

FY2013

Feasibility Studies of Large-scale Projects in line with the Joint Crediting
Mechanism (JCM) to Achieve Low Carbon Emissions in Asia

Report on

Ho Chi Minh City-Osaka City Cooperation Project
for Developing Low Carbon City

March 2014

Global Environment Centre Foundation

I . Summary

1. Overview of Ho Chi Minh City

1.1 Social and economic conditions

Ho Chi Minh City is the largest city of Vietnam, and occupies an important political position as a government-ruled municipality, similarly to the capital city, Hanoi.

Ho Chi Minh City has 19 urban districts and five suburban farming areas. As of 2010, the city has an area of 2,096 km² with a population of 7.4 million (source: Statistical Yearbook of Vietnam 2010).

Moreover, not only is Ho Chi Minh City the center of the Vietnamese economy, but it also is an important base of culture, education, science and technology, industry, services, maritime traffic; etc.

1.2 Administrative organizations and their roles

Since Ho Chi Minh City is a government-ruled municipality, it has the same political structure as that of a province. The City People's Council, consisting of 95 elected councilors; and the City People's Committee, consisting of 13 members chosen by the People's Council, are the most important local government organizations of the city. There is an administrative organization consisting of 17 departments and relevant organizations under the City People's Committee.

1.3 Implementation status of climate control

Since Ho Chi Minh City is located in a swale on the west bank of the Saigon River, the city is said to be the most susceptible to climate change. Particularly, the city's vulnerability to a rise in sea level caused by global warming has been pointed out. There are concerns over serious adverse effects to future economic and social activities, due to the increase in flood disasters triggered by typhoons or high tide water, and increase in health injuries caused by such disasters.

Against such a background, Ho Chi Minh City has been proceeding with measures against climate change. The Ho Chi Minh City Action Plan to Deal with Climate Change was developed in April 2013 with support from Rotterdam, the Netherlands.

The city emphasizes the action plan, and lists the following five goals aimed at improving the capability of the citizens and the city to deal with the effects of future climate change.

- To carry out qualitative and quantitative research in terms of the climate changes concerning all related fields, and also to carry out evaluation of such research.
- To construct a climate change database of the entire city and integrate and upgrade the database.
- To prepare a policy and a system concerning implementation, operation, and adjustment of the action plan.
- To develop human resources who will serve for urban management in order to deal with climate change, and to improve capability of the personnel in charge of the climate change
- To preferentially carry out projects which are prone to the effects of climate change or projects which are scientifically proven to be prone to the effect of the climate change.

At the current point in time, the plan has just been developed, and it remains to be seen how funds for the plan can be secured.

2. Construction of System for Promotion of a Low-Carbon City

2.1 System of Ho Chi Minh City for Promotion of a Low-Carbon City

The efforts for development of a low-carbon Ho Chi Minh City are promoted mainly by the Ho Chi Minh City Climate Change Steering Committee.

The committee consists of the entire departments of Ho Chi Minh City, and has an advisory group and Climate Change Bureau as the lower organizations of the committee. The Climate Change Bureau is set up within the Department of Natural Resources and Environment (DONRE).

2.2 System of Osaka City for Promotion of a Low-Carbon City

Osaka City set up the Osaka Low-Carbon City Development Support Headquarters, a cross-sectional organization, on July 11, 2013 in response to the beginning of technical cooperation by the public and private sectors for development of a low-carbon Ho Chi Minh City.

The Headquarters utilizes cutting-edge technologies possessed by private enterprises for the development of a low-carbon city. It also obtains the cooperation from the Osaka Provincial Government for the purpose of promoting the transfer of Osaka City's comprehensive knowhow of urban management/urban development. This is in order to resolve urban problems in the Asian region, and to activate the regional economy in Osaka.

2.3 System for implementation of the project

Thanks to support from the Global Environment Centre Foundation, the Ho Chi Minh City Climate Change Steering Committee and the Osaka Low-Carbon City Development Supporting Headquarters held joint conferences (two workshops, one international symposium).

Moreover, private corporates such as Nikken Sekkei Research Institute; Chuo Fukken Consultants Co., Ltd.; Shimizu Corporation; Nippon Express Group; Hitachi Zosen Corporation; K.K. Satisfactory International; Kobelco Eco-Solutions Co., Ltd.; and EX Research Institute Ltd. Environmental and Regional Planning, Research and Consulting carried out the feasibility investigation.

In addition, the Kansai International Center of the Japan International Cooperation Agency (JICA) and Kansai Economic Federation (Kankeiren) provided support for such activities.

3. Coordination between Cities

3.1 Background

Osaka City concluded a memorandum of understanding on cooperative relationships in major fields (economic relationship, environment and water control) with Ho Chi Minh City in July 2011. Receiving support from the Ministry of Environment, JICA, and other organizations, the Osaka City government, private enterprises, and research institutes have jointly dispatched technology investigation teams, held policy dialogues and workshops in Vietnam, conducted a feasibility survey for transfer of Japanese technologies, and accepted trainees.

3.2 Details of coordination between cities

This project aims at the following two goals through expansion and development of cooperation in waste, waterworks, sewerage, and urban railways sectors between the two cities into support of development of a low-carbon society, including energy-saving and traffic issues:

- ① To integrate the superior environmental technology of Osaka and its environmental administration, and to export them as a system so that large-scale JCM projects are uncovered or formed; and
- ② To establish an operation/maintenance and management system such as setting up a solidarity body which organizationally and systematically supports large-scale development of a JCM project between the two cities, or creation of a master plan of a low-carbon city.

Thus, we aim for carbon reduction in Ho Chi Minh City where environmental burdens have been increasing, and making Ho Chi Minh City a model for other mega cities of Asia with the same problems.

3.3 Results of discussions

(1) 1st field work (July 2013)

In time with the 1st workshop (kickoff meeting) held on July 12, we held discussions concerning the future coordination between Osaka City and Ho Chi Minh City, with the relevant departments of Ho Chi Minh City.

Table Schedule for Discussion with Ho Chi Minh City at the 1st Field Work

Date	Time	Location
Wed. July 10	9:00~10:00	Climate Change Bureau
	14:00~15:00	Dept. of Industry and Trade
Thur. July 11	10:00~11:00	Dept. of Natural Resources and Environment
	14:00~16:00	Dept. of Zoning and Architecture

(2) 2nd field work (August 2013)

To understand the problems and needs concerning the urban policies, traffic policies, and housing policies of Ho Chi Minh City and to discuss future coordination between the two cities, the 2nd field work was conducted in August.

Table Schedule for Discussion with Ho Chi Minh City at the 2nd Field Work

Date	Time	Location
Wed. August 28	10:00~11:30	Climate Change Bureau
Thur. August 29	8:30~9:30	Dept. of Transport
	10:00~11:30 14:00~15:00	Dept. of Construction
Fri. August 30	14:00~16:00	Dept. of Zoning and Architecture

(3) 3rd field work (September 2013)

To understand the problems and needs concerning environmental policies and urban policies of Ho Chi Minh City and to discuss future coordination between the two cities, we conducted the 3rd field work in September.

Table: Schedule for Discussion with Ho Chi Minh City at the 3rd Field Work

Date	Time	Location
Tue. October 1	9:00~12:00	Dept. of Science and Technology Energy Saving Center

(4) Invitation of delegation from Ho Chi Minh City (October 2013)

We invited a delegation from Ho Chi Minh City for an international symposium held in Osaka City. To this symposium, we performed discussion about the energy saving, city planning and traffic, waste and waste water treatment.

(5) Invitation of Vice-Mayor of Ho Chi Minh City (November 2013)

To the visit to Japan of the Vice Chairman of Ho Chi Minh City people's committee, we performed the discussion about waste disposal treatment or flood measures..

4. Feasibility Survey and Discussion on MRV Methodology

4.1 Studies on CO2 Reduction by Eco-driving and Cooperative Transportation & Delivery

(1) Study on CO2 Reduction by Implementation of Eco-driving

Eco-driving is to drive an automobile to minimize its fuel consumption. Using a digital tachograph allows improvement of driving technique, maintenance of the effect, and reduction of CO2 emissions as well. The effect of emission reduction can be estimated as about 2tCO2 per truck per year on the premise of the driving conditions of a typical truck (running distance: 200 km/day, operating days: 250 day/year, mileage: 4 km/L).

Additionally, fuel cost can also be saved. When studying the feasibility of business on the conditions of purchase price of a digital tachograph (1,000 USD/unit), running cost (300 USD/truck), light oil price (1 USD/L), annual amount of light oil saved (875 L/truck) and service period (10 years), the IRR for 10 years is 135.2%, and the payout time is 21 months, thus the cash flow will turn into a positive value after the second year. In light of the effect of fuel cost saving, the cost-effectiveness can be considered sufficient.

Meanwhile, under the current price levels in Vietnam, the price of an on-board unit of 1,000 USD cannot be considered low on any account. With the goal of popularization in the future, in addition to establish the finance scheme for these businesses, it is also necessary to establish and operate the certification system for the businesses that implement Eco-driving properly and to consider systematic incentives for the certified businesses.

(2) Study on CO2 Reduction by Cooperative Transportation & Delivery

Cooperative transportation and delivery is to carry out efficient physical distribution through in consolidation of goods that were transported separately, collective transportation of goods from multiple owners or destinations, establishment of cooperative bases, and other measures. Although there are many forms of cooperative transportation and delivery and their effects of emissions reduction differ, a model project is set here assuming a commercial facility such as a supermarket.

The conditions for the project are as follows; from each supplier, (1) there are deliveries by 30 (2t loading capacity) trucks per day, (2) one truck is loaded with goods (commercial products) of 1 ton, and in the project, (3) the goods from three suppliers are collected to one 4 t truck and then delivered, (4) there is no change in facilities other than the vehicles, and (5) there is no back cargo on.

This results of the CO2 reduction of 156.5 t per year. As for cost, the introduction of vehicles and modification of loading and unloading facilities might be required. The

costs for them are excluded from the study because they largely depend on individual cases. As for the effects, when assuming the amount of light oil use of 44,800 L per year and light oil price of 1 USD/L, a cost savings of 44,800 USD (4,480,000 yen with a dollar-yen rate of 100 yen/USD) can be achieved, and major cost reducing items include the vehicle cost due to reduced number of vehicles (depreciation cost), vehicle maintenance cost and labor cost for drivers.

Since both costs and effects depend on individual cases, it is important to advance the project while creating agreements between related parties on conceivable burden, allocation and role sharing.

4.2 Study on Building Energy Saving and Local Energy Supply Systems

(1) Energy Saving System in Buildings and GHG Emissions Reduction Effect

In Ho Chi Minh City, many of the buildings that were constructed in the late 1990s are due for equipment renewal. Targeting approximately 20,000 square meters of floor space in office buildings, annual energy consumption and carbon dioxide emissions were surveyed, applicable energy saving technologies were identified, and the effects of introducing them were estimated.

It was found that a greenhouse gas emissions reduction of approximately 35% can be anticipated by introducing technologies with a relatively large introduction effect, namely adsorption dehumidification air conditioning, heating of cool water, tusk and ambient lighting, and smart BEMS, etc. Since the baseline emissions are 4,716 t-CO₂/year, the reduction effect was calculated to be 1,650 t-CO₂/year.

Concerning the MRV methodology, a method that entails monitoring energy consumption following the introduction of energy saving, and calculating emission reductions upon adding corrections based on changes in system energy saving performance and building energy demand was examined.

(2) Energy Saving System in Local Areas and GHG Emissions Reduction Effect

As a local area energy saving system, assuming a city block with total floor area of 100,000 square meters, local energy management entailing onsite power generation + heat supply and utilization of heat from the temperature difference of river water were raised as promising technologies for introduction. It was calculated that through introducing such technologies, a greenhouse gas reduction effect of approximately 33% or 7,727t-CO₂/year could be achieved.

