For example, solar energy is suitable in regions where sunshine hours are long and insolation is high. As for wind energy, annual wind velocity should be higher than 5m/s and a stable wind direction is also preferable. Generally, larger cities have much potential to utilize food waste as biomass; on the other hand, the potential for rural towns or villages are in agriculture and dairy wastes. It is necessary to analyze the possibility of using these renewable energy sources on the supply and demand side.
Actions of each participant, local government, the citizenry and private sector	Even in the formulation of excellent measures based on the above analysis, it is difficult to tie in measures for immediate realization of targets. In this aspect, it will be practical to assess what kind of action historically has reaped dividends and the kind of success models among the various environmental fields within the local government. There are cases wherein mitigation targets are realized through cross-sectoral measures, or are ancillary benefits from other projects or measures. Therefore, in the formulation and implementation of climate change mitigation plans, it is important to assess plans or measures implemented by other divisions or sections within the local government. In addition, successful models of public-private-community collaborations should be utilized in climate change mitigation.

What types of measures should be promoted?

The “Regional plan on promoting global warming countermeasures” covers measures for the public sector, private sector, and citizens. Generally, local governments formulate three types of measures:

- Measures that take the form of a local government initiative;
- Measures that encourage action among local residents and companies;
- Measures that can be implemented through cooperation among local government, local residents, and private establishments, etc.

Table 3-5 shows these examples.

Table 3-5 Types of climate change mitigation measures

Types	Examples
Measures that can be taken as an initiative of the local government	- Energy conservation in public facilities. - Installation of renewable energy sources such as solar power. - Efficient use of energy in waste incineration plant. - Introduction of low emission vehicles to public cars.
Measures that can encourage action among local residents and companies	- Subsidies to install solar power for households. - Rent “Energy conservation management system (Monitoring equipment of electricity)” to households. - Promotion of eco-train passes or eco-tickets (Discount tickets when using public transportation with families).
Measures that can be implemented through cooperation among the local government, local residents and companies	- Promote energy-efficient labeling system. - Biodiesel projects utilizing waste cooking oil. - Classification of wastes, etc.

On the other hand, the “Action plan on climate change mitigation measures on local government activities” covers public sector measures only.

Which sector is the target?

Generally, measures are considered for the following sectors:

- Industries
- Commercial
- Residential
- Transportation

- Energy industries
- Non-energy-oriented CO_2
- CH_4 and N_2O
- HFCs, PFCs and SF_6
- Forest sinks

Examples of measures considered and implemented by the Japanese local government are shown in Annex 1.

Implementation process

Two major contents are included in this section: one is the implementation body that operates and manages the plan and the other is the follow-through and management aspect.

(3) Planning framework

In the formulation of the "Regional plan on promoting global warming countermeasures," most local governments create two committees that consider the framework and contents of the plan. One committee involves all major stakeholders within the region including residents, enterprises, experts, associations, etc., and the other acts as an internal committee involving all the relevant departments and sections within the local government. Draft plans are commonly made publicly through web sites or community magazines.

On the other hand, the formulation of the "Action plan on climate change mitigation measures on local government activities" usually involves only an internal committee since it merely covers local government activities.

3.1-3 Implementation

The plan stipulates that the local government implements each measure. In climate change mitigation measures, there are instances wherein the environmental sections are not the only ones in charge of the measures but also other departments or sections in the local government that are involved or have started the initiative. In such cases, the local government sets up an internal committee to coordinate and promote the measures.

In actions wherein the cooperation of citizens and enterprises is necessary, it will be ideal to collaborate with the Regional Councils on Global Warming Countermeasures or other appropriate organizations.

Local governments, prefectural centers for climate change action, climate change action officers, business operators, the public, and other entities engaged in climate change mitigation activities are encouraged by the Global Warming Measures Promotion Law to organize regional councils on global warming countermeasures to discuss measures needed to control greenhouse gases in relation to daily or common activities.

3.1-4 Follow-up and assessment

Internal committees or regional councils on global warming countermeasures will follow up the progress of each measure and the achievement rates of targets, especially on the quantitative assessment of GHG emissions, as well as the total and/or sectoral and/or project base emissions.

3.1-5 Revision of plans

When necessary, local governments revise their plans or targets, especially in cases wherein social and economic factors have changed.

3.2 Climate change mitigation in selected cities

3.2-1 Selection of cities

The following seven cities were chosen not only because of their ambitious climate change mitigation plan, but for the fact that they act as models for other local governments in other countries. They include the Environmental Model Cities (see 2.2-4). These seven cities have different physiologies and demographics such as population, industrial structure, etc.

- Environmental Model Cities: Yokohama, Kitakyushu, Obihiro, Toyama, Shimokawa, and Minamata
- Tokyo

3.2-2 Yokohama

(1) Remarkable features of Yokohama's climate change mitigation program

- Comprehensive measures based on medium- to long-term policy:
  - Implementation of "Yokohama medium- to long-term action policy on global warming (January 2008)".
- Lead organization to implement measures:
  - The city's new "Climate Change Policy Headquarters" has been launched (April 2008).
  - This new headquarters is staffed by 34 personnel.
  - Headed by the deputy mayor and managed by a director-general.
  - Controls the organization wherein all the departments and divisions participate.
- Promotes "interdepartmental" actions in the Yokohama city office:
  - "Climate Change Policy Headquarters" has the ability to envision and implement

crosscutting measures.

- "Power of citizens":
  - Active action by local residents, and a prevailing high sense of participation among the sectors.
- Advanced efforts on waste management:
  - Dramatic decrease in wastes based on "G30 plan (Plan on waste reduction)."

(2) Climate change mitigation in Yokohama

Population	3,651,428 (As of October 1, 2008)
Area	434.98 km^2 (As of October 1, 2008)
GHG emissions	19,770 thousand tCO_2 (FY2005) 5.52 tCO_2/capita (FY2005) (Resident: 22.2%, Transportation: 21.9%, Energy industries: 18.6%, Commercial: 16.9%, Industries: 14.9%, Waste: 3.4%, Other gases: 2.0%)
Climate change mitigation plans	- Yokohama medium- to long-term action policy on global warming (January 2008) - Yokohama action plan on local government activities (March 2007) - Yokohama Regional plan on promoting global warming countermeasures (November 2006)
GHG emission reduction targets	
Short-term	More than 6% reduction of GHG emissions per capita in FY2010 from FY1990 level (Yokohama Regional plan on promoting of global warming countermeasures (revised on November 2006).
Medium- to long-term	Medium-term: More than 30% reduction of GHG emissions per capita in FY2025 from FY2004 level. Long-term: More than 60% reduction of GHG emissions per capita in FY2050 from FY2004 level. (Yokohama medium- to long-term action policy on global warming (January 2008).
Major ongoing measures	
Actions on infrastructure development	1) Installation and utilization of new energy sources, improvement of energy systems. - Formulation of "Utilization plan on new energy sources". - Effective utilization of waste heat from waste incineration plant. - Effective utilization of biogas from sewage sludge digestion. - Utilization of reclaimed water as heat source for air-conditioning units. - Installation of solar power systems, solar heating systems. - Introduction of clean energy vehicles, e.g. hybrid, EV, CNG. - Installation of wind power systems. - Installation of mini-hydropower systems. - Installation of cogeneration systems.

	- Improvement of energy efficiency of energy systems. 2) Reduction of domestic waste. - Actions on reducing and separating waste collection. - Composting and use of school lunch leftovers as animal feed. 3) Measures to reduce CFC substitutes. 4) Develop and promote use of public transportation. 5) Measures to improve traffic flow. 6) Expand CO_2 sinks and measures to relieve heat-island effect - Promote urban greening - Develop parks - Filter rain water - Study and research heat-island effect
Actions on businesses by the Yokohama city office	1) Established "Yokohama regional council on global warming mitigation" and prepared the "Yokohama city office action plan on global warming". 2) ISO14001 certification. 3) Promote / Introduce green accounting.
Actions to encourage actions of local residents and companies by the Yokohama city office	1) Encourage volunteerism among local residents - Spread and raise awareness, information service, and environmental education. 2) Encourage companies to make voluntary action plan - Promote/ Introduce environmental management systems - Conclude environment conservation agreements - Prepare ordinances 3) Institutionalize economic measures - Subsidies and low-interest loan 4) Promote green procurement
Details of climate change mitigation plan **- Yokohama medium- to long-term action policy on global warming -**	
Background and Objectives	It is difficult to predict climate change impacts only through the promotion of existing plans targeted for 2010. Therefore, Yokohama formulated its medium- to long-term action policy that is not an extension of existing measures. It has made an appeal that it is a duty of the city to take the lead, raise awareness and spark debate to realize effective measures.
Basic policies	- Develop mechanisms to reduce CO_2 and improve the quality of life. - Concentrate policy resources on effective actions and stimulate policy innovation in the central and local governments. - Promote market demand-pull measures. - Promote actions through active communications, cooperation, and policy collaborations with citizens and enterprises.