In systems such as this, it is important to fully examine the environmental impacts of using fuel in power generation systems and utilizing temperature differences of river water

and so on.

Japan has a particularly high temperature and high humidity climate among the advanced countries, and its technology in the field of dehumidifying air conditioning is superior. Since energy saving in buildings and local areas is largely based on combining minor technologies, it is important to build appropriate standards founded on public and private sector cooperation as in the case of Japan's energy saving law.

4.3 Improvement of Route Bus Service

(1) Proposed Project

1/ Overview of Proposed Project

The following approaches are proposed for promotion of route bus service.

Approach 1: Development of park & ride promotion model using parking space for a suburban large-sized commercial facility

Citizens or shoppers who got a certain amount of prepaid shopping cards for a suburban large-sized commercial facility can use its parking space as their own park & bus ride (P&BR) parking lot when commuting.

Approach 2: Development of public transport Eco-point model

Citizens who used public transport can be granted a specific Eco-point and get benefits such as discounts and special goods from a commercial facility by utilizing saved Eco-points.

2/ Future Needs for the Proposed Project

AEON Group opened No.1 Mall in Ho Chi Minh City in January 2014 and is about to set out No.2 Mall in October 2014. The People's Committee of Ho Chi Minh City approved the AEON Group's commercial plan comprising 23 large-sized shopping malls in total. These commercial facilities will form a definite field of the proposed project.

(2) GHG Emission Reduction Effects

Demands for conversion to P&BR were estimated by the use of a model for selection of traffic mode which was devised through the questionnaire survey about citizens' change in traffic mode. GHG emission reduction effects by application the proposed project to AEON No.1 Mall were projected at 306t-CO₂ per year according to the estimated P&BR demands. If this figure is uniformly applied to all the 23 approved malls, GHG emission reduction effects in the entire city amounts to 7,053t-CO₂ per year (=306t-CO₂/year x 23 Malls).

(3) MRV Methodology

1/ Requirements for qualification

Requirement i: Introduction of IC card system for bus fare accounting

Requirement ii: Location of a private commercial in the suburbs

Requirement iii: Service of a bus route for P&BR

Requirement iv: Mandatory application for P&BR addressed to users when getting prepaid shopping cards

Requirement v: Funding from businesses with regard to grant of Eco-points

Requirement vi: Developing a system automatically computing reduction of GHG emission

2/ MRV Organization

To compute GHG emission reduction, a third party organization collects and manages both data (living places, destinations, etc.) on commercial users which AEON and other businesses get and data on bus passengers (riding record on IC cards, etc.) which DOT of Ho Chi Minh City grasps. As it is expected that the number of commercial businesses and transport providers taking part in the proposed project increases year by year, the computing system will have to be cloud-computed sooner or later.

(4) Future Issues and Expectation


As the city of Ho Chi Minh has expressed cooperation in the proposed project, preparation and system development for the full-scale operation will have to be carried out together with verification and issue clarification through a test operation.



4.4 Facilitation of the environment for Electric Motorcycles and Community Cycle

(1) Project Summary

This project aims to reduce GHG emission by shifting from gasoline to electric motorcycles and refraining from using gasoline in Ho Chi Minh, one of the world's leading cities of motorcycle users. The project attempts to encourage the citizen to shift to electric motorcycles and improve the convenience through establishing charging stations for the motorcycles and lending stations for sharing electric motorcycles.

(2) Project and Survey Contents

Project Content	Promotion of electric motorcycles (through pre-introduction/demonstration experiment) Low-rate lease of electric motorcycles: approx. 10 motorcycles at 10 place of businesses Establishment of charging stations: approx. 10 places	
-----------------	--	---

	 Introduction of parking lot management system (implementing sharing business, planning parking management utilizing charging stations)	
Target Place of Businesses (candidates)	<ul style="list-style-type: none"> • Place of Businesses: public agencies, business offices for logistics, etc. • Industrial Complexes: AMATA, Long Hau, VSIP, Cat Lai, Ho Nai 3, etc. • Commercial Facilities: Vincom Center, Aeon, etc. • Universities: Vietnam National Univ., Ho Chi Minh City – University of Technology, Foreign Trade Univ., Univ. of Transport & Communications, etc. 	
Operation Content	<ul style="list-style-type: none"> • Use by concerned parties at place of businesses, industrial complexes, and universities • Implementing rental motorcycles (sharing service) at commercial facilities 	
Survey Content	<ul style="list-style-type: none"> • Monitoring: usage situation monitoring (GPS, etc.), questionnaire surveys and interviewing users • Verification of MRV methodology and environmental integrity 	

(3) Significance of this project

GHG reduction effect of 300 tCO₂/yr. could be achieved if 1,000 gasoline motorcycles shift to electric motorcycles. In the future, spillover effects of 165 thousand tCO₂/yr. could potentially be achieved if 10% of 5.5 million registered motorcycles in Ho Chi Minh City shift to electric motorcycles.

Japanese manufacturing technologies of high-performance, trouble-free electric motorcycles and charging equipment can fully be utilized, and operation know-how and business models for low-carbon mobility (such as electric motorcycle) as well as know-how for comprehensive transportation policies with the use of charging facilities could be introduced.

(4) Schedule

FY2014: pre-introduction and operation (demonstration experiment) at one place of business

FY2015–2016: official introduction and operation at 10 place of businesses and 10 parking areas

4.5 Introduction of the Waste-to-Energy (WtE) System – A summary

(1) A Summary of the project and its operations

This study aimed to understand the feasibility of electricity production by waste incineration based on the concerns for Ho Chi Minh City (HCMC)'s expected waste increase and reduction of treatment capacity. Generating electricity from the incineration of city

waste will reduce greenhouse gases. Currently, governing bodies do not have the capacity or a preferred purchasing method for renewable energy; henceforth Japanese companies have not been able to develop WtE operations in Vietnam. This year the barriers for Japanese companies entering the Vietnamese market were made clear from our experience with the implementation of the greenhouse gas reduction estimate scenario analysis alongside our operations evaluation by further understanding the tendencies of such regulation and legislation arrangements, and the financial scheme. Moreover, data was collected from a scenario analysis and operations evaluation of a local waste separation and collection survey.

(2) Effectiveness of Greenhouse gas emissions reductions

In order to study the effectiveness of greenhouse gas emissions reductions for the introduction of a WtE system in HCMC, two visits were made to District 1, Binh Thanh District from July 14–21, 2013 and December 17–26, 2013. During these visits, analyses of the waste separation and the composition of the separated waste were performed and data collected.

(3) MRV methodology

The current situation of HCMC's waste treatment was investigated to evaluate the suitability of introducing MRV methodology for a WtE system referenced against existing CDM methodologies.

By introduction of the system for WtE by incineration the following contribute to greenhouse gas emissions reductions: avoidance of methane gas produced at the final landfill site and co-operative energy produced from the incineration to replace fossil fuels. It is estimated that there will be a 7,195t reduction of greenhouse gas emissions per year.

(4) Environment and sufficiency

In order to determine methods of securing sufficiency for the environment, all possible environmental effects that may occur due to the introduction of a WtE system must be accounted for and listed.

In this project, dioxin gases released from the incineration process can be forecasted as an environmental burden, whereas positive results range from cleaner water environment for surroundings, deterring the production of greenhouse gases, and employing waste pickers to help those in poverty.

(5) Future Research

An obstacle to introducing the WtE system in HCMC would be the profitability of the operation.

4.6 Feasibility Study on Introduction of Low Carbon Technology for Industrial Waste Water Treatment

(1) Study Overview

Survey on the current situation of industrial waste water treatment in Ho Chi Minh City and analysis on the market needs and benefits for sludge treatment, anaerobic treatment and waste water recycling were conducted. Based on that, feasibility study on introduction of highly efficient water treatment equipment was implemented.

(2) Low Carbon Technologies

Viewpoints	Technology
Technology to reduce greenhouse gas emission associated with electricity and fuel consumption	- Anaerobic fluidized bed reactor - Fine bubble aerator
Technology to reduce greenhouse gas emission associated with clean and industrial water consumption	- Membrane activated sludge reactor - Ozonization reactor - Low pressurized RO filter
Technology to reduce greenhouse gas emission from sludge generated from organic waste water	- Anaerobic digester

(3) CO₂ Emission Reduction Effect through the Implementation of the Project

Carbon emission reduction effect when the above mentioned anaerobic digester is introduced in the brewer with 1,000t/d waste water generation was found to be 660t-CO₂/year.

(4) MRV Method

MRV method for the introduction of above mentioned anaerobic digester to treat organic sludge generated from waste water was studied.

(5) Future Needs for Introduction of Low Carbon Technology in Ho Chi Minh City (Possibility and Potential)

Although specific target industries are not identified, it is expected that industries generating organic rich waste water would proactively adopt these low carbon technologies in the aspect of energy recovery and reduction in the amount of sludge disposal. In particular, the demands for the above mentioned technologies have high potential to be introduced considering a number of business operators in the industrial complex currently under development.

With regards to the investment for waste water treatment in the private sector, it is necessary to develop sales strategy packaged with technology and finance scheme so that an economic incentive is prioritized. In other words, governmental policy to provide an economic incentive for environmental conservation is essential considering the current situation where investment in the environmental conservation is limited.

(6) Strategies to Expand Projects at a Large Scale

- i. Ensuring economic incentives for low carbon technology introduction
- ii. Effective implementation of environmental regulations
- iii. Development of a scheme packaging technology introduction and technology support

5. Symposium

5.1 1st Workshop (July 2013)

In order to share purposes and information of the studies, we held a kickoff workshop.

More than 80 people attended the workshop. The attendants included approximately 40 people from the Japanese side, including Mr. Kotaro Kawamata, General Manager of the International Cooperation Office, Global Environment Bureau, Ministry of Environment; Mr. Takano, Head of the Environmental Policy Division of the Environment Bureau of Osaka City; and Mr. Fumihiko Okiura, Deputy Chief Representative of the Viet Nam Office of JICA. Approximately 40 people from the Vietnamese side attended, including Mr. Minh Ha, Chief of the International Cooperation Division of the Ministry of Natural Resources and Environment; Mr. Toan, Chief of the Science and Technology, Environment, and International Cooperation Unit of the Directorate of Roads of Vietnam, the Ministry of Transport; Mr. Phuoc, Vice-Director of the Department of Natural Resources and Environment of Ho Chi Minh City; and people relevant to the Department of Trade and Industry and the Department of Zoning and Architecture.

Mr. Kawamata of the Ministry of Environment introduced a package-type support from the Government of Japan and other funding methods for realizing a leapfrog-type low-carbon society in an Asian city. Stating that planning based on scientific knowledge is important for reducing greenhouse gas (GHG), he introduced the fact that Japan has already begun supporting the creation of plans for reducing GHG utilizing AIM in various countries. He also stated that efforts for the development of a low-carbon society had already been reported in the ASEAN + 3 Environment Ministers' Meeting and the East Asia Low-Carbon Partnership. Moreover, he also stated that Japan would utilize the Joint Crediting Mechanism (JCM), which Japan signed on July 2, as one of the tools to support development of a low-carbon society. He added that national-level and city-level support will be provided not only for transfer of technology, but also for preparation of legal systems and capacity building.

Moreover, Osaka City/GEC and Ho Chi Minh City released reports on the current condition of projects for which feasibility surveys would be conducted this year. In addition, the Public Works Bureau of Osaka City gave explanations on the roles and implementation policies and activities of the Osaka Water & Environment Solutions Association (hereinafter referred to as OWESA), which was established to contribute to water and environmental issues through coordination between public and private sectors. For the explanation of the activities, the projects in the waterworks, sewage, and waste sectors that the OWESA and private companies are working on were introduced. Also, explanations were given on specific efforts made overseas. Furthermore, explanations were also given on the content of the "Project for improvement of urban drainage management technology in Ho Chi Minh City, Viet Nam," to be implemented in Ho Chi Minh City from this year. The "Hub for transmission of information" to deepen understanding of sewage; "Hub for technical development" in which public and private sectors coordinate together; and the "Satellite Hub" for introducing superior technology of the companies in Osaka and the Kansai region were introduced. An expectation was expressed for coordination in the waterworks and waste sectors to expand cutting-edge technology in a wide range of fields.

The Vietnamese side stated that Ho Chi Minh City had decided to establish an action plan on climate change by 2015, and that it anticipated support from both the Government of Japan and Osaka City for the

establishment of the plan and implementation of specific mitigation projects. Ho Chi Minh City particularly contributes to the development of Vietnam, which enjoys high economic growth, and green growth and low carbon are crucial for the future development of the city. They explained that an action plan on climate change has been established amid such circumstances, and missions have been proposed in six applicable fields: scientific research, urban planning, water resources, agriculture, public health, and national defense and security; and in two mitigation fields, energy and waste, respectively. Currently, projects are ongoing in the transportation, energy, waterworks, and sewage and waste sectors; and the Vietnamese side expressed their intention to link such projects to JCM so that the projects can develop into business.

In the latter half of the workshop, discussions were held in three working sessions on energy conservation, urban planning, and waste and sewage, to clarify problems and future policies of each sector.

Finally, the attendants confirmed that the two cities would carry out studies in a cooperative manner for the symposium to be held in October in Osaka.

5.2 International Symposium (October 2013)

Approximately 130 people, including Mr. Seigo Tanaka, Vice Mayor of Osaka City; Mr. Yamamoto, Chief of the Environment Bureau; Mr. Kotaro Kawamata, Chief of the International Cooperation Office, Global Environment Bureau, Ministry of Environment; and Mr. Motonori Tsuno, Chief Representative of JICA Kansai, as well as attendants from the industrial circle such as Kansai Economic Federation (Kankeiren) attended from the Osaka City side. On the other hand, approximately 20 including Mr. Le Hoang Quan, Chairman of the Ho Chi Minh City People's Committee (Mayor); Mr. Dao Anh Kiet, Director of the Department of Natural Resources and Environment; Mr. Phan Minh Tan, Director of the Department of Science and Technology; Mr. Tran Chi Dung, Director of the Department of Zoning and Architecture; and other concerned parties attended the symposium.

At the symposium, a presentation was made on Ho Chi Minh City's efforts for the development of a low-carbon society and their expectation regarding support from Japan. The explanation was given that the population of Ho Chi Minh City was rapidly increasing along with its economic growth, and various problems have spawned in the city as a result; such as a shortage of electricity and drinking water, an increase in traffic jams, and amount of waste landfill and air and water pollution. Ho Chi Minh City is said to be the most susceptible to climate change in the world, and it was revealed that the city would proactively support projects for the development of a low-carbon city. Moreover, the Ho Chi Minh City side expressed their expectation that Osaka City, based on the cooperation with the Global Environment Center Foundation (GEC), would consider implementation of the projects, including JCM; and introduced some examples of the projects. Finally, they stressed that they expected Osaka City to support the establishment of their action plan on climate change, which would be established in 2015.

From the Osaka City side, proposals for the development of a low-carbon society through the "All-Osaka" approach were made. Specific problems were introduced such as air pollution, water contamination, and waste that Osaka City experienced during the age of high economic growth, as well as how administration and private companies had cooperated and how the problems were improved. Based on the result of the field work that Osaka City conducted this fiscal year, the Osaka City side made proposals for the

low-carbonization of Ho Chi Minh City in the waste, urban area development, and energy sectors. In order to implement the proposals, it is important to introduce the environmental technology that companies in Osaka and the Kansai region have. Therefore, Osaka City stated that it would address the realization of the low-carbonization of Ho Chi Minh City with the united efforts of Osaka, including cooperation for the establishment of the action plan on climate change.

Moreover, GEC, which has been conducting research this year for the purpose of holistic support of environmental administration and environmental technology, and establishment of an operation and maintenance system through setting up of a liaison organization between the two cities in anticipation of utilization of JCM, gave an explanation about the research. GEC stated that it would make efforts to make adjustments, so that the two cities can share necessary information and to strengthen the basis of operation/maintenance and management system of Team Osaka, including finance, as headquarters of the research.

Following the presentations, the two cities agreed that Osaka City would provide cooperation and Ho Chi Minh City would establish the action plan on climate change by 2015.

The Ministry of Environment introduced support from the Government of Japan that enables leapfrog-type progress for developing countries. The ministry explained that in terms of support for introduction of low-carbon technology such as JCM to developing countries, much substantial research had been conducted, thanks to the support from the Ministry of Environment. Particularly, Ho Chi Minh City was regarded as an important city of the research for forming a large-scale JCM project. The ministry stated that for the next fiscal year and beyond, plans for financial support through cooperation with JICA and Asian Development Bank (ADB) for popularization of the low-carbon technology had been under consideration.

Six private companies made statements about Japanese technology for realizing the low-carbonization of Ho Chi Minh City, and expressed their intention to take an “All-Japan” approach for the development of a low-carbon society.

The contents agreed through the discussion of the symposium were summarized as the “Memorandum of Understanding on Developing Low-Carbon City Between Ho Chi Minh and Osaka,” and signed by Mr. Toru Hashimoto, mayor of Osaka; and Chairman Quan of Ho Chi Minh City on October 22.

5.3 2nd Workshop (February 2014)

The 2nd workshop to summarize the research conducted during this fiscal year was held. Approximately 50 concerned parties, including Mr. Kotaro Kawamata, Chief of the International Cooperation Office, Global Environment Bureau, Ministry of Environment; Mr. Minoda, General Manager of Facility Department, Environment Bureau of Osaka; and Mr. Sakai, Chief of Southern Vietnam Branch Office of JICA, attended the workshop. From the Vietnamese side, approximately 60 people, including Mr. Dao Anh Kiet, Director of the Department of Natural Resources and Environment; and persons from Ho Chi Minh City Energy Saving Center, Department of Trade and Industry, Department of Zoning and Architecture, and Department of Transport, as well as reporters, attended the workshop. As a result, more than 100 people attended the workshop, exceeding prior expectations.

Mr. Kawamata of the Ministry of Environment; Ms. Linh, Vice-Director of Ho Chi Minh City; and Mr. Sasaki of Osaka City respectively made presentations on Japan's support for development of low-carbon cities in developing countries (particularly in Asia) and specific efforts for such development, plans and problems of green growth and low-carbonization of Ho Chi Minh City, and an overview of support for development of a low-carbon city in the future Ho Chi Minh City with flood countermeasures at its core.

Subsequently, organizations which conducted the research released reports on their respective feasibility studies concerning JCM, and active discussions were held, including an exchange of opinions, for the expansion and improvement of the project and suggestion of ideas. Moreover, through the workshop, it was once again confirmed that the two cities would cooperate in the future for the establishment of the Ho Chi Minh action plan on climate change.

6. PR Activities

6.1 Website

A website was opened for disclosure of information concerning the surveys ([URL] <http://osaka-hcm-lcc.net/>).

6.2 Seminar for private companies (September 2013)

This seminar was held to introduce the purposes and activities of the “Ho Chi Minh City-Osaka City Cooperation Project for Developing Low Carbon City,” so that private companies would newly participate in the business for development of a low-carbon society.

Approximately 40 people from private and other companies attended the seminar. Explanations were given and opinions were exchanged on support from Osaka City and efforts by the Government of Japan for realizing a low-carbon society, as well as on the business assistance system of the Ministry of Environment utilizing the Joint Crediting Mechanism (JCM).

6.3 Side event at COP 19 (November 2013)

A side event was held on the eighth day (Monday, November 18) of the 19th Conference of the Parties (COP 19) of the United Nations Framework Convention on Climate Change (UNFCCC) held in Warsaw, Poland (from November 11 to 23, 2013) at the Japan Pavilion, with the cooperation from the Ministry of Environment, the Ministry of Natural Resources and Environment of Vietnam, and the Kansai Economic Federation.

Approximately 25 people attended the side event. GEC gave a brief explanation on the Joint Crediting Mechanism (JCM), and the Ministry of Environment introduced the “Ho Chi Minh City-Osaka City Cooperation Project for Developing a Low-Carbon City,” which had been adopted as one subject of the “FY 2013 Feasibility Survey on the Formation of a Large-Scale JCM Project for Realizing a Low-Carbon Society in Asia”, a survey by the Ministry of Environment. Three organizations in different positions made presentations, which were GEC, the Government of Vietnam, and the Kansai Economic Federation. Each of them mentioned the city-level efforts on NAMA, the results from the coordination of public and private sections and that of cities, from their respective perspectives. Explanations and discussions focusing on the importance and innovativeness of the project were conducted.

II. Main Text of the Report

— Table of contents —

1. Overview of Ho Chi Minh City	II -1
1.1 Social and economic conditions	II -1
1.2 Administrative organizations and their roles	II -1
1.3 Implementation status of climate control	II -2
2. Construction of System for Promotion of a Low-Carbon City	II -3
2.1 System of Ho Chi Minh City for Promotion of a Low-Carbon City	II -3
2.2 System of Osaka City for Promotion of a Low-Carbon City	II -3
2.3 System for implementation of the project	II -4
3. Coordination between Cities	II -6
3.1 Background	II -6
3.2 Details of coordination between cities	II -7
3.3 Results of discussions	II -8
4. Feasibility Survey and Discussion on MRV Methodology	II -17
4.1 Studies on CO ₂ Reduction by Eco-driving and Cooperative Transportation & Delivery	II -17
4.2 Study on Building Energy Saving and Local Energy Supply Systems	II -18
4.3 Improvement of Route Bus Service	II -19
4.4 Facilitation of the environment for Electric Motorcycles and Community Cycle	II -20
4.5 Introduction of the Waste-to-Energy (WtE) System	II -21
4.6 Feasibility Study on Introduction of Low Carbon Technology for Industrial Waste Water Treatment	II -23
5. Symposium	II -25
5.1 1 st Workshop (July 2013)	II -25
5.2 International Symposium (October 2013)	II -26
5.3 2 nd Workshop (February 2014)	II -27
6. PR Activities	II -29
6.1 Website	II -29
6.2 Seminar for private companies (September 2013)	II -29
6.3 Side event at COP 19 (November 2013)	II -29

1. Overview of Ho Chi Minh City

1.1 Social and economic conditions

Ho Chi Minh City is the largest city of Vietnam, and occupies an important political position as a government-ruled municipality, similarly to the capital city, Hanoi.

Ho Chi Minh City has 19 urban districts and five suburban farming areas. As of 2010, the city has an area of 2,096 km² with a population of 7.4 million (source: Statistical Yearbook of Vietnam 2010).

Moreover, not only is Ho Chi Minh City the center of the Vietnamese economy, but it also is an important base of culture, education, science and technology, industry, services, maritime traffic; etc.

1.2 Administrative organizations and their roles

Since Ho Chi Minh City is a government-ruled municipality, it has the same political structure as that of a province. The City People's Council, consisting of 95 elected councilors; and the City People's Committee, consisting of 13 members chosen by the People's Council, are the most important local government organizations of the city. There is an administrative organization consisting of 17 departments and relevant organizations under the City People's Committee.

The names and roles of each department are as follows:

1. Department of Interior: In charge of internal administration, such as administration by lower (county level) administrative organizations.

2. Department of Justice: In charge of drawing up bills, confirmation of documents concerning breaches of law, and education and promulgation of laws.

3. Department of Planning and Investment: Planning projects, realizing and recommending economic/social development plans and policies concerning systems and management of the economy and society, and planning and administrative management of investment by the city inside and outside of the country.

4. Department of Finance: In charge of budget, taxes, other various fees, funds for development investment, commissions, supplemental budget, debts, management of public assets, etc.

5. Department of Industry and Trade: In charge of commercial and industrial policies and trade with foreign countries.

6. Department of Transport: In charge of traffic (roads and domestic channels) and urban infrastructure (clean water, sewage, parks, lighting, and parking).