Measures (Selected)	1) Living - Encourage environmentally friendly consumer behavior and energy saving actions by raising awareness and public relations. - Develop mechanisms to encourage action on global warming mitigation. - Promote 3 R (reduce, reuse, recycle) on residential wastes.
	2) Business - Promote energy saving actions among businesses and offices. - Create new business models. - Promote 3R (Reduce, Reuse, Recycle) on business wastes.
	3) Building - Choose high-energy performance buildings through the introduction of evaluation and rating systems of energy-performing buildings. - Implement model projects. - Promote buildings, which have low lifecycle CO_2 emissions.
	4) Transportation - Implement leading measures in inner-city areas. - Reduce emissions from automobiles. - Provide smoother transportation and curb demand. - Encourage use of public transportation. - Raise awareness on environmentally friendly mobility.
	5) Energy - Create new mechanisms. - Implement pilot projects.
	6) Green area - Improve ground surface and implement actions to ensure “wind paths”. - Enhance CO_2 sinks and biomass resources supply.
	7) Public works - Improve energy savings on public buildings by introducing energy saving lighting and equipment, and renewable energy. - Apply the “Yokohama Green Building Program” in renovating existing public buildings as well in new construction, expansion and reconstruction. - Promote shift to fuel-efficient vehicles or low emission vehicles and introduce biofuels. - Utilize unused energy such as mini hydropower, biomass power, and waste power.

Promoting the plan	- Establish the Headquarter. - Set up discussions to shape measures. - Work on an ordinance. - Partner with citizens, enterprises, and public administration. - Cooperate with cities carrying out innovative measures at home and abroad.
Implementation bodies	
Responsible sections/organizations	Climate change policy headquarters: 34 persons Yokohama regional councils on global warming countermeasures: 14 persons, 45 enterprises, 9 associations Regional councils on global warming countermeasures for enterprises: 116 enterprises
Budget	
Total	2,400 billion Yen

Climate Change

	FY2008	FY2007	Thousand Yen 2008/2007
Climate change mitigation by general account budget	474,612	263,788	210,824 (79.9%)
Wind power project by special account budget	51,001	56,000	-4,999 (-8.9%)
Labor cost	261,000	171,000	90,000 (52.6%)
Total	786,613	490,788	295,825 (60.3%)

3.2-3 Kitakyushu

(1) Remarkable features of Kitakyushu's climate change mitigation program

- An "Environment power" which was achieved through cooperation among the industrial sector, public administrator, and the citizenry and the lessons learned from the city's past pollution problems:
  - High environment consciousness can take root among industries, enterprises, public administration, and the citizenry.
  - Advanced measures and technologies in the industrial sector.
  - Patient efforts by city officers as seen in the painstaking segregation of waste collection.
- Promotion of urban structure conversion and energy measures in the industrial sector:
  - Promotion of a low-carbon society through the realization of stock-oriented urban infrastructure development.
  - The efficient use of energy through collaboration with various factories.
- Variety of contents or measures to encourage citizen action:
  - The Kitakyushu Environment Passport project, the Household Eco-Account Book, etc.
  - Variety of contents: Energy help desk, web site, public relations magazines, etc.
- Active efforts on international cooperation:
  - Variety of training courses on the environment and considerable experiences of acceptance of trainees and the deployment of experts.
  - Transfer of technologies and know-how especially to Asian counties.
  - Quantification of GHG emission reductions by technology transfer.

(2) Climate change mitigation in Kitakyushu

Population	984,953 (As of October 1, 2008)
Area	487.71 km^2 (As of October 1, 2007)
GHG emissions	15,600 thousand tCO_2 (FY2005) 16 tCO_2/capita (Resident: 7.0%, Transportation: 9.0%, Energy industries: 2.0%, Commercial: 8.0%, Industries: 66.0%, Waste: 3.0%, Non-energy-oriented CO_2: 4.0%, Other gases: 1.0%)
Climate change mitigation plans	- Medium- to long-term plan is being prepared based on the Kitakyushu Environmental Model City proposal. - Kitakyushu action plan on climate change mitigation measures on local government activities (revised on October 2006). - Kitakyushu regional plan on promoting global warming countermeasures (October 2006).

GHG emission reduction targets	
Short-term	Residential: 10% GHG reduction per household by FY2010 from FY2002 level. Commercial: 10% GHG reduction per floor area by FY2010 from FY2002 level. Transportation: 10% GHG reduction per vehicle by FY2010 from FY2002 level. (Kitakyusyu Regional plan on promoting global warming countermeasures (October 2006)
Medium- to long-term	Medium-term: More than 30% reduction of GHG emissions per unit by 2030 from current situation for all the sectors. Long-term: 8 million tCO_2 reduction (50% reduction) by 2050 from FY2005 level, 23.4 million tCO_2 reduction (150% reduction) by advancing environmental diplomacy, totally 31.4 million tCO_2 reduction (200% reduction). (Kitakyushu Environmental Model City proposal (2008)
Major ongoing measures	
Residential	1) Encourage energy conservation and resource savings in daily living. - Spread and raise awareness of Eco-life: 5,444 households participated in the Household Eco-Account Book (FY2007). - Promote environmental education with CO_2 emission reduction measures in schools.
Commercial, Industry	1) Promote efficient use of energy. - Simplified energy diagnostics for buildings: 125 buildings (FY2007). 2) Promote environment-conscious businesses. - EncourageISO14001 and Eco-Action 21: 56 companies (as of the end of 2007). 3) Measures on buildings, etc. - Encourage ESCO projects.
Transportation	1) Promote public transportation use. - Improve convenience of bus use. 2) Promote environment-conscious car use. - Promote Eco-drive: 23,114 persons participated in the Eco-drive campaign (as of the end of 2007). 3) Promote efficient logistics. - Promote modal shift: Shift from trucks to ships or railways. Subsidy program has been established for modal shift projects. 25 projects have been subsidized as of FY2007.

Public	1) Energy conservation - Save electricity in offices, etc. - Keep appropriate temperatures. - Replace with energy-efficient equipment. 2) Use public cars - Promote eco-driving. - Introduce clean energy vehicles, e.g. CNG: 41 vehicles (37 CNG, 2 electric, 2 Hybrid). 3) Promote energy conservation in public buildings. - Utilize renewable energy such as solar power: 22 solar power systems (from 1998 to 2007). - Utilize energy-efficient electric appliances such as high efficiency lights. 4) Actions on services for citizens - Eco-drive on city buses. - Introduce co-generation system to public hospitals. - Generate electricity and heat on waste incineration plant.
Details of climate change mitigation plan **- Kitakyushu Regional plan on promoting of global warming countermeasures -**	
Background and Objectives	Citizens, enterprises, and public administration promote actions on reducing GHG taking into account Kitakyushu's local features, help achieve the Kyoto Protocol commitment, establish a sustainable society, and leave a better environment for future generations.
Basic policies	- Share the plan with all the stakeholders. - Formulate effective measures. - Set clear goals. - Formulate measures for each sector.
Measures (Selected)	1) Residential sector - Encourage energy saving actions by citizens through Kitakyushu Environment Passport project. - Energy Efficiency Labeling System of home appliances. - Promote environmental education.
	2) Industrial and commercial sector - Promote efficient use of energy. - Set an Energy Information Desk in the city office. - Promote Kitakyushu Eco-Industrial complex.
	3) Transportation sector - Formulate transportation master plan. - Improve conveniences of railway, monorail and buses. - Encourage park-and-ride and bicycle use.

	4) Urban structure sector - Formulate and implement Kitakyushu Environmental Consideration Guideline. - Formulate measures to prevent heat island effect. - Promote eco-renovation of schools and environmental education.
	5) Waste sector - Revise garbage collection system. - Promote Eco-Town project.
	6) Public sector - Promote energy and resources conservations in line with ISO14001. - Promote green purchasing. - City officers to lead actions in their daily living. - Promote energy conservation renovation projects. - Introduce renewable energies. - Introduce low emission vehicles.
	7) International cooperation on environmental field - Promote international cooperation on the environmental field. - Consider utilization of Kyoto mechanism.
	8) Development of human resources and technologies - Establish environmental experts bank. - Establish environmental learning information networks. - Develop experts on climate change mitigation.
	9) Renewable energy - Introduce solar power, wind power, micro hydropower. - Utilize sewage sludge. - Utilize biodiesel and bioethanol. - Utilize hydrogen fuel cells.
	10) Forest sink - Support private forest management. - Appropriately manage municipal forests. - Introduce greening in urban areas.
Promoting the plan	- Set up venues for information exchanges. - Strengthen actions on raising awareness. - Cooperate with central and prefectural governments, etc.
Implementation bodies	
Responsible sections/organizations	Director of environmental capital: 1 person Environmental capital promotion office: 13 persons Environmental management section: 13 persons
Budget	
Total	General account budget: 1,183,385,150 thousand Yen (FY2008)
Climate Change	3,000 million yen for 37 projects

3.2-4 Tokyo

(1) Remarkable features of Tokyo's climate change mitigation program

- Formulation and implementation of medium- to long-term policies on climate change mitigation in the early stages:
  - Formulation and implementation of Tokyo's climate change strategy in June 2007.
- Formulation and implementation of advanced regulatory programs for enterprises and structures:
  - Tokyo CO_2 Emission Reduction Program for large enterprises.
  - Tokyo Green Building Program for large buildings.
  - Cap & Trade emission trading system for large CO_2-emitting enterprises.
- Implementation of bold measures:
  - Introduction of solar energy up to 1 million kW until 2016.
  - Campaign to "Eliminate Incandescent Lamps" from households.
  - The formulation of rules allowing the preferential treatment for fuel-efficient vehicles in all stages of vehicle production, marketing, purchasing and use.
- Leadership of the governor:
  - Effective decision-making and expansion of aggressive measures.