7. Department of Agriculture and Rural Development: In charge of agriculture, forestry, salt industry, water resources, fishery, and development of rural areas. Also in charge of prevention and response to damages from flood and typhoon disasters.

8. Department of Construction: In charge of approval of construction, issuance of public bidding permits, quality management of buildings, real estate management, management of housing and public buildings, judgment of projects, authentication of compliance with standards, etc.

9. Department of Natural Resources and Environment: In charge of the field of resources and environment, as well as maritime and remote island issues.

10. Department of Information and Communication: In charge of mass media, publication, postal

services, parcel delivery, communication and the Internet, broadcasting, management of radio frequencies, etc.

11. Department of Zoning and Architecture: In charge of urban design and guiding construction of architecture according to the entire city plan authorized by the central government.

12. Department of Labor, Invalids and Social Affairs: In charge of working environments, social insurance, wages, management of children's health, etc.

13. Department of Culture, Sports and Tourism: In charge of culture, sports, and tourism.

14. Department of Science and Technology: In charge of science and technology, quality standards, intellectual properties, and measures against radioactivity.

15. Department of Education and Training: In charge of school education, lifelong education, etc.

16. Department of Health: In charge of operations concerning medical care and health of citizens.

17. Department of Foreign Affairs: In charge of diplomacy concerning Ho Chi Minh City.

1.3 Implementation status of climate control

Since Ho Chi Minh City is located in a swale on the west bank of the Saigon River, the city is said to be the most susceptible to climate change. Particularly, the city's vulnerability to a rise in sea level caused by global warming has been pointed out. There are concerns over serious adverse effects to future economic and social activities, due to the increase in flood disasters triggered by typhoons or high tide water, and increase in health injuries caused by such disasters.

Against such a background, Ho Chi Minh City has been proceeding with measures against climate change. The Ho Chi Minh City Action Plan to Deal with Climate Change was developed in April 2013 with support from Rotterdam, the Netherlands.

The city emphasizes the action plan, and lists the following five goals aimed at improving the capability of the citizens and the city to deal with the effects of future climate change.

- To carry out qualitative and quantitative research in terms of the climate changes concerning all related fields, and also to carry out evaluation of such research.
- To construct a climate change database of the entire city and integrate and upgrade the database.
- To prepare a policy and a system concerning implementation, operation, and adjustment of the action plan.
- To develop human resources who will serve for urban management in order to deal with climate change, and to improve capability of the personnel in charge of the climate change
- To preferentially carry out projects which are prone to the effects of climate change or projects which are scientifically proven to be prone to the effect of the climate change.

At the current point in time, the plan has just been developed, and it remains to be seen how funds for the plan can be secured.

2. Construction of System for Promotion of a Low-Carbon City

2.1 System of Ho Chi Minh City for Promotion of a Low-Carbon City

The efforts for development of a low-carbon Ho Chi Minh City are promoted mainly by the Ho Chi Minh City Climate Change Steering Committee.

The committee consists of the entire departments of Ho Chi Minh City, and has an advisory group and Climate Change Bureau as the lower organizations of the committee. The Climate Change Bureau is set up within the Department of Natural Resources and Environment (DONRE).

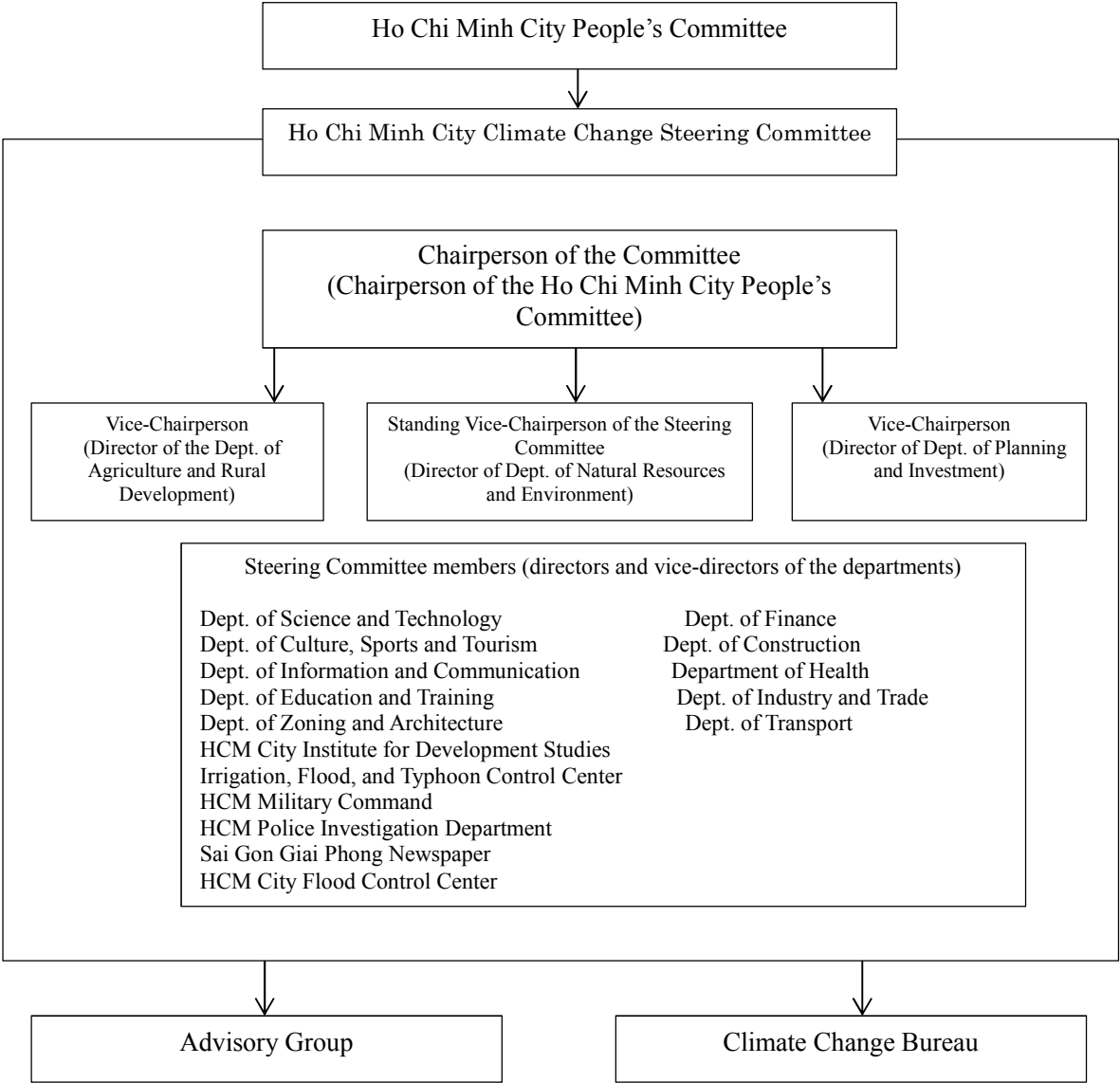


Table: System for promotion of a low-carbon society in Ho Chi Minh City

2.2 System of Osaka City for Promotion of a Low-Carbon City

Osaka City set up the Osaka Low-Carbon City Development Support Headquarters, a cross-sectional organization, on July 11, 2013 in response to the beginning of technical cooperation by the public and private sectors for development of a low-carbon Ho Chi Minh City.

The Headquarters utilizes cutting-edge technologies possessed by private enterprises for the development

of a low-carbon city. It also obtains the cooperation from the Osaka Provincial Government for the purpose of promoting the transfer of Osaka City’s comprehensive knowhow of urban management/urban development. This is in order to resolve urban problems in the Asian region, and to activate the regional economy in Osaka.

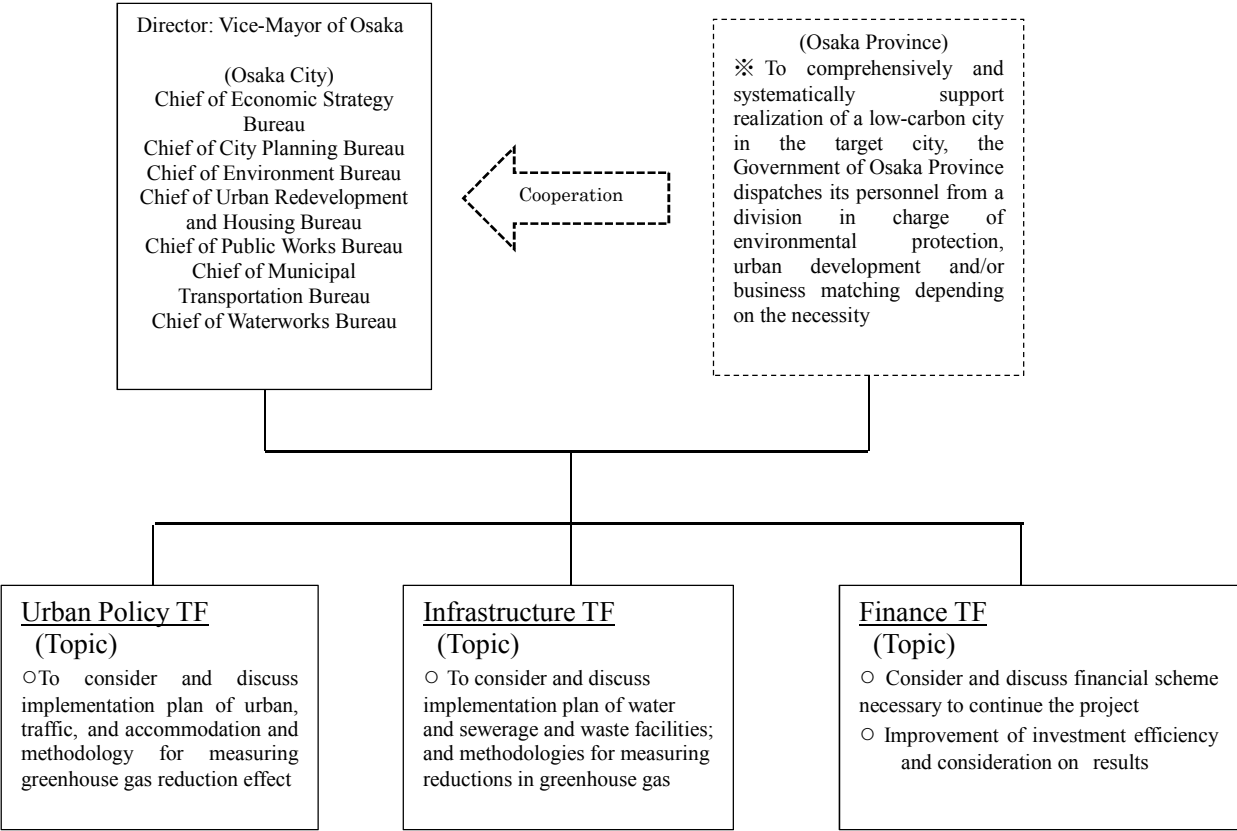


Table: System of Osaka City for promotion of low-carbon society

2.3 System for implementation of the project

Thanks to support from the Global Environment Centre Foundation, the Ho Chi Minh City Climate Change Steering Committee and the Osaka Low-Carbon City Development Supporting Headquarters held joint conferences (two workshops, one international symposium).

Moreover, private corporates such as Nikken Sekkei Research Institute; Chuo Fukken Consultants Co., Ltd.; Shimizu Corporation; Nippon Express Group; Hitachi Zosen Corporation; K.K. Satisfactory International; Kobelco Eco-Solutions Co., Ltd.; and EX Research Institute Ltd. Environmental and Regional Planning, Research and Consulting carried out the feasibility investigation.

In addition, the Kansai International Center of the Japan International Cooperation Agency (JICA) and Kansai Economic Federation (Kankeiren) provided support for such activities.