(2) Climate change mitigations in Tokyo

Population	12,898,939 (As of October 1, 2008)
Area	2,187.42 km^2 (As of October 1, 2007)
GHG emissions	59,690 thousand tCO_2 (FY2005) (Resident: 26.2%, Transportation: 26.0%, Commercial: 36.4%, Industries: 9.6%, Waste: 1.8% (Percentage in total CO_2 emissions)
Climate change mitigation plans	- Tokyo climate change strategy (June 2007) - Tokyo action plan on climate change mitigation measures on local government activities (August 2005)
GHG emission reduction targets	
Short-term	-
Medium- to long-term	Total: 25% GHG reduction until 2020 from 2000 level. Commercial: 7% GHG reduction in the commercial sector by 2020 from 2002 level. Residential: 20% GHG reductions in the commercial sector by 2020 from 2002 level. Transportation: 40% GHG reductions in the commercial sector by 2020 from 2002 level. Increase the share of renewable energy up to 20% by 2020.

Major ongoing measures	
Residential	- Creation of the Energy Efficiency Labeling System for home appliances. - Campaign for "Elimination of Incandescent Lamps" from households.
Commercial, Industry	- Tokyo CO_2 Emission Reduction Program: Large GHG-emitting business establishments are required to submit and announce a five-year GHG reduction plan and this plan is evaluated, rated and announced. - Tokyo Green Building Program: Designed to improve the energy conservation performance of large buildings.
Transportation	- Promotion of low emission and high efficiency vehicle use. - Promotion of Eco-driving. - Promotion of biofuel use.
Public	- Tokyo 2007 Energy Conservation Specifications: Provides that public facilities should be newly constructed, expanded or refurbished on a large scale in order to achieve substantial CO_2 reduction. - Utilization of renewable energy such as fuel cell bus, wind power, micro-hydro power, solar power, sewage sludge. - Replacement of streetlights and park lights with high-efficiency lights.
Details of climate change mitigation plan **- Tokyo climate change strategy -**	
Background and Objectives	Avoiding a possible global crisis that may be caused by climate change requires the reduction of greenhouse gas emissions all over the world by half by the middle of the current century. To this end, Japan, the European Union, the United States, and other industrialized nations must reduce greenhouse gas emissions not by 50% but by a dramatic 60-80%. The aim is to achieve and realize a new city model in the 21st century that could accomplish such dramatic gas reductions in Tokyo without delay. The objectives are: - Reduce Tokyo's CO_2 emissions without delay. - TMG advances pioneering strategies on behalf of the Japanese government to come up with effective and specific measures. - TMG takes the lead in Japan's climate change mitigation measures. - Advance clear policy to stimulate public opinion and implement strategies.

Basic policies	- Create a mechanism to bring Japan's environmental technologies into full play to achieve CO_2 reductions. - Create a mechanism allowing large and small businesses and households to achieve CO_2 reductions on their own. - Carry out measures strategically and intensively during the period of the first 3-4 years as the initial period toward a shift to a low-carbon society. - Utilize private and public funds and tax incentives, and carry out necessary investment boldly.
Measures (Selected)	1) Initiative I: Promote Private Enterprises' Efforts to Achieve CO_2 Reductions - Introduce Cap & Trade System targeting large CO_2-emitting business establishments. - Promote smaller businesses' energy conservation measures through the introduction of the Environmental Collateralized Bond Obligation (CBO) Program, etc. - Call upon financial institutions to expand environmental investment and loan options and disclose information about investments. - Achieve widespread use of renewable energies by promoting the Green Power Purchasing Program. - Collaborate with regard to smoke, soot and air pollution control measures.
	2) Initiative II: Achieve CO_2 Reductions in Households in Earnest – Cut down on light and fuel expenses through low-CO_2 lifestyles. - Wage a "Campaign to Eliminate Use of Incandescent Lamps" among households. - Build comfortable houses using natural light, heat and wind – regenerate the solar thermal market. - Improve the energy-saving performance of houses. - Facilitate the spread of renewable energies and energy-saving equipment such as photovoltaic power generation systems and high-efficiency water heaters in houses.
	3) Initiative III: Lay Down Rules for CO_2 Reductions in Urban Development - Formulate the world's highest-level energy conservation specifications for buildings and apply them to facilities of the Tokyo Metropolitan Government. - Require large new buildings to have energy conservation performance plans. - Introduce the Energy Conservation Performance Certificate Program (a tentative name) for large new buildings. - Promote the effective utilization of energy and the use of renewable energies in local areas.

	4) Initiative IV: Accelerate the Effort to Reduce CO_2 from Vehicle Traffic - Formulate the rules on the use of fuel-efficient vehicles to facilitate the widespread use of hybrid cars. - Implement a project to encourage green vehicle conducive to CO_2 reductions. - Create a mechanism of support for voluntary activities such as the Eco-Drive Campaign. - Carry out traffic measures by taking advantage of the world's most refined public transportation facilities.
	5) Initiative V: Create TMG's Own Mechanism to Support Activities in the Respective Sectors - Introduce the CO_2 emission trading system. - Create a program to encourage and support smaller businesses and households' energy-saving efforts. - Commence a study both in terms of tax reduction and taxation to introduce TMG's own Energy Conservation Tax Incentive (a study to be conducted by the Tokyo Metropolitan Tax Research Council in the current fiscal year).
	TMG's Pioneering Actions - Apply the 2007 Tokyo Energy Conservation Design Specifications fully to TMG facilities starting in the current fiscal year. - Formulate "Guidelines for Energy Conservation and the Introduction of Renewable Energies" (a tentative name) in TMG facilities this summer. - Create the "National Network of Green Power Purchasing" in collaboration with local governments across the country. - Replace all vehicle traffic signals and pedestrian traffic signals in Tokyo with LED signals. - Formulate measures designed to reduce CO_2 emissions produced in the procurement process of goods (including public work projects). - Revise the Global Warming Prevention TMG Plan.
	Collaborate with Local Governments in the Tokyo Metropolitan Area and Across the Country. - Deploy the "National Network of Green Power Purchasing" in collaboration with local governments across the country. - An initiative in the Tokyo Metropolitan Area (an initiative launched by the Eight Local Government Summit, May 30, 2007).
	Pushing Ahead with the Carbon-Minus Movement - Raise awareness on Carbon Minus in everyday living and work lifestyles. - Collaborate with major cities of the world. - Cooperate with cities in Asia.

Promoting the plan	TMG will carry out measures and strategies in cooperation with private business enterprises, NGOs, and other parties, and through other means such as agreements and municipal ordinances. - Hold stakeholders' meetings. - Examine the direction to which the TMG ordinance will be revised and aim to complete it by 2008. - Give shape to the 10-Year Project for a Carbon-Minus Tokyo. - Revise the Tokyo Metropolitan Environmental Master Plan.
Implementation bodies	
Responsible sections/organizations	Environment Bureau, Global Environment Department

3.2-5 Obihiro

(1) Remarkable features of Obihiro's climate change mitigation program

- Implementation of measures focused on the utilization of local resources:
  - Utilization of biomass energy such as livestock and agricultural wastes.
  - Introduction of solar power to exploit abundant local solar resource.
- Active actions of public administration:
  - Formulation of several nascent environmental protection plans, i.e. Environmental Master Plan, New Energy Vision, Energy Conservation Vision, etc.
  - Effective collaboration with universities and research institutes.

(2) Climate change mitigation in Obihiro

Population	168,927 (As of September 30, 2008)
Area	618.94 km^2 (As of September 30, 2008)
GHG emissions	1,384 thousand tCO_2 (FY2000) (Resident and commercial: 49.5%, Transportation: 29.7%)
Climate change mitigation plans	- Medium- to long-term plan is being prepared based on the Obihiro Environmental Model City proposal. - Obihiro action plan on climate change mitigation measures on local government activities (revised on September 2007).
GHG emission reduction targets	
Short-term	-
Medium- to long-term	Medium-term: More than 30% GHG reduction within 2020 to 2030 from 2000 level Long-term: 50% reduction until 2050 from 2000 level. (Obihiro Environmental Model City proposal (2008)
Major ongoing measures	
Residential	- Subsidy program to encourage introduction of solar power to households: 118 households (462.87 kW) until 2006. - Subsidy program to encourage the introduction of wood pellet stoves to household: 7 households in 2006.
Commercial	- Subsidy program to encourage ISO14001 certification: 13 companies certified from 2000 to 2004, Tokyo Green Building Program: Designed to improve the energy conservation performance of large buildings.
Transportation	- Operation of shared taxis. - Operation of community buses.
Industry	- Certification of Clean Agriculture Company.