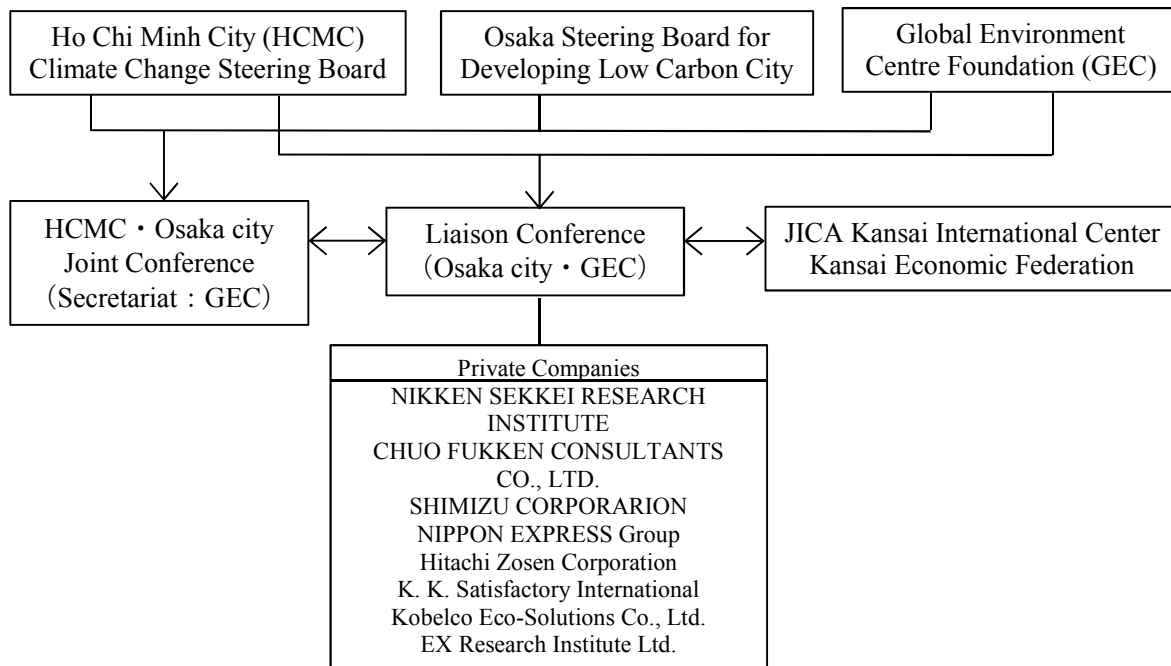


Table: Operation of the project

3. Coordination between Cities

3.1 Background

Osaka City concluded a memorandum of understanding on cooperative relationships in major fields (economic relationship, environment and water control) with Ho Chi Minh City in July 2011. Receiving support from the Ministry of Environment, JICA, and other organizations, the Osaka City government, private enterprises, and research institutes have jointly dispatched technology investigation teams, held policy dialogues and workshops in Vietnam, conducted a feasibility survey for transfer of Japanese technologies, and accepted trainees.

The following are examples of specific efforts made in the past:

In the waste sector, a waste management seminar was held in Ho Chi Minh City in February 2012. At this seminar, the conditions of waste management were explained by the Ho Chi Minh City side. Then, the Osaka City side gave an explanation on the history and current condition of waste management, and introduced private enterprises' waste disposal-related technologies.

The City of Osaka has implemented the "integrated solid waste-to-energy" project of the Ministry of Environment through coordination between public and private sectors since 2012. This project is aimed at carrying out a feasibility survey of integrated waste management such as recycling valuable resources by separation, composting organic waste, and energy recovery through combustion power generation of municipal solid waste.

Moreover, as a business commissioned by the Ministry of Environment, Osaka City implemented the "Vietnam 3Rs/waste management support and cooperation project" through coordination between public and private sectors. This project aimed to support policymaking concerning the 3Rs (reduce, reuse and recycle)/waste management in Vietnam, and at the same time chose Ho Chi Minh City as a model city and gave support in creation of an action plan for Ho Chi Minh City concerning waste management.

In terms of human resource development, an overseas training course for Vietnamese was held in Japan in January 2013. In the training course, the trainees were given a brief explanation on waste management in Japan and Osaka City, exchanged opinions, and visited the facilities of private enterprises, where they exchanged opinions.

Concerning the waterworks sector, a memorandum concerning technical exchanges was concluded between the Osaka City Waterworks Bureau and the Saigon Water Corporation in December 2009, and technical cooperation for the improvement of waterworks in Ho Chi Minh City proceeded along. At the same time, Osaka City also implemented the "Water Saving and Environmentally-friendly Water Recycling Project" with the New Energy and Industrial Technology Development Organization in fiscal years 2009 and 2010; the "Survey concerning Sustainable Cooperative Water Supply Project between Public and Private Sectors in ASEAN Countries" in 2011 with the Ministry of Economy, Trade and Industry; and the "Study on Water Supply Improvement in Ho Chi Minh City" with JICA between 2012 and 2013, through coordination between public and private sectors to develop the projects into business.

In the sewerage sector, Osaka City conducted a basic research concerning measures against water immersion in the urban area of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) in 2011 by a public and private sectors' joint team, together with a private enterprise in the Kansai area. In this

research, the team confirmed the necessity of supplementary measures against water immersion taking climate changes into consideration; and also confirmed the necessity to review the master plan, which was established more than 10 years ago.

Moreover, in fiscal 2012, a public and private sector joint team of Osaka City and the Urban Infrastructure Technology Center Foundation cooperated in continued research by the MLIT, set a model area concerning responses to future effects of the climate changes confirmed in the previous fiscal year, and also studied the possibility of introducing a method for coordination between public and private sectors.

In the meantime, in terms of support of human resource development, Osaka City implemented the “Instruction course for sewerage management in Vietnam” in 2011 and 2012 as part of a JICA instruction course. In addition, in order to improve management and asset management capabilities, the “Ho Chi Minh City Sewerage Management Capability Development Project (Phase 2: between 2011 and 2014)” was implemented by JICA. For this project, Osaka City dispatched two experts from August 2011 over a long period of time, and at the same time dispatched experts of management of ledgers and water quality analysis for a short period, depending on the necessity. Furthermore, Osaka City accepted 12 trainees for the “Ho Chi Minh City Sewerage Management Capability Development Project Phase 2: CP Instruction” in fiscal 2012.

From fiscal 2012, Osaka City has focused on maintenance and management of sewer culverts, and will begin a project through grass-roots (community-oriented) technical cooperation for carrying out working-level technical cooperation/exchanges.

In the urban railways sector, Osaka City has dispatched its personnel from fiscal 2008 to Ho Chi Minh City to provide cooperation for the Urban Railway Construction Project (Line 1).

3.2 Details of coordination between cities

This project aims at the following two goals through expansion and development of cooperation in waste, waterworks, sewerage, and urban railways sectors between the two cities into support of development of a low-carbon society, including energy-saving and traffic issues:

- ① To integrate the superior environmental technology of Osaka and its environmental administration, and to export them as a system so that large-scale JCM projects are uncovered or formed; and
- ② To establish an operation/maintenance and management system such as setting up a solidarity body which organizationally and systematically supports large-scale development of a JCM project between the two cities, or creation of a master plan of a low-carbon city.

Thus, we aim for carbon reduction in Ho Chi Minh City where environmental burdens have been increasing, and making Ho Chi Minh City a model for other mega cities of Asia with the same problems.

Based on past discussion between the two cities and basic field studies (fiscal 2012 and 2013, “Study on Feasibility Survey of Overseas Development of Japanese Venous Industry” and “Study on Water Supply Improvement in Ho Chi Minh City”), we aim at uncovering and developing large-scale JCM projects in fiscal year 2014 and beyond, and establishing an operation/maintenance and management system to support such projects.

This year’s study was conducted mainly to figure out the problems and needs of Ho Chi Minh City, and

to “formulate a project” and “consider planning and systems.” Details of the result of the study will be described in “3.3. Results of discussions.”

3.3 Results of discussions

(1) 1st field work (July 2013)

In time with the 1st workshop (kickoff meeting) held on July 12, we held discussions concerning the future coordination between Osaka City and Ho Chi Minh City, with the relevant departments of Ho Chi Minh City.

Table Schedule for Discussion with Ho Chi Minh City at the 1st Field Work

Date	Time	Location
Wed. July 10	9:00~10:00	Climate Change Bureau
	14:00~15:00	Dept. of Industry and Trade
Thur. July 11	10:00~11:00	Dept. of Natural Resources and Environment
	14:00~16:00	Dept. of Zoning and Architecture

Details of the discussions are as follows:

① Discussion with Climate Change Bureau

Projects that Ho Chi Minh City is currently focusing on are the development of an environmentally-friendly industrial park and flood-disaster related projects. Moreover, it is not only technology and funds of the project that should be taken into consideration, but also the national-level legal procedures concerning the issues necessary for the projects.

Ho Chi Minh City lacks the knowhow of separating urban waste and methods to popularize such separation to its citizens. Furthermore, in order to discuss setting regulations or conditions toward citizens concerning climate changes, it is important to understand the actual usage of energy in Ho Chi Minh City.

② Discussion with Department of Industry and Trade

No specific policy has been set concerning Ho Chi Minh City’s energy policy at present. Moreover, the central government decides power supply plans. Demand for electricity in the City of Ho Chi Minh is 2,600 MW, mainly generated by hydraulic power.

The Department of Industry and Trade operates the Energy Conservation Center of Ho Chi Minh City (ECC). The center is in charge of energy transmission in Ho Chi Minh City and solving problems such as blackouts.

Electricity policies are planned by the central government, and implemented by local administrative organizations. The specific goal of Ho Chi Minh City is to reduce power consumption by 6.7% to 5.3%.

The action plans in the energy field are described in “2010 – 2015 Resolution Statement on Green

Energy Policies and Measures.” Although the policies and measures are implemented in cooperation with other departments and bureaus, the Department of Industry and Trade is the center of implementation.

③ Discussion with Department of Natural Resources and Environment

CO, NO₂, dust, and noise are measured by monitoring the air in Ho Chi Minh City. Thanks to support from Denmark and Norway, an automatic monitoring system was introduced, though many of its components are broken now.

Environmental standards are set by the government (MONRE). At present, noise exceeds these standards; and depending on the location, both CO and dust also exceed standards.

Water quality of the Saigon River and the Dong Nai River is monitored, and the water quality in canals and water in the vicinity of the ocean is measured.

Water quality is measured according to government (MONRE) standards.

Pollution of the air is not visible unless it is measured, but because pollution of water is visible, citizens often complain about it. In an area with many cars, there are less houses and therefore less complaints concerning air pollution.

They have received support from JICA for effluent treatment since 2002, and have marshalled data.

Currently, a large amount of living drainage directly flows into the rivers, but BOD is low in the areas where effluent treatment facilities are provided.

Although laws regulate that medium and small plants should have a water treatment facility, Ho Chi Minh City cannot manage small-scale plants. When plants discharging 50m³/day or more of drainage were inspected, 397 out of 439 carried out effluent treatment and cleared the standards. Their goal by 2015 is to have 80% or more companies clearing the standards.

Although fines are charged when environmental law are violated, they are small fines and therefore future revision is required.

④ Discussion with Department of Zoning and Architecture

Although they recognize that urban greening, energy conservation, and utilization of renewable energy will be important in the future, Ho Chi Minh City only recognizes the existence of the issue and does not actually evaluate them. There is no regulation concerning reduction of CO₂ emissions and the city has not carried out a quantitative evaluation of how much it can be reduced.

Ho Chi Minh City feels that low-carbon technology costs too much. Due to a lack of prior experience, they cannot judge which technology is good or bad.

Urban Railway Line 1 is under construction and is scheduled to start operation in a decade. However, concerning Urban Railway Line 2, although there is a plan for construction, it is not yet known when it will be completed. The Department of Zoning and Architecture set up a railway plan, but its operation is managed by the Department of Transport.