Public	- ISO14001 certification. - Obtain 10.6% CO_2 emission reduction in FY2006 from 1999 level. - Introduction of solar power systems to public facilities. - Introduction of wood pellet stoves. - Raise awareness about energy savings in daily life: No-car day, Household Eco-Account Book, etc. - Replacement with low emission vehicles. - Training of environmental advisors.
Details of climate change mitigation plan **- Obihiro Environmental Model City proposal (Medium- to long-term plan based on this proposal is now on the process of formulation) -**	
Background and Objective	Promote integrated measures on local environment and climate change. And also promote medium- to long-term measures to end dependence on fossil fuels by utilizing biomasses and local resources of one of the largest farming areas in Japan.
Basic policies	- Living, Green and Town development - Agriculture and Food of Obihiro - Create resources and energy - Comfortable and active city - Eco-friendly living
Measures (Selected)	1) Living, Green and Town development - Expand and preserve the “Forest of Obihiro” - Develop base of recycling facilities - Develop eco-towns
	2) Agriculture and Food of Obihiro - Climate change mitigation in agriculture. - Establish circulation system of biomass resources. - Promote local production for local consumption.
	3) Create resources and energy - Utilize huge amount of biomass energy. - Produce cattle dung pellet as a fuel. - Study possibility of hydrogen production plants.
	4) Comfortable and active city - Encourage use of public transportation. - Improve bicycle and pedestrian use.
	5) Eco-friendly living - Expand eco-friendly living to all the citizens. - Establishment of partnership organizations. - Establish environment funds. - Promote actions through international exchanges.

Promoting the plan	- Set up new organization to implement measures and follow-up activities through collaboration between industry, educational institutions and the administration. - Existing committees in city offices to continue working on cross-sectoral measures
Implementation bodies	
Responsible sections/organizations	Environment division: 17 persons (3 to 4 full-time officers from 2009) Headquarters for climate change mitigation measures: Chief is the Mayor, 24 committee members

3.2-6 Toyama

(1) Remarkable features of Toyama's climate change mitigation program

- Advance measures on the use of public transportation:
  - For public administration to take the initiative in promoting the use of public transportation.
  - Improve convenience in public transportation.
- Design a compact city centering on public transportation:
  - Promote the habitation of the city center or the areas along public transportation routes.
  - Formulate regulations to control the construction of large facilities in the suburbs, especially those that draw in large numbers of residents.

(2) Climate change mitigation in Toyama

Population	417,282 (As of March 31, 2008)
Area	1,241.85 km^2 (As of March 31, 2008)
GHG emissions	4,502 thousand tCO_2 (FY2003) (Resident: 15.8%, Transportation: 24.1%, Commercial: 14.3%, Industries: 45.8% (Percentage in total CO_2 emissions))
Climate change mitigation plans	- Medium- to long-term plan is being prepared based on the Toyama Environmental Model City proposal. - Toyama action plan on climate change mitigation measures on local government activities (March 2006).
GHG emission reduction targets	
Short-term	-
Medium- to long-term	Medium-term: 30% GHG reduction by 2030 from 2010 level. Long-term: 50% reduction by 2050 from 2010 level. (Toyama Environmental Model City proposal (2008))

<table>
<tr><td colspan="2">Details of climate change mitigation plan
- Toyama Environmental Model City proposal (Medium- to long-term plan based on this proposal is now on the process of formulation) -</td></tr>
<tr><td>Background and Objective</td><td>Toyama city is highly dependent on cars and its urban area is expanding into suburban areas. Therefore, it has the lowest population density among all prefectural capitals in Japan. Registered vehicle number is still increasing and gasoline consumption is the second highest among prefectural capitals. In these circumstances, there is a need to reduce CO_2 emissions and establish a sustainable development.</td></tr>
<tr><td>Basic policies</td><td>To re-form Toyama city into a “Compact City” where citizens can live comfortably without using cars by promoting public transportation use and accumulating functions such as residential and commercial facilities in the city center.</td></tr>
<tr><td rowspan="4">Measures (Selected)</td><td>1) Activation of public transportation
- Develop LRT (Light Rail Transit) network.
- Introduce eco-train pass project.
- Operate community buses.
- Promote voluntary surrender of driver licenses.</td></tr>
<tr><td>2) Concentration of functions in the city center and vicinity of public transportation.
- Invigorate city center.
- Provide preferential treatment for habitation along public transportation routes..</td></tr>
<tr><td>3) Promotion of eco-friendly life with compact town development
- Improve energy efficiency of houses and living.
- Reduce wastes.
- Encourage volunteer activities by citizens through city office assistance.</td></tr>
<tr><td>4) Promotion of eco-friendly businesses with compact town development
- Spread use of high energy-efficiency electric and gas appliances.
- Promote use of electric vehicle and CNG vehicles.
- Shift commuting behavior such as participating in a carless days.
- Introduce renewable energy such as small-scale hydro power plants.</td></tr>
<tr><td>Promoting the plan</td><td>- Town meeting: Implemented to explain and share the measures of Toyama city.
- Team Toyama: Set up by volunteer associations and enterprises, and takes actions on climate change mitigation. The mayor is the captain of the team.
- Team Toyama Advisory Meetings: Local universities and enterprises participate in meetings.</td></tr>
<tr><td colspan="2">Implementation bodies</td></tr>
</table>

Responsible sections/organizations	Environment Department, Environment Policy Division Environment Department, Environment Conservation Division

3.2-7 Shimokawa

(1) Remarkable features of Shimokawa's climate change mitigation program

- Large amounts of GHG reduction through conservation and enhancement of forest sinks
  - Increase forest sinks by 3.8 times from 2020 to 2030 and 4.5 times by 2050 from their 1990 level.
  - Enhance forest sinks through cyclic forest management.
- Effective use of forest resources:
  - Introduce a district heating system utilizing forest biomass.
  - Realize zero-carbon houses through the use of local wood materials.
  - Promote afforestation through carbon offsetting programs.

(2) Climate change mitigation in Shimokawa

Population	3,842 (As of September 30, 2008)
Area	644.20 km^2 (As of April 1, 2008)
GHG emissions	55,880 tCO_2 (FY2003)
Climate change mitigation plans	- Medium- to long-term plan is being prepared based on the Shimokawa Environmental Model City proposal. - Shimokawa action plan on climate change mitigation measures on local government activities (January 2005).
GHG emission reduction targets	
Short-term	-
Medium- to long-term	Medium-term: 3.8 times of forest sink and 32% GHG reduction by 2020─2030 from 1990 level (Forest sink: 389,580 tCO_2, CO_2 emissions: 57,574 tCO_2). Long-term: 4.5 times of forest sink and 66% GHG reduction by 2050 from 1990 level. (Shimokawa Environmental Model City proposal (2008))

<table>
<tr><td colspan="2">Details of climate change mitigation plan
- Shimokawa Environmental Model City proposal (Medium- to long-term plan based on this proposal is now on the process of formulation) -</td></tr>
<tr><td>Background and Objective</td><td>Since 90% of Shimokawa is forested, the town has been developed based on this resource.</td></tr>
<tr><td>Basic policies</td><td>Based on pioneering and leading actions of Shimokawa town on forestry business, Shimokawa town promotes integrated utilization of forest biomass and cooperates / collaborates with citizens and private enterprises.</td></tr>
<tr><td rowspan="5">Measures (Selected)</td><td>1) Cyclic use of local resources
- Implement forest management.
- Plant resource plant “Yanagi.”
- Introduce bioethanol pilot plant.</td></tr>
<tr><td>2) Carbon offset program
- Develop institutional design for carbon offsetting.
- Test implementation and verification of the carbon offset program.</td></tr>
<tr><td>3) Introduction of forest biomass energy
- Introduce forest biomass heat supply system.
- Establish a Forest Biomass Institute.
- Introduce district heating system utilizing forest biomass.</td></tr>
<tr><td>4) Introduction of zero-carbon houses
- Implement environmentally friendly houses</td></tr>
<tr><td>5) Actions of citizens
- Implement biodiesel fuel projects.
- Implement “Carrying My Own Bag” when shopping.
- Launch CO_2 reduction contest and environmental education.</td></tr>
<tr><td>Promoting the plan</td><td>Set up a new council to promote cyclical use of forest biomass and local resources, and to create new industries. The members are public sector, citizenry, enterprises, universities, and associations.</td></tr>
<tr><td colspan="2">Implementation bodies</td></tr>
<tr><td>Responsible sections/organizations</td><td>Regional Development Division
Construction and Forestry Division</td></tr>
</table>

3.2-8 Minamata

(1) Remarkable features of Minamata's climate change mitigation program

- Promotion of measures based on lessons learned from the Minamata tragedy:
  - Provide venues for environmental learning.
  - Develop an environmental industry.
  - Develop low-cost measures and collaborate with various actors within the city.
  - Promote actions that act as good reference practices for other local governments.
- Implementation of actions in collaboration with the citizenry:
  - Promote waste reduction and classification.
  - Promote Minamata's original environmental ISO for households, schools, etc.
  - Provide certification of eco-shops.

(2) Climate change mitigation in Minamata

Population	28,518 (As of September 30, 2008)
Area	162.87 km^2 (As of September 30, 2008)
GHG emissions	238,647 tCO_2 (FY2005)
Climate change mitigation plans	- Medium- to long-term plan is being prepared based on the Minamata Environmental Model City proposal - Minamata action plan on climate change mitigation measures on local government activities (November 2001)
GHG emission reduction targets	
Short-term	-
Medium- to long-term	Medium-term: 32.7% GHG reduction by 2020 from 2005 level. Long-term: 50.1% GHG reduction by 2050 from 2005 level. (Minamata Environmental Model City proposal (2008))

<table>
<tr><td colspan="2">Details of climate change mitigation plan
- Minamata Environmental Model City proposal (Medium- to long-term plan based on this proposal is now on the process of formulation) -</td></tr>
<tr><td>Background
and Objectives</td><td>Based on the Minamata lesson which occurred during a period of unharnessed economic growth, Minamata was declared in 1992 as Japan’s first environmental model city. Minamata has been actively promoting climate change mitigations and environmental activities in cooperation with citizens and enterprises, undertaking such actions as waste separation, waste reduction, establishing original environmental ISO for houses or schools.
Because these actions cost less for the city and are participated in by many actors in the city, they have become good reference points or models for other local governments both in Japan and abroad. Enhancing these activities and developing and introducing innovative technologies, Minamata indeed is set to achieve its greenhouse gas reduction goals.</td></tr>
<tr><td>Basic policies</td><td>- Implementation of environmental friendly living.
- Establishment of environmental friendly industries.
- Co-existence with nature and environmentally sound urban development.
- Promotion of environmental learning.</td></tr>
<tr><td rowspan="4">Measures
(Selected)</td><td>1) Implementation of environmental friendly living
- Reduce and classify waste .
- Promote environmental ISO for households.
- Implement urban development to encourage use of community bus and bicycles.
- Certify eco-shops.</td></tr>
<tr><td>2) Establishment of environmental friendly industry
- Promote environmental ISO for enterprises.
- Utilize local resources as biomass energy.
- Develop second eco-industrial complex.</td></tr>
<tr><td>3) Co-existence with nature and environmentally sound urban development
- Designate biotopes.
- Formulate regional environmental agreement framework.
- Construct eco-house towns.</td></tr>
<tr><td>4) Promotion of environmental learning
- Establish a Minamata Environmental University.
- Establish Minamata environmental private schools.
- Promote international cooperation on the environment.
- Establish pollution prevention and environment training center.</td></tr>
</table>

Promoting the plan	- Cross-sectoral organizations in Minamata city office, semi-public organizations such as the “Environment Techno-Center” and “Environment City Urban Development Committee” will mainly promote the measures.
Implementation bodies	
Responsible sections/organizations	Welfare and Environment Department, Environment Division

3.2-9 Findings

(1) Features of selected cities' climate change mitigation program

The main features of the selected cities outlined in 3.2-2 to 3.2-8 are summarized in Table 3-6.

Table 3-6 Features of selected cities' climate change mitigation programs

	Feature
Yokohama	- Comprehensive measures based on medium- to long-term policies. - Powerful organization to implement measures. - Promoting to take "cross-department" actions in Yokohama city office. - "Power of citizens". - Advanced efforts on waste management.
Kitakyushu	- "Environment power" accumulated and learned through cooperation with industrial community, public administration, and citizens through pollution problems in the past. - Promotion of urban structure conversion and energy measures in the industrial sector. - Variety of contents or measures to encourage actions of citizens. - Active efforts on international cooperation.
Tokyo	- Formulation and implementation of medium- to long-term policies on climate change mitigation in the early stages. - Formulation and implementation of advanced regulatory programs for enterprises. - Implementation of bold measures. - Leadership of the governor.
Obihiro	- Implementation of measures that focus on utilizing local resources. - Active actions of the public administration.
Toyama	- Advance measures on promoting the use of public transportation. - Designing a compact city centering on public transportation.
Shimokawa	- Large amounts of GHG reduction through conservation and enhancement of forest sinks. - Effective use of forest resources.
Minamata	- Promotion of measures based on lessons learned from the Minamata tragedy, which occurred in a period of unhampered economic growth. - Implementation of actions in collaboration with citizens.

(2) Formulating climate change mitigation measures among local governments

Local governments' climate change mitigation measures should include wide swathes of areas covering residential, commercial, transportation, industrial, and other areas and sectors. Likewise, it is not always necessary to promote new mitigating measures, the climate change mitigation rubric being the analysis of the local characteristics, the careful consideration of cross-sectoral measures, and the careful accounting of experiences and strong points of the public administrators.

As shown in Table 3-6, local governments have implemented measures based on past experiences on one or another field of concern, or on local characteristics rather than formulating new measures on climate change mitigation.

For example, Yokohama has considered citizen's action as a vital component of its mitigation efforts. This is because citizen's action has been one of the city's strongest suits, allowing it in the past to establish a successful segregated collection and waste management system. So for its climate change mitigation measures, Yokohama can tap its collaborative strengths with its citizenry due to such best practice.

This likewise holds true for Kitakyushu and Minamata whose climate change mitigation measures are based on collaborative efforts with their respective citizenries and private enterprises which showed in their past experiences in solving pollution problems.

For its part, Obihiro is maximizing its local resources such as its agriculture and livestock fuels.

What is unique for Tokyo is its formulation and implementation of regulatory programs for enterprises since it has urgent issues to reduce emissions from a number of enterprises.

Again, there were cases wherein mitigation measures were realized through cross-sectoral measures, or wherein targets were achieved as ancillary benefits stemming from other measures or other areas. Thus it is important to assess plans or measures implemented by other divisions or sections within the local government.

Although it may seem redundant, the policies or decisions of the heads of local governments are important since mitigation efforts have cross-sectoral aspects and require the elimination of vertically divided administrative functions.

3.3 Current status of and issues in formulating and implementing climate change mitigation measures

The table below summarizes the current status of and major issues in formulating and implementing climate change mitigation measures among Japanese local governments.

Table 3-7 Current status of and major issues in formulating and implementing climate change mitigation measures

	Item	Current status	Issue	Solution
Planning Stage	Formulation of plan	Many local governments formulate plans on climate change mitigations, due mainly to legal obligations or change in social conditions.	Some local governments cannot formulate the plans due to lack of human resources and budget.	Instead of outsourcing to consultants, formulate plans by city officers themselves. Formulation not of a comprehensive plan, but measures focused on high feasibility ones.
	Human resource	There are cases that staff assignment for climate change mitigations are increasing.	Especially in small cities, it is still difficult to increase human resources for climate change.	Formulation not of a comprehensive plan, but measures focused on high feasibility ones.
	Budget	There are cases were budgets for climate change mitigations are increasing.	Especially in small cities, it is still difficult to get or increase budget for climate change.	Formulate plans by city officers themselves. Concentrate on high feasibility measures.
	Analysis of current situations such as emissions	Become easier to estimate GHG emissions, as the Ministry of Environment provides guidelines.	In municipalities, the precision is low due to limitation of available statistics, and difficult to follow-up.	Instead of estimating total emissions of local governments, estimate and follow-up project emissions.
	Setting targets	Many types of targets can be seen such as total emissions or sectoral or specific emissions.	Difficult to follow-up progress due to lack of statistics	Set targets that can be followed.
	Consideration of measures	Knowledge and experiences are accumulated, therefore possible to formulate effective measures.	Difficult to formulate appropriate measures due to lack of ideas or experiences.	Refer other cities' plans or measures that have similar local characteristics. Check other sections' measures.
Implementation Stage	Implementation body	Can make the best use of human resources such as prefectural centers for climate change action, climate change action officers and regional councils on global warming countermeasures.	Limited human resources in public administrations.	Collaborations with persons or organizations that promote actions in the region.
	Budget	There are cases were budgets for climate change mitigations are increasing.	Especially in small cities, it is still difficult to get or increase budget for climate change.	Check other sections' measures to avoid overlapping on investment and budget.

Chapter 4 Climate change mitigation measures of local governments in developing countries

4.1 Current status of climate change mitigation measures of local governments in developing countries

Climate change mitigation measures follow the standard process of: (i) formulating a plan, (ii) implementing the measures, (iii) monitoring progress, and (iv) revising the plan, which is the case in other sectoral measures.

The Bangkok Metropolitan Administration has formulated and implemented a climate change plan, i.e. the "Bangkok Metropolitan Administration Action Plan on Global Warming Mitigation 2007–2012." This is the first stage in the aforementioned process, and the Bangkok Metropolitan Administration will need to proceed to the next steps.

However, there is little evidence among local governments in developing countries wherein climate change mitigation carries a premium among a set of priorities and that the above steps are followed through to their necessary conclusion. In most cases in the developing world, climate change mitigation is indirectly implemented through other projects such as ODA-funded initiatives on areas such as forest conservation, protection of the natural environment, environmental management, energy and resources, transportation, urban development, water resources, disaster prevention and agricultural development, etc. Although these projects are not climate change-specific, they hold potentials in reducing GHG emissions or enhancing CO_2 sinks.