(2) 2nd field work (August 2013)

To understand the problems and needs concerning the urban policies, traffic policies, and housing policies of Ho Chi Minh City and to discuss future coordination between the two cities, the 2nd field work was conducted in August.

Table Schedule for Discussion with Ho Chi Minh City at the 2nd Field Work

Date	Time	Location
Wed. August 28	10:00~11:30	Climate Change Bureau
Thur. August 29	8:30~9:30	Dept. of Transport
	10:00~11:30	Dept. of Construction
	14:00~15:00	
Fri. August 30	14:00~16:00	Dept. of Zoning and Architecture

① Discussion with Climate Change Bureau

Ho Chi Minh City chose an advisory group in charge of the working-level discussion concerning climate change. Young personnel with expertise and who are fluent in English were chosen as the advisors.

When conducting an interview with another department or bureau of Ho Chi Minh City, it is effective and efficient to discuss with advisors of each department or bureau through the Climate Change Bureau as a window.

Personnel of the Climate Change Bureau had just taken a course of measurement, reporting, and verification (MRV) sponsored by the Institute for Global Environmental Strategies (IGES). However, because of lack of useful data in Ho Chi Minh City, they recognize that it is not easy to figure out the amount of greenhouse gas in the city.

② Discussion with the Department of Transport

The Department of Transport mainly carries out management of passengers and cargo.

There are 150 bus lines. Among them, 109 lines receive aid from the central government while the other 41 lines are managed by Ho Chi Minh City without aid. They have 3,000 buses [including small buses (12-seater) and large (80-seater) buses] and transport 1.3 million people a day.

There are 16 taxi companies by which 11,000 vehicles are registered. They transport 500,000 people a day.

They occupy 10% of the entire people's transport in the city (18 million a day). The department wants to increase the ratio to between 20 and 25% by 2020. Moreover, the department is planning to increase the ratio to between 30 and 40% by 2030. For this purpose, the department plans to expand the bus network first.

In terms of the railways, they plan to construct seven-line urban rapid transit railways, two lines of monorail, and two lines of light rail transit (LRT) (for more details, refer to No. 568 Decision: Vietnamese website).

The No. 568 Decision describes not only railways, buses, and taxis, but the entire transportation network including channels, bus terminals, bridges, and roads.

They have recently introduced 50 compressed natural gas buses (CNG bus) and are scheduled to introduce 300 more by 2015.

For the preparation of the urban railway, they will consider coordination between buses or taxis and railway terminals.

They have tried to force a shift from motorbikes to public transportation system in the past, only to fail (one motorbike/one person, two motorbikes/one family).

As a method to regulate usage of motorbikes, increases in gasoline tax and charges on introduction of the motorbikes into urban central areas are conceivable.

They are also considering introducing a bus lane, aiming at a shift from motorbikes to buses.

The Korean International Cooperation Agency (KOICA) carried out research on the introduction of eight bus lanes. Moreover, KOICA chose one lane and carried out a standard design in the second phase. It costs 2 million USD and is a 14 km-long road. Although the road has not been authorized yet, KOICA plans to make this a clean development mechanism (CDM) project.

Introduction of a bus lane has been discussed for the Saigon East-West Highway. Funds from the World Bank are scheduled to be utilized. The project cost is 152 million USD.

In terms of roads, highways and national roads are preferentially prepared. Moreover, they are scheduled to prepare five grade separations.

Concerning the relocation of Tan Son Nhat International Airport, some posit that expansion of the existing airport would be better, and opposition against construction of a new airport has rapidly increased in the past few weeks.

Concerning urban railways, Lines 1, 2, and 5 will be constructed respectively with official development assistance (ODA) from Japan, investment from German Credit Bank, and ODA from Spain. For Lines 3, 4, 6, and 7, they still demand investment. Construction of Line 2 will soon launch. Moreover, though construction of Line 1 has started, construction has been behind schedule and completion of construction has been delayed to 10 years later. Concerning other projects, there is no progress at all. It is also uncertain whether they can receive ODA from Spain.

For the construction of the roads, they consider public-private partnership (PPP) for Beltway 2. The Beltway 2 runs on the outer periphery of the town, so that trucks would not come into the center of the town. Construction of a 5-km stretch of the beltway has not been done and they demand new investors for the construction.

Although they understand the distance covered by buses and number of passengers the buses transport, they do not know the distance covered by taxis or motorbikes. They know the number of passengers taxis transport.

Motorbikes registered in other provinces are brought into Ho Chi Minh City, and the number of motorbikes running in Ho Chi Minh City exceeds the number of motorbikes registered in the city.

To succeed in each project, international support is crucial.

They will prepare data in cooperation with relevant organizations.

③ Discussion with the Department of Construction

Eight million people are registered as residents of Ho Chi Minh City. Adding temporary residents such as migrant workers who have not been registered as residents of the city, city population reaches 10 million.

There are three types of housing: public housing, commercial housing, and residences for public servants. Preparation of public housing is a highly urgent task. Public housing is also classified into three types: for students, for workers, and for low-income households.

There were few apartments by 1975 and most people lived in single family houses. Population of the city then was 2.5 million, which now has increased threefold.

Nowadays, the high-income class purchases expensive commercial housing and low-income class purchases less expensive housing. Public servants can live in a dormitory or an official residence at a reasonable rent. In any case, when they grow up and get married, they generally live independently from their parents.

They recognize the importance of the urban plan and urban development, and they need funding and high quality plans for them. It is important to prepare housing and urban infrastructure in a well-balanced manner.

The central government also emphasizes the housing issue, and has a national strategy program concerning preparation of housing.

Ho Chi Minh City also has the “Housing Development Plan”, which is a vision by 2030 (including some targets by 2020) as part of the nation’s strategic housing development plan. They set numerical targets, such as how many houses with an area of XXm² will be built by which year.

The bulk of the recent real-estate market is mainly commercial housing (houses built for sale). If the development of the commercial housing and preparation of infrastructure progresses well, they will lead to good urban development.

In order to realize good development, it is necessary to coordinate with investors who have financial resources, and such investors should be a company which can collect funds from foreign capital.

In the wake of the global economic recession in 2008, the real-estate market of Ho Chi Minh City declined, and as a result commercial housing is in oversupply with 12,000 commercial housing units remaining unsold.

On the other hand, public housing is in short supply. As a measure to solve this issue, they divide up an unsold apartment room (approximately 120m²) into thirds and sell them cheaply.

Although the Department of Transport manages transportation network infrastructure, the department does not make an investment. The investors are public companies under the Department of Transport (one similar to the third sector in Japan).

Concerning the road expansion plan, 24 proposals were made on the basis of the development plan between 2010 and 2030. Construction of the Ho Chi Minh transportation network system is one such proposal.

It plans to expand main roads, instead of expanding roads in the existing urban areas.

The districts to be newly developed are Thu Duc, Second District (Thu Thiem), and Ninth District (Suoi Tien) in the east, Twelfth District and Hoc Mon in the north, South Saigon, Seventh District and Eighth District in the south, and Bin Chanh District in the west.

As a new trend, Ho Chi Minh City government intends to be independent from the nation to become a metropolitan government. As the word “autonomous” might be regarded as an expression leading to rebellion against the central government in a socialist country, it is considered more appropriate to call it a metropolitan government. Ho Chi Minh City is currently a local administrative organization, and is not a local government. They need to solve the issue of personnel matters and infrastructure preparation, and therefore will start the transition as a model project from 2015.

The Department of Zoning and Architecture is in charge of preservation of the streetscape and drawing up of development plans. The Department of Transport is in charge of drawing up of road, subway, waterworks, and sewerage plans. The main tasks of the Department of Construction are actually realizing such plans, construction management, and housing development. Because their duties cannot be completed by the department alone, they often hold joint meetings for coordination between departments.

Development of Thu Duc, Second District, and Ninth District has advanced the most, and broad roads have already been constructed.

In terms of the environment, attention to energy has been paid to a certain degree for a large-scale structure. Individual residences is the sector requiring the most environmental consciousness, but currently no measures have been taken.

They created a guidebook for individual residences, based on the environmental technology learned from Germany.

For consideration of the energy conservation issue, it is important how they will deal with existing facilities.

In terms of greening, since structures are sterically-constructed, greening must be developed three-dimensionally.

Due to cheap energy prices, it seems that people are not highly conscious about energy conservation in Ho Chi Minh City. On the other hand, energy prices in Japan are relatively higher than in Vietnam, and therefore energy conservation has been promoted. Therefore, it is conceivable that if energy prices rise in Ho Chi Minh, City, citizens will be more interested in energy conservation.

④ Discussion with the Department of Zoning and Architecture

They held a symposium concerning urban planning that deals with climate change, in which experts from the EU also participated.

With cooperation from Cottbus University in Germany, they created a guideline concerning climate change as part of the Megacity Project (released on the website). The Megacity Project is not a specific urban development plan, but a project for studies on investment. It aims at studying an

energy-saving grid and energy-conservation method which can be introduced when considering the development of a new town.

As an example of its application in the development of a town, they planted trees in cooperation with a Japanese company.

(3) 3rd field work (September 2013)

To understand the problems and needs concerning environmental policies and urban policies of Ho Chi Minh City and to discuss future coordination between the two cities, we conducted the 3rd field work in September.

Table: Schedule for Discussion with Ho Chi Minh City at the 3rd Field Work

Date	Time	Location
Tue. October 1	9:00~12:00	Dept. of Science and Technology Energy Saving Center

Details of the discussions are as follows:

① Discussion with Department of Science and Technology

The Department of Science and Technology provides consultant services upon requests from other administrative organizations.

The department proposes environment-friendly advice for development plans. The department currently addresses wind-power generation (developing a turbine), photovoltaic power generation, utilization of solar heat for boiling water, utilization of biomass (verification test conducted by the University of Tokyo and Vietnam National University, Ho Chi Minh City – University of Technology), etc.

As an effort for reducing greenhouse gas, priority has not been given to the issues in each field such as energy conservation. Moreover, due to the lack of funds, the necessary equipment has not been introduced into medium-and-small companies that exist in large numbers in Vietnam. In addition, the lack of human resources in the fields of technology and management is another problem.

② Discussion with the Energy Saving Center

The Energy Saving Center carries out popularization activities of technology and provides consultant services concerning energy conservation, and also provides support to community activities. Moreover, approximately 50% of the energy audit of companies is conducted by the Energy Saving Center. The center has top abilities in terms of energy conservation management of structures and buildings.

Concerning setting up of a master plan for reducing greenhouse gas, the plan could possibly become a mere formality if the plan is set up only by the administrative organizations of Ho Chi Minh City. It is necessary to collect information and data through specific research, summarize such information and data, and establish a feasible policy.

(4) Invitation of delegation from Ho Chi Minh City (October 2013)

We invited a delegation from Ho Chi Minh City for an international symposium held in Osaka City.

Details of the discussion are as follows:

① Discussion concerning the field of energy conservation

Due to a lack of people with expertise in energy conservation, Ho Chi Minh City is short of experts who can explain energy-saving technology to citizens. In order to deepen the people's understanding, it is necessary to visualize energy conservation technology.

Since the enforcement of a law on energy conservation, documents concerning energy management are sent from business operators to the authorities every year. This is a very important source of information for consideration of a low-carbon society. However, while they recognize the necessity to analyze these documents and take statistics, they do not know specifically how to analyze the data. Because such data may become the basis for establishing a climate change action plan, they request cooperation with that.

② Discussion concerning urban planning/traffic

Road traffic in Ho Chi Minh City has problems such as accidents, air pollution, traffic jams, and steep rises in gasoline prices. It is desirable that the citizens shift to utilizing a public transportation system. However, it takes time and money to prepare such a system; and therefore it is necessary to simultaneously take soft measures (price and regulation) for traffic control.

For the purpose of improving traffic congestion, they are considering restricting entrance into the center of the city (pricing).

They want advice on what administrative measures would be useful.

They consider that motorbikes contribute to improving traffic congestion, and usage of cars should be regulated. Because there are many narrow roads in Ho Chi Minh City, bicycles and motorbikes are convenient for the citizens. For people in areas that public transportation cannot reach, motorbikes will serve them. Main users of motorbikes are middle to low-income earners living in the center of the city and those who go to their nearest stations from suburbs.

The citizens of Ho Chi Minh City also want safe and convenient services of public transportation (particularly buses). Because there are many pickpockets, citizens also want improvement in security.

Currently, a driver and a conductor are on a bus. They want to computerize the bus more and reduce the number of conductors.

In terms of their greening target, they set a goal of 2.4m²/person in the center of the city, 7.1m²/person in a newly developed area, and 12m²/person in the suburbs, as a result of the addition of parks and street trees in the master plan. There is a mangrove forest in Ho Chi Minh City, and when adding this to the existing plants in urban areas, plants occupy approximately 39% of the city. There are approximately 200ha of green areas in the inner cities.

In terms of urban areas, approximately 1/2000 of the entire plan has been completed. Concerning an environment-friendly city, its viability is low, it is technically difficult, and costs more. Moreover, since they have no past experience or record of an environment-friendly city, they are interested in Japan's technology, products, and specific solutions concerning an environment-friendly city. They asked if we would analyze the cost efficiency of development of a low-carbon society, as they would suggest undeveloped areas in the future.

③ Discussion concerning waste and effluent treatment

They have only three sewage treatment facilities, and approximately 50% of all sewage is treated. Currently, they plan to build three more treatment facilities, and they consider that they will need 12 in total.

An appropriate treatment method for the sludge generated from sewage treatment facilities has not been established yet. Moreover, they are interested in Japan's treatment technology to generate biogas from the sewage sludge.

(5) Invitation of Vice-Mayor of Ho Chi Minh City (November 2013)

The vice-mayor of Ho Chi Minh City asked questions concerning attitudes toward waste disposal facilities, a promotion and awareness campaign of waste separation for citizens, and Osaka City's experience concerning the roles of the disaster countermeasures office.

Moreover, the vice-director of the Department of Natural Resources and Environment of Ho Chi Minh City asked questions about the experience of Osaka City concerning the idea of a cost burden for collection and disposal of household waste, and measures for promoting waste separation.

The vice-director of the Department of Planning of Ho Chi Minh City asked questions to Osaka City concerning ideas and regulations on covering ground surfaces for the purpose of preventing underground seepage of rainwater as a measure against immersion, as rainfall inundation frequently occurs in some parts of Ho Chi Minh City as it has urbanized.

In relation to this, Ho Chi Minh City side asked questions about immersion prevention measures concerning preparation of traffic infrastructure, and the progress of sewage system preparation in Osaka City.

4. Feasibility Survey and Discussion on MRV Methodology

4.1 Studies on CO2 Reduction by Eco-driving and Cooperative Transportation & Delivery

(1) Study on CO2 Reduction by Implementation of Eco-driving

Eco-driving is to drive an automobile to minimize its fuel consumption. Using a digital tachograph allows improvement of driving technique, maintenance of the effect, and reduction of CO2 emissions as well. The effect of emission reduction can be estimated as about 2tCO2 per truck per year on the premise of the driving conditions of a typical truck (running distance: 200 km/day, operating days: 250 day/year, mileage: 4 km/L).

Additionally, fuel cost can also be saved. When studying the feasibility of business on the conditions of purchase price of a digital tachograph (1,000 USD/unit), running cost (300 USD/truck), light oil price (1 USD/L), annual amount of light oil saved (875 L/truck) and service period (10 years), the IRR for 10 years is 135.2%, and the payout time is 21 months, thus the cash flow will turn into a positive value after the second year. In light of the effect of fuel cost saving, the cost-effectiveness can be considered sufficient.

Meanwhile, under the current price levels in Vietnam, the price of an on-board unit of 1,000 USD cannot be considered low on any account. With the goal of popularization in the future, in addition to establish the finance scheme for these businesses, it is also necessary to establish and operate the certification system for the businesses that implement Eco-driving properly and to consider systematic incentives for the certified businesses.

(2) Study on CO2 Reduction by Cooperative Transportation & Delivery

Cooperative transportation and delivery is to carry out efficient physical distribution through in consolidation of goods that were transported separately, collective transportation of goods from multiple owners or destinations, establishment of cooperative bases, and other measures. Although there are many forms of cooperative transportation and delivery and their effects of emissions reduction differ, a model project is set here assuming a commercial facility such as a supermarket.

The conditions for the project are as follows; from each supplier, (1) there are deliveries by 30 (2t loading capacity) trucks per day, (2) one truck is loaded with goods (commercial products) of 1 ton, and in the project, (3) the goods from three suppliers are collected to one 4 t truck and then delivered, (4) there is no change in facilities other than the vehicles, and (5) there is no back cargo on.

This results of the CO2 reduction of 156.5 t per year. As for cost, the introduction of vehicles and modification of loading and unloading facilities might be required. The

costs for them are excluded from the study because they largely depend on individual cases. As for the effects, when assuming the amount of light oil use of 44,800 L per year and light oil price of 1 USD/L, a cost savings of 44,800 USD (4,480,000 yen with a dollar-yen rate of 100 yen/USD) can be achieved, and major cost reducing items include the vehicle cost due to reduced number of vehicles (depreciation cost), vehicle maintenance cost and labor cost for drivers.

Since both costs and effects depend on individual cases, it is important to advance the project while creating agreements between related parties on conceivable burden, allocation and role sharing.

4.2 Study on Building Energy Saving and Local Energy Supply Systems

(1) Energy Saving System in Buildings and GHG Emissions Reduction Effect

In Ho Chi Minh City, many of the buildings that were constructed in the late 1990s are due for equipment renewal. Targeting approximately 20,000 square meters of floor space in office buildings, annual energy consumption and carbon dioxide emissions were surveyed, applicable energy saving technologies were identified, and the effects of introducing them were estimated.

It was found that a greenhouse gas emissions reduction of approximately 35% can be anticipated by introducing technologies with a relatively large introduction effect, namely adsorption dehumidification air conditioning, heating of cool water, tusk and ambient lighting, and smart BEMS, etc. Since the baseline emissions are 4,716 t-CO₂/year, the reduction effect was calculated to be 1,650 t-CO₂/year.

Concerning the MRV methodology, a method that entails monitoring energy consumption following the introduction of energy saving, and calculating emission reductions upon adding corrections based on changes in system energy saving performance and building energy demand was examined.

(2) Energy Saving System in Local Areas and GHG Emissions Reduction Effect

As a local area energy saving system, assuming a city block with total floor area of 100,000 square meters, local energy management entailing onsite power generation + heat supply and utilization of heat from the temperature difference of river water were raised as promising technologies for introduction. It was calculated that through introducing such technologies, a greenhouse gas reduction effect of approximately 33% or 7,727t-CO₂/year could be achieved.

In systems such as this, it is important to fully examine the environmental impacts of using fuel in power generation systems and utilizing temperature differences of river water

and so on.

Japan has a particularly high temperature and high humidity climate among the advanced countries, and its technology in the field of dehumidifying air conditioning is superior. Since energy saving in buildings and local areas is largely based on combining minor technologies, it is important to build appropriate standards founded on public and private sector cooperation as in the case of Japan's energy saving law.

4.3 Improvement of Route Bus Service

(1) Proposed Project

1/ Overview of Proposed Project

The following approaches are proposed for promotion of route bus service.

Approach 1: Development of park & ride promotion model using parking space for a suburban large-sized commercial facility

Citizens or shoppers who got a certain amount of prepaid shopping cards for a suburban large-sized commercial facility can use its parking space as their own park & bus ride (P&BR) parking lot when commuting.

Approach 2: Development of public transport Eco-point model

Citizens who used public transport can be granted a specific Eco-point and get benefits such as discounts and special goods from a commercial facility by utilizing saved Eco-points.

2/ Future Needs for the Proposed Project

AEON Group opened No.1 Mall in Ho Chi Minh City in January 2014 and is about to set out No.2 Mall in October 2014. The People's Committee of Ho Chi Minh City approved the AEON Group's commercial plan comprising 23 large-sized shopping malls in total. These commercial facilities will form a definite field of the proposed project.

(2) GHG Emission Reduction Effects

Demands for conversion to P&BR were estimated by the use of a model for selection of traffic mode which was devised through the questionnaire survey about citizens' change in traffic mode. GHG emission reduction effects by application the proposed project to AEON No.1 Mall were projected at 306t-CO₂ per year according to the estimated P&BR demands. If this figure is uniformly applied to all the 23 approved malls, GHG emission reduction effects in the entire city amounts to 7,053t-CO₂ per year (=306t-CO₂/year x 23 Malls).

(3) MRV Methodology

1/ Requirements for qualification

Requirement i: Introduction of IC card system for bus fare accounting

Requirement ii: Location of a private commercial in the suburbs

Requirement iii: Service of a bus route for P&BR

Requirement iv: Mandatory application for P&BR addressed to users when getting prepaid shopping cards

Requirement v: Funding from businesses with regard to grant of Eco-points

Requirement vi: Developing a system automatically computing reduction of GHG emission

2/ MRV Organization

To compute GHG emission reduction, a third party organization collects and manages both data (living places, destinations, etc.) on commercial users which AEON and other businesses get and data on bus passengers (riding record on IC cards, etc.) which DOT of Ho Chi Minh City grasps. As it is expected that the number of commercial businesses and transport providers taking part in the proposed project increases year by year, the computing system will have to be cloud-computed sooner or later.

(4) Future Issues and Expectation


As the city of Ho Chi Minh has expressed cooperation in the proposed project, preparation and system development for the full-scale operation will have to be carried out together with verification and issue clarification through a test operation.



4.4 Facilitation of the environment for Electric Motorcycles and Community Cycle

(1) Project Summary

This project aims to reduce GHG emission by shifting from gasoline to electric motorcycles and refraining from using gasoline in Ho Chi Minh, one of the world's leading cities of motorcycle users. The project attempts to encourage the citizen to shift to electric motorcycles and improve the convenience through establishing charging stations for the motorcycles and lending stations for sharing electric motorcycles.

(2) Project and Survey Contents

Project Content	Promotion of electric motorcycles (through pre-introduction/demonstration experiment) Low-rate lease of electric motorcycles: approx. 10 motorcycles at 10 place of businesses Establishment of charging stations: approx. 10 places	
-----------------	--	---

	 Introduction of parking lot management system (implementing sharing business, planning parking management utilizing charging stations)	
Target Place of Businesses (candidates)	<ul style="list-style-type: none"> • Place of Businesses: public agencies, business offices for logistics, etc. • Industrial Complexes: AMATA, Long Hau, VSIP, Cat Lai, Ho Nai 3, etc. • Commercial Facilities: Vincom Center, Aeon, etc. • Universities: Vietnam National Univ., Ho Chi Minh City – University of Technology, Foreign Trade Univ., Univ. of Transport & Communications, etc. 	
Operation Content	<ul style="list-style-type: none"> • Use by concerned parties at place of businesses, industrial complexes, and universities • Implementing rental motorcycles (sharing service) at commercial facilities 	
Survey Content	<ul style="list-style-type: none"> • Monitoring: usage situation monitoring (GPS, etc.), questionnaire surveys and interviewing users • Verification of MRV methodology and environmental integrity 	

(3) Significance of this project

GHG reduction effect of 300 tCO₂/yr. could be achieved if 1,000 gasoline motorcycles shift to electric motorcycles. In the future, spillover effects of 165 thousand tCO₂/yr. could potentially be achieved if 10% of 5.5 million registered motorcycles in Ho Chi Minh City shift to electric motorcycles.

Japanese manufacturing technologies of high-performance, trouble-free electric motorcycles and charging equipment can fully be utilized, and operation know-how and business models for low-carbon mobility (such as electric motorcycle) as well as know-how for comprehensive transportation policies with the use of charging facilities could be introduced.