For example, the following JICA-funded projects have climate change mitigation component:

- Study on the Master Plan for Air Pollution Control in Guiyang Municipality
- Implementation Support for 3R Initiative of Hanoi City for Cyclical Society
- Clean Dhaka Master Plan
- Study on the Master Plan for Solar Energy Utilization in Nigeria
- The Project on the Practical Energy Management Training Center in the Kingdom of Thailand
- Study on Urban Transportation Master Plan and Feasibility Study in HCM Metropolitan Area in the Socialist Republic of Viet Nam
- Promotion of the Biogas Technologies in the Kyrgyz Republic

Since 1993, the International Council for Local Environmental Initiatives (ICLEI) has promoted the Cities for Climate Protection (CCP) Campaign, its main focus being climate change mitigation among local governments all over the world including those in the developing countries.

The outline of the CCP campaign is shown in Table 4-1.

Table 4-1 Outline of the Cities for Climate Protection (CCP) Campaign

Objective	In 1993, at the invitation of ICLEI, municipal leaders met at the United Nations in New York and adopted a declaration that called for the establishment of a worldwide movement of local governments with the aim of reducing greenhouse gas emissions, improving air quality, and enhancing urban sustainability. The result was the creation of the Cities for Climate Protection (CCP) Campaign.
Milestone	The five milestones of the CCP Campaign and the methodology behind it provides a simple, standardized means of calculating greenhouse gas emissions, as well as of establishing targets to lower emissions, reducing greenhouse gas emissions, and monitoring, measuring and reporting performances. The ICLEI has developed several software tools that help cities comply with the methodologies. Milestone 1. Conduct a baseline emissions inventory and forecast. Milestone 2. Adopt an emissions reduction target for the forecast year. Milestone 3. Develop a Local Action Plan. Milestone 4. Implement policies and measures. Milestone 5. Monitor and verify results.
Advantage	The five milestones provide a flexible framework that can accommodate varying levels of analysis, effort, and availability of data. This element makes the CCP both unique and innovative and increases its transferability among local governments. It is the breadth of this program that enables it to cross north/south, developed/developing, metropolis/town boundaries and that has made it successful worldwide.
Participants	691 participants (cities) in 31 countries as of February 2008. - Africa: 12 - Asia: 63 - Europe: 126 - South America: 18 - North America: 268 - Oceania: 204

Source: ICLEI web site: http://www.iclei.org/index.php?id=800

4.2 Selection of cities

In this section, the current state of climate change mitigation measures among local governments in developing countries was studied. With due consideration to regional balance and other factors, ten cities in the C40 group were selected, as shown in Table 4-2 (The Large Cities Climate Leadership Group).

Studied cities are Beijing, Delhi, Dhaka, Hanoi, Jakarta, Buenos Aires, Mexico City, Rio de Janeiro, Cairo, and Johannesburg.

Table 4-2 Studied cities

	Country	City	a	b	c	d
Asia	Thailand	Bangkok			○	
	China	Beijing			●	
	India	Delhi			●	
	Bangladesh	Dhaka	●			
	Vietnam	Hanoi		●		
	China	Hong Kong			○	
	Turkey	Istanbul				○
	Indonesia	Jakarta			●	
	Pakistan	Karachi		○		
	India	Mumbai			○	
	China	Shanghai			○	
South America	Columbia	Bogota			○	
	Argentina	Buenos Aires				●
	Venezuela	Caracas				○
	Peru	Lima			○	
	Mexico	Mexico City				●
	Brazil	Rio de Janeiro				●
	Brazil	Sao Paulo				○
Africa	Ethiopia	Addis Ababa	○			
	Egypt	Cairo			●	
	South Africa	Johannesburg				●
	Nigeria	Lagos		○		

●: Studied cities
a: Least Developed Countries
b: Other Low Income Countries
c: Lower Middle Income Countries and Territories
d: Upper Middle Income Countries and Territories
(DAC List of ODA Recipients, Effective for reporting on 2008, 2009 and 2010 flows)

4.3 Climate change mitigations in selected cities

4.3-1 Beijing

Beijing's climate change mitigation measures are implemented by the city's Environmental Protection Bureau. Beijing's mitigation efforts are focused not only on isolated climate changes but also on various interactions between climate change and other ecological stresses that impact on the city's growth and development. The city's mitigating efforts substantially contribute in addressing urban sustainability[1] concerns.

- Promotion of Renewable Energy

  Beijing is accelerating its harnessing of renewable energies such as solar, wind, geothermal, biomass etc., including the development of new energies that optimize energy structures. In 2008, Beijing completed the first stage of its first wind power generation station. Likewise, through a large-scale biomass project, it has harnessed energy from the city's garbage.

- Improvement of Heating Infrastructure

  In the past nine years, Beijing has invested 2.5 billion Yuan into its biomass project, gradually transforming small-scale and scattered coal-fired boilers and stoves into a centralized and clean heating system for its urban areas, thus reducing coal use by a hefty six million tons each year. By the end of 2007, the biomass centralized heating area covered 3,000,000 m^2.

- Energy Saving in Key Industries

  In the construction industry, the city promotes policies on energy-saving technologies and new materials. While in its transportation sector, Beijing has accelerated the process of updating vehicles, eliminating high emission old cars, and encouraging the use of energy-efficient, clean, low-emission, new power vehicles. It is the first city in China that has applied the EURO4 grade emission standards for vehicles, accelerated the construction of traffic information systems, improved the organization and management level of vehicle operations, and lowered empty load rates of vehicles.

- Restructuring of Industry

  In accordance with the "Notice from the Beijing Municipal Government on the elimination of outdated production procedures, high energy and water consumptions, and high pollutants" 14 industries have been categorized as eliminable and restrained enterprises. Seven of these industries gained high negativity and this included small-scale cement plants and enterprises engaged in chemicals and chemical products, manufacturing, paper and the paper products, etc. The city allows the provision of public finance or subsidy to eliminated enterprises.

[1] Xiao Xia Wang, Beijing Practices Tackling Climate Change, International Journal of Urban Sciences, 12(1), 2008, 40-48.

4.3-2 Delhi

Delhi's Department of Environment implements the city's environmental measures. Although there seems to be no specific climate change mitigation plan, it is presumed that climate change mitigation is simultaneously realized through the city's implementation of other ecological programs like its initiatives on air pollution measures, water conservation, waste management, promotion of the 3Rs, greening, promotion of eco-life, etc.

The following are Delhi's major environmental programs:[1]

- Plantation and greening

  A government-led plantation and greening program participated in by residents' welfare associations, market traders' association, non-governmental organizations (NGOs), and schools. As a result of the greening program, Delhi's forest cover increased from 26 km^2 in 1997 to 268 km^2 in 2003.

- Environment awareness campaigns

  About 1600 eco-clubs have been established among various schools and colleges in Delhi, and these include over 50% of government schools. The eco-clubs conduct various environmental activities throughout the year.

  An anti-littering and anti-plastic bag campaign is also undertaken under the Bhagidari Program and it involves residents' welfare associations, market traders' associations, schools, NGOs, corporations, etc. This helps create awareness among citizens of Delhi.

- Waste management

  The city also conducts the 3R campaign to help minimize waste generation. A zero garbage concept has been launched among the eco-clubs involving schools and residents' welfare associations. Likewise, the segregation of garbage has been started in 125 colonies.

- Ambient air quality

  Delhi has recorded improved ambient air quality, especially in terms of suspended particulate matter (SPM), sulphur dioxide (SO_2), nitrogen oxide (NO), and lead. This remarkable achievement was realized through the city's persistent efforts of phasing out old commercial vehicles, coupled with the widespread introduction of unleaded petrol and low sulphur diesel fuel, and the extensive use of CNG-powered vehicles, as well as the city's gains in forest cover.

[1] Delhi Department of environmental: http://environment.delhigovt.nic.in/

4.3-3 Dhaka

Already prone to disasters such as cyclone-caused flooding, there is growing concern that the future still holds dire for Bangladesh due to climate change. This concern is validated by the fact that most of Bangladesh is 10 meters lower than sea level, making the rise in sea levels potentially lethal for the country. Bangladesh therefore needs substantial assistance in adapting to climatic changes.

Like many other cities Dhaka does not have a specific climate change mitigation program as can be gleaned from information on Dhaka City's web site[1]. However, it is presumed that greenhouse gases are indirectly reduced through other projects such as those on waste management and the regulation of transportation pollution.

One of this is the JICA-assisted waste management project in Dhaka. In March 2005, the city had formulated a Clean Dhaka Master Plan with JICA's assistance, with a component on waste management that involved the establishment of a waste collection system with the participation of residents.

Some of these waste management projects are registered with the United Nations Framework Convention on Climate Change (UNFCCC) as CDM projects, as follows:

- Project name: Composting of Organic Waste in Dhaka
- Project number: Project 0169
- Registration date: May 18th, 2006
- GHG emission reductions: 89,259tCO_2/year
- Source: http://cdm.unfccc.int/Projects/DB/SGS-UKL1134142761.05/view

- Project name: Landfill Gas Extraction and Utilization at the Matuail landfill site, Dhaka, Bangladesh
- Project number: Project 0078
- Registration date: September 17th, 2006
- GHG emission reductions: 80,000tCO_2/year
- Source: http://cdm.unfccc.int/Projects/DB/SGS-UKL1121091128.62/view

[1] Dhaka city web site: http://www.dhakacity.org/index.php

4.3-4 Hanoi

In Hanoi, greenhouse gasses are indirectly reduced through other programs such as the "Implementation Support for the 3R Initiative for Hanoi City for Recycling Society" which is supported by JICA.

Although Hanoi has no climate change-specific program, in 2003, Vietnam's central government submitted the "Vietnam Initial National Communication" to the UNFCCC[1]. The document shows the government's mitigation and adaptation measures on climate change. The document has the following features:

Energy sector

- Replacement of low-efficiency coal-fired boilers by higher-efficiency ones.
- Replacement of low-efficiency oil-fired boilers by higher-efficiency ones.
- Fuel efficiency improvements with lean burn engine in transportation.
- Development of geo-thermal power.
- Development of solar power.
- Building of wind power stations.
- Efficiency improvement in coal-fueled cooking stoves.
- Replacement of incandescent light bulbs with compact fluorescent lamps.
- Use of more efficient industrial motors.

Forestry and land use change

- Protection of existing forests and plantations.

Agriculture

- Water management of rice fields.
- Provision of processed feed for animal.
- Setting up of biogas stoves in rural areas.

[1] Viet Nam Initial National Communication under the United Nations Framework Convention on Climate Change, 2003.

4.3-5 Jakarta

As with other cities, Jakarta has no climate change-specific program, so its greenhouse gases are indirectly reduced through other campaigns and projects such as those supported by JICA, World Bank, ADB, etc. Jakarta has also participated in the Clinton Climate Initiative (CCI; see 4.3-10).

For example, the following projects funded and assisted by JICA or Global Environment Facility (GEF) hold potential for reducing GHG emissions.

JICA projects:

- The Study on Integrated Transportation Master Plan for JABOTABEK in the Republic of Indonesia
- Study on the Master Plan for Air Pollution Control in Jakarta

GEF projects:

- West Java/Jakarta Environmental Management Project: The project will reduce methane gas emissions from municipal solid waste through aerobic composition of municipal waste as an alternative to landfill dumping.

- Bus Rapid Transit and Pedestrian Improvements in Jakarta: The project addresses the key root cause of transportation unsustainability, i.e. a dysfunctional transportation pricing structure which de facto subsidizes private motor vehicle use by undervaluing scarce public space.

- Promoting Energy Efficiency in the Industries: To promote industrial energy efficiency through systems optimization approach and ISO energy management standards.

4.3-6 Buenos Aires

Buenos Aires has been a participant to the ICLEI's CCP Campaign and the CCI. It likewise promotes GHG reductions campaign of the GEF and other organizations. The following GEF-funded projects are measures on climate change mitigations:

- Efficient Street Lighting Program: The project will assist Argentina in removing key barriers to energy conservation in the street lighting sector. These barriers include lack of information about viable energy saving opportunities in street lighting, access to commercial sources of financing, and increased transaction costs for initial installations. More specifically, the project will enable the development, structuring, and financing of viable model transactions that demonstrate innovative mechanisms to overcome identified market barriers. These mechanisms have a high replication potential in the Argentinean markets and could also be introduced in other street lighting markets with potential for high-energy savings. Projected annual energy savings after barrier removal exceed 1450 GWh.

- Energy Efficiency Project: The proposed project aims to achieve sustained increases in energy efficiency of electricity and natural gas use for most sectors, in effect lowers the trajectory of greenhouse gas emissions from Argentina.

4.3-7 Mexico City

In July 2007, Mexico City formulated and proposed the Mexico City Climate Mitigation Strategy which is an international event conducted by ICLEI. The objective of the strategy is to reduce GHGs and improve CO_2 sinks in the city through various measures. The major programs implemented by Mexico City from 2001 to 2006 are the following:[1]

- Metrobus: Starting with its Program for the Introduction of Environmentally Friendly Measures for Transport (PIMAAT) in 2002, the city's Environmental Bureau has implemented measures to realize efficient and low emission public transportations. The project was funded by the GEF at about 5.8 million dollars. Under the project, the BRT system and the Metrobus were introduced on Insurgents Street in July 2005. The Metrobus runs along a 19-km route and has 36 bus stops. In the first year alone, 71.1 million commuters became used to the Metrobus system. 100 Metrobus units replaced 380 old buses, thereby significantly reducing fuel consumption and emission. The annual CO_2 emission reduction is calculated as 37,472tCO_2 year.

- Methane recovery on waste disposal site: The project targets to arrest GHGs from waste disposal sites through the recovery and combustion of methane from these sites. A 90% reduction can be achieved from this project and the reduction will be sold as carbon emission reduction (CER) after the program is registered as a CDM project. The estimated emission reductions are at least 6.6 million tons of CO_2 within the period of 2008 to 2012.

- Environmental administration system: Started in 2001, the environmental administration system is a program that aims to save electricity and water consumption, to enhance procurement of environmentally friendly goods, and to encourage classification and recycling of wastes in Mexico City. As of September 2006, 17 organizations and 30 buildings were participating in the program and from 2001 to September 2006, 1,361,453kWh of electricity was saved and 851 tCO_2 was reduced.

- Solar hot water system: The program promotes the use of solar hot water systems in swimming pools, showers, kitchens, laundries, etc. Around 355,264 tCO_2 is estimated to be reduced by the program.

[1] NEDO International Report No.998 (April 11, 2007, NEDO)

4.3-8 Rio de Janeiro

Rio de Janeiro has participated in ICLEI's CCP Campaign and the CCI. It also promotes GHG emission reduction projects supported by the GEF or other organizations. The following GEF-funded projects are measures on climate change mitigation:

- Biomass Integrated Gasification/Gas Turbine Project: The project adopts promising technology that generates electricity through plantation grown fuel. The project resolves important engineering, economic, and financial issues, as well as assesses the commercial feasibility and environmental compatibility of the demonstration plant, which will be constructed in a follow-on phase.

- Sugar Cane Bagasse and Trash: A feasibility study on the installation of a large-scale gas turbine utilizing bagasse.

- Energy Efficiency Project: The project will support supply-side loss-reduction investments; promote integrated supply- and demand-side management pilot projects; create mechanisms (including improved institutional and policy frameworks) to finance investments in energy efficiency by utilities, consumers, and energy service companies (ESCOs); and provide capacity building and technical assistance to support electric energy efficiency and conservation programs, financial mechanisms, policies, regulations and standards.

4.3-9 Cairo

Although Cairo has participated in the CCI, it also has no climate change-specific project and its greenhouse gases are indirectly reduced through other projects such as the ones supported by JICA, World Bank, etc.

The following projects, which are funded or assisted by JICA or the GEF hold potential for reducing GHGs:

JICA

- Sustainable Urban Development Master Plan in Greater Cairo Region
- Transportation Master Plan and Feasibility Study of Urban Transportation Projects in Greater Cairo Region in the Arab Republic of Egypt
- Water Treatment Plant Development Plan in Greater Cairo Region

GEF Projects

- Introduction of Viable Electric and Hybrid-Electric Bus Technology: The objective of the project is to demonstrate electric and hybrid electric bus technology in historic sites and protected areas, including components on sustainable manufacturing, operational, and maintenance infrastructure to support a growing market. Increased utilization of electric and hybrid electric buses will replace diesel buses in historic sites, protected areas, and newly designed cities in Egypt.

- Solar Thermal Hybrid Project: The aim of the project is to contribute to the global improvement of the economic attractiveness of solar thermal technology.

- Sustainable Transportation: The project aims to reduce the growth of energy consumption and related greenhouse gas emissions of Egypt's transportation sector, while simultaneously mitigating local environmental problems such as increasing traffic, deteriorating urban air quality, congestion, etc.

4.3-10 Johannesburg

Johannesburg's Department of Environment implements climate change mitigation measures, and it does this through the following activities and measures:[1]

- Climate change strategy, incorporating mitigation and adoption strategy and implementation;
- Cleaner production initiatives;
- Greening of events such as the 2010 FIFA World Cup;
- Crosscutting activities across all functional areas; and
- National and international liaison.

The city also has participated in the CCI, and in July 2007 set up the following three climate change mitigation programs:[2]

1. Energy efficiency program;
2. Energy efficiency building retrofitting program; and
3. Solar street light township electrification program.

The energy efficiency program includes the Rea Vaya Bus Rapid Transit system and it aims to reduce 311,586 tCO_2. Another energy efficiency project is a landfill gas-to-energy project which produced a report recently completed, wherein eight proposal bids for gas extraction were evaluated. The project entails trapping methane gas, which is generated as a result of landfill decomposition, into gas wells and then flaring or using the gas to generate electricity. Four open landfill sites (Goudkoppies, Robinson Deep, Marie Louise, and Ennerdale) and six closed landfill sites (Linbro Park, Kya Sands, Mapetla, Panorama, Waterval, and Meredale) in Johannesburg were identified to have good potential for gas extraction.