(4) Schedule

FY2014: pre-introduction and operation (demonstration experiment) at one place of business

FY2015–2016: official introduction and operation at 10 place of businesses and 10 parking areas

4.5 Introduction of the Waste-to-Energy (WtE) System – A summary

(1) A Summary of the project and its operations

This study aimed to understand the feasibility of electricity production by waste incineration based on the concerns for Ho Chi Minh City (HCMC)'s expected waste increase and reduction of treatment capacity. Generating electricity from the incineration of city

waste will reduce greenhouse gases. Currently, governing bodies do not have the capacity or a preferred purchasing method for renewable energy; henceforth Japanese companies have not been able to develop WtE operations in Vietnam. This year the barriers for Japanese companies entering the Vietnamese market were made clear from our experience with the implementation of the greenhouse gas reduction estimate scenario analysis alongside our operations evaluation by further understanding the tendencies of such regulation and legislation arrangements, and the financial scheme. Moreover, data was collected from a scenario analysis and operations evaluation of a local waste separation and collection survey.

(2) Effectiveness of Greenhouse gas emissions reductions

In order to study the effectiveness of greenhouse gas emissions reductions for the introduction of a WtE system in HCMC, two visits were made to District 1, Binh Thanh District from July 14–21, 2013 and December 17–26, 2013. During these visits, analyses of the waste separation and the composition of the separated waste were performed and data collected.

(3) MRV methodology

The current situation of HCMC's waste treatment was investigated to evaluate the suitability of introducing MRV methodology for a WtE system referenced against existing CDM methodologies.

By introduction of the system for WtE by incineration the following contribute to greenhouse gas emissions reductions: avoidance of methane gas produced at the final landfill site and co-operative energy produced from the incineration to replace fossil fuels. It is estimated that there will be a 7,195t reduction of greenhouse gas emissions per year.

(4) Environment and sufficiency

In order to determine methods of securing sufficiency for the environment, all possible environmental effects that may occur due to the introduction of a WtE system must be accounted for and listed.

In this project, dioxin gases released from the incineration process can be forecasted as an environmental burden, whereas positive results range from cleaner water environment for surroundings, deterring the production of greenhouse gases, and employing waste pickers to help those in poverty.

(5) Future Research

An obstacle to introducing the WtE system in HCMC would be the profitability of the operation.

4.6 Feasibility Study on Introduction of Low Carbon Technology for Industrial Waste Water Treatment

(1) Study Overview

Survey on the current situation of industrial waste water treatment in Ho Chi Minh City and analysis on the market needs and benefits for sludge treatment, anaerobic treatment and waste water recycling were conducted. Based on that, feasibility study on introduction of highly efficient water treatment equipment was implemented.

(2) Low Carbon Technologies

Viewpoints	Technology
Technology to reduce greenhouse gas emission associated with electricity and fuel consumption	- Anaerobic fluidized bed reactor - Fine bubble aerator
Technology to reduce greenhouse gas emission associated with clean and industrial water consumption	- Membrane activated sludge reactor - Ozonization reactor - Low pressurized RO filter
Technology to reduce greenhouse gas emission from sludge generated from organic waste water	- Anaerobic digester

(3) CO2 Emission Reduction Effect through the Implementation of the Project

Carbon emission reduction effect when the above mentioned anaerobic digester is introduced in the brewer with 1,000t/d waste water generation was found to be 660t-CO2/year.

(4) MRV Method

MRV method for the introduction of above mentioned anaerobic digester to treat organic sludge generated from waste water was studied.

(5) Future Needs for Introduction of Low Carbon Technology in Ho Chi Minh City (Possibility and Potential)

Although specific target industries are not identified, it is expected that industries generating organic rich waste water would proactively adopt these low carbon technologies in the aspect of energy recovery and reduction in the amount of sludge disposal. In particular, the demands for the above mentioned technologies have high potential to be introduced considering a number of business operators in the industrial complex currently under development.

With regards to the investment for waste water treatment in the private sector, it is necessary to develop sales strategy packaged with technology and finance scheme so that an economic incentive is prioritized. In other words, governmental policy to provide an economic incentive for environmental conservation is essential considering the current situation where investment in the environmental conservation is limited.

(6) Strategies to Expand Projects at a Large Scale

- i. Ensuring economic incentives for low carbon technology introduction
- ii. Effective implementation of environmental regulations
- iii. Development of a scheme packaging technology introduction and technology support

5. Symposium

5.1 1st Workshop (July 2013)

In order to share purposes and information of the studies, we held a kickoff workshop.

More than 80 people attended the workshop. The attendants included approximately 40 people from the Japanese side, including Mr. Kotaro Kawamata, General Manager of the International Cooperation Office, Global Environment Bureau, Ministry of Environment; Mr. Takano, Head of the Environmental Policy Division of the Environment Bureau of Osaka City; and Mr. Fumihiko Okiura, Deputy Chief Representative of the Viet Nam Office of JICA. Approximately 40 people from the Vietnamese side attended, including Mr. Minh Ha, Chief of the International Cooperation Division of the Ministry of Natural Resources and Environment; Mr. Toan, Chief of the Science and Technology, Environment, and International Cooperation Unit of the Directorate of Roads of Vietnam, the Ministry of Transport; Mr. Phuoc, Vice-Director of the Department of Natural Resources and Environment of Ho Chi Minh City; and people relevant to the Department of Trade and Industry and the Department of Zoning and Architecture.

Mr. Kawamata of the Ministry of Environment introduced a package-type support from the Government of Japan and other funding methods for realizing a leapfrog-type low-carbon society in an Asian city. Stating that planning based on scientific knowledge is important for reducing greenhouse gas (GHG), he introduced the fact that Japan has already begun supporting the creation of plans for reducing GHG utilizing AIM in various countries. He also stated that efforts for the development of a low-carbon society had already been reported in the ASEAN + 3 Environment Ministers' Meeting and the East Asia Low-Carbon Partnership. Moreover, he also stated that Japan would utilize the Joint Crediting Mechanism (JCM), which Japan signed on July 2, as one of the tools to support development of a low-carbon society. He added that national-level and city-level support will be provided not only for transfer of technology, but also for preparation of legal systems and capacity building.

Moreover, Osaka City/GEC and Ho Chi Minh City released reports on the current condition of projects for which feasibility surveys would be conducted this year. In addition, the Public Works Bureau of Osaka City gave explanations on the roles and implementation policies and activities of the Osaka Water & Environment Solutions Association (hereinafter referred to as OWESA), which was established to contribute to water and environmental issues through coordination between public and private sectors. For the explanation of the activities, the projects in the waterworks, sewage, and waste sectors that the OWESA and private companies are working on were introduced. Also, explanations were given on specific efforts made overseas. Furthermore, explanations were also given on the content of the "Project for improvement of urban drainage management technology in Ho Chi Minh City, Viet Nam," to be implemented in Ho Chi Minh City from this year. The "Hub for transmission of information" to deepen understanding of sewage; "Hub for technical development" in which public and private sectors coordinate together; and the "Satellite Hub" for introducing superior technology of the companies in Osaka and the Kansai region were introduced. An expectation was expressed for coordination in the waterworks and waste sectors to expand cutting-edge technology in a wide range of fields.

The Vietnamese side stated that Ho Chi Minh City had decided to establish an action plan on climate change by 2015, and that it anticipated support from both the Government of Japan and Osaka City for the

establishment of the plan and implementation of specific mitigation projects. Ho Chi Minh City particularly contributes to the development of Vietnam, which enjoys high economic growth, and green growth and low carbon are crucial for the future development of the city. They explained that an action plan on climate change has been established amid such circumstances, and missions have been proposed in six applicable fields: scientific research, urban planning, water resources, agriculture, public health, and national defense and security; and in two mitigation fields, energy and waste, respectively. Currently, projects are ongoing in the transportation, energy, waterworks, and sewage and waste sectors; and the Vietnamese side expressed their intention to link such projects to JCM so that the projects can develop into business.

In the latter half of the workshop, discussions were held in three working sessions on energy conservation, urban planning, and waste and sewage, to clarify problems and future policies of each sector.

Finally, the attendants confirmed that the two cities would carry out studies in a cooperative manner for the symposium to be held in October in Osaka.

5.2 International Symposium (October 2013)

Approximately 130 people, including Mr. Seigo Tanaka, Vice Mayor of Osaka City; Mr. Yamamoto, Chief of the Environment Bureau; Mr. Kotaro Kawamata, Chief of the International Cooperation Office, Global Environment Bureau, Ministry of Environment; and Mr. Motonori Tsuno, Chief Representative of JICA Kansai, as well as attendants from the industrial circle such as Kansai Economic Federation (Kankeiren) attended from the Osaka City side. On the other hand, approximately 20 including Mr. Le Hoang Quan, Chairman of the Ho Chi Minh City People's Committee (Mayor); Mr. Dao Anh Kiet, Director of the Department of Natural Resources and Environment; Mr. Phan Minh Tan, Director of the Department of Science and Technology; Mr. Tran Chi Dung, Director of the Department of Zoning and Architecture; and other concerned parties attended the symposium.

At the symposium, a presentation was made on Ho Chi Minh City's efforts for the development of a low-carbon society and their expectation regarding support from Japan. The explanation was given that the population of Ho Chi Minh City was rapidly increasing along with its economic growth, and various problems have spawned in the city as a result; such as a shortage of electricity and drinking water, an increase in traffic jams, and amount of waste landfill and air and water pollution. Ho Chi Minh City is said to be the most susceptible to climate change in the world, and it was revealed that the city would proactively support projects for the development of a low-carbon city. Moreover, the Ho Chi Minh City side expressed their expectation that Osaka City, based on the cooperation with the Global Environment Center Foundation (GEC), would consider implementation of the projects, including JCM; and introduced some examples of the projects. Finally, they stressed that they expected Osaka City to support the establishment of their action plan on climate change, which would be established in 2015.

From the Osaka City side, proposals for the development of a low-carbon society through the "All-Osaka" approach were made. Specific problems were introduced such as air pollution, water contamination, and waste that Osaka City experienced during the age of high economic growth, as well as how administration and private companies had cooperated and how the problems were improved. Based on the result of the field work that Osaka City conducted this fiscal year, the Osaka City side made proposals for the

low-carbonization of Ho Chi Minh City in the waste, urban area development, and energy sectors. In order to implement the proposals, it is important to introduce the environmental technology that companies in Osaka and the Kansai region have. Therefore, Osaka City stated that it would address the realization of the low-carbonization of Ho Chi Minh City with the united efforts of Osaka, including cooperation for the establishment of the action plan on climate change.

Moreover, GEC, which has been conducting research this year for the purpose of holistic support of environmental administration and environmental technology, and establishment of an operation and maintenance system through setting up of a liaison organization between the two cities in anticipation of utilization of JCM, gave an explanation about the research. GEC stated that it would make efforts to make adjustments, so that the two cities can share necessary information and to strengthen the basis of operation/maintenance and management system of Team Osaka, including finance, as headquarters of the research.

Following the presentations, the two cities agreed that Osaka City would provide cooperation and Ho Chi Minh City would establish the action plan on climate change by 2015.

The Ministry of Environment introduced support from the Government of Japan that enables leapfrog-type progress for developing countries. The ministry explained that in terms of support for introduction of low-carbon technology such as JCM to developing countries, much substantial research had been conducted, thanks to the support from the Ministry of Environment. Particularly, Ho Chi Minh City was regarded as an important city of the research for forming a large-scale JCM project. The ministry stated that for the next fiscal year and beyond, plans for financial support through cooperation with JICA and Asian Development Bank (ADB) for popularization of the low-carbon technology had been under consideration.

Six private companies made statements about Japanese technology for realizing the low-carbonization of Ho Chi Minh City, and expressed their intention to take an “All-Japan” approach for the development of a low-carbon society.

The contents