The energy efficiency building retrofit program, which is a new procurement and financial model for 12 council-owned buildings, is now in its pilot phase. Energy use will be dramatically reduced through a number of measures. The pilot buildings are in Dobsonville, Ennerdale, Jabulani, Lenasia, Meadowlands, Newtown, and Sandton, including the Metro Centre, Museum Africa, Putco, the Roodepoort City Hall and Roodepoort Civic Centre.

In all of these initiatives, the CCI is providing technical assistance to Johannesburg in the areas of energy efficient procurement, information support on technology and products, and financial and cost analysis.

[1] Department of environmental planning and management: http://www.joburg.org.za/content/view/968/78/1/2/
[2] Johannesburg: http://www.joburg.org.za/content/view/2021/201/

Annex 1 Local government measures on climate change mitigation in Japan

Table 4-3(1) Local government measures on climate change mitigation (Industrial Sector) in Japan

Category	Measure	Local government role
Improvement of operation	Steadily implement and follow up voluntary action plans	- Raise awareness of measures. - Support to get certification of the Environment Management System. - Introduce program on voluntary action plans. - Support enterprises in introducing energy saving facilities and feasibility studies.
Installation of equipment, facilities, etc.	Promote introduction of high-performance industrial furnaces	- Support introduction. - Raise awareness of measures.
	Spread high-performance boilers	- Support introduction. - Raise awareness of measures.
	Spread fuel-efficient construction machinery in the construction field	- Use fuel-efficient construction machinery for public works. - Formulate measures to support the spread of fuel-efficient construction machinery.
	Energy efficient natural refrigerant refrigeration system	- Spread and raise awareness of measures.
Improvement of energy quality	Promote Area energy network	- Promote area energy network through urban planning systems. - Promote pioneering model projects. - Promote environmental improvement. - Provide assistance through low-interest loan systems and subsystems, etc.

Table 4-3(2) Local government measures on climate change mitigation (Commercial Sector) in Japan

Category	Measure	Local government role
Improvement of operation	Promote measures on buildings for tenants	- Publish best practices, provide help desks. - Support programs on small businesses.
	Spread Building Energy Management Systems (BEMS)	- Take initiatives in introducing BEMS. - Formulate measures to introduce BEMS.

Installation of equipment, facilities, etc.	Improve energy conservation capability of buildings	- Use guidance and advices, designation, disclosure and recommendation systems for clients, etc. based on the Energy Conservation Law. -Implement energy conservation measures for buildings owned by local governments. - Promote the development of green government buildings, promote green assessments and renovations. - Promote appropriate operation and management of existing government offices and facilities.
	Introduction and spread energy efficient equipments to enterprises	- Raise awareness of measures. - Take initiatives in introducing equipment. - Provide subsidy for initial investment.
Improvement of energy quality	Promote Area energy network	- Promote area energy network through urban planning systems. - Promote pioneering model projects. - Promote environmental improvement. - Provide assistance through low-interest loan systems and subsystems, etc.

Table 4-3(3) Local government measures on climate change mitigation (Residential Sector) in Japan

Category	Measure	Local government role
Improvement of operation	Spread Home Energy Management Systems (HEMS)	- Formulate measures to introduce HEMS.
	Change the behavior of consumer	- Raise awareness of measures. - Promote green consumer orientation.
Installation of equipment, facilities, etc.	CO_2 saving in houses	- Promote energy-conserving houses, materials, and facilities. - Provide information on energy-conserving houses.
	Improve efficiency of equipment that meets top-runner standards	- Provide information on energy conservation through energy conservation labels, etc. - Raise awareness of measures. - Provide information on “Stores cooperating in the promotion of energy conserving household appliances”.

	Promote replacement with energy conserving equipment	- Provide information on “Stores cooperating in the promotion of energy-conserving household appliances”. - Provide information on energy savings through Energy Efficiency Labeling Program, etc.

Table 4-3(4) Loocal government measures on climate change mitigation (Transportation Sector) in Japan

Category	Measure	Local government role
Improvement of operation	Promote use of public transportation	- Develop public transportation. - Improve services and convenience. - Raise awareness of measures. - Implement and support social experiments that promote public transportation use.
	Promote environmentally friendly use of automobiles	- Raise awareness of eco-driving and idle-stopping.
	Adjust the demand of automobile traffic	- Promote traffic demand management policies. - Develop an environment for bicycle use. - Implement and support social experiments that promote bicycle use.
	Realize Environmentally Sustainable Transportation (EST)	- Raise awareness of measures. - Develop transportation infrastructure that will reduce the environmental burden.
	Modal shift to railway freight	- Raise awareness of environmentally friendly railway freight transportation. - Raise awareness of measures.
	Improve efficiency of trucking	- Raise awareness of measures. - Reinforce bridges so they can carry larger vehicles.
Installation of equipment, facilities, etc.	Promote environmentally friendly use of automobiles	- Raise awareness of measures. - Introduce initiatives. - Formulate measures to support the purchase of automobiles with anti-idling function.
	Promote Intelligent Transportation Systems (ITS)	- Collect and provide traffic information. - Take initiative in introducing ITS. - Promote ETC and VICS, etc.

	Develop traffic safety facilities	- Install traffic signals. - Promote measures against bottlenecks by installing traffic signals at railroad crossings and guide traffic using traffic information boards.
	Improve fuel efficiency of automobiles according to top-runner standards	- Promote measures. - Introduce initiatives.
Improvement of energy quality	Spread and promote clean energy automobiles	- Provide subsidy for clean energy vehicles. - Take initiative in introducing clean energy vehicles. - Raise awareness of measures.

Table 4-3(5) Local government measures on climate change mitigation (Energy Sector) in Japan

Measure	Local government role
Build network of dispersed new energy sources	- Promote use of new energy sources. - Assist advanced businesses in regions.
Promote measures for new energy sources (expand use of biomass, photovoltaic power generation, etc.)	- Promote formulation, implementation, and evaluation of comprehensive plans to introduce new energy sources. - Introduce and promote through public facilities. - Assist introduction of new energy sources. - Raise awareness of measures. - Build system for production, collection, transportation, conversion, and use of regional biomass.
Promote introduction of co-generation and fuel cells, etc.	- Take initiative to introduce these energy sources. - Provide subsidy to introduce these energy sources.

Table 4-3(6) Local government measures on climate change mitigation (Non-energy CO_2 Sector) in Japan

Measure	Local government role
Expand use of blended cement	- Promote initiatives for introduction based on the Law on Promoting Green Purchasing.
Promote measures to reduce CO_2 emissions deriving from waste incineration	- Promote residents' voluntary activities to limit waste generation, reuse, recycling, and environmental education. - Promote initiatives for introduction based on the Law on Promoting Green Purchasing, etc.

Table 4-3(7) Local government measures on climate change mitigation (CH_4, N_2O) in Japan

Measure	Local government role
Reduce amount of final disposal of waste, etc.	- Promote residents' voluntary activities to limit waste generation, reuse, recycling, and environmental education.
Upgrade combustion in sewage sludge incineration facilities	- Upgrade combustion system of sewage sludge.
Upgrade combustion in general waste disposal facilities, etc.	- Upgrade combustion system in waste disposal.

Table 4-3(8) Local government measures on climate change mitigation (HFCs, PFCs, SF_6) in Japan

Measure	Local government role
Promote planned efforts made by industry	- Support efforts by businesses.
Promote development, etc. of substitute material and use of substitute products	- Promote procurement of substitute products. - Raise awareness of substitute products. - Promote initiatives for introduction.
Recover HFC packed as refrigerant in equipment in accordance with laws, etc.	- Appropriately implement and apply laws. - Raise awareness of measures.

Table 4-3(9) Local government measures on climate change mitigation (Forest sink) in Japan

Measure	Local government role
Develop sound forests	- Promote appropriate forest maintenance including necessary thinning, multilayering, and managing forests, as well as lengthening the period until trees can be cut. - Promote commissioning, etc. of operation and management to motivated personnel and promote development by public bodies. - Promote efforts to nurture and secure core forest and forestry personnel responsible for forest maintenance.
Appropriately manage and protect	- Promote natural vegetation protection and recovery measures in coordination with appropriate conservation management.

forest reserves, etc.	- Prevent damage from forest disease pests, etc. and measures to prevent forest fires. - Expand natural parks and natural environment conservation areas and strengthen conservation management in these areas.
Promote forest-building, etc. with the participation of the people	- Promote afforestation of a more wide-ranging group, such as having companies, etc. participate in afforestation. - Improve technology knowhow of forest volunteers, etc. and develop safety systems. - Promote forest environmental education. - Promote green worker programs that protect animals and plants, including those in forests, national parks, etc.
Use wood and woody biomass	- Promote use of regional materials for housing and public facilities. - Promote measures for consumers aimed at expanding actual demand for regional materials. - Develop a production, distribution, and processing system, coordinated from upstream to downstream, which can meet consumer needs - Promote use of low-quality material and woody biomass and energy and products

Source: Guidelines on formulating the “Regional plan on promoting global warming countermeasures” (Ministry of Environment, Japan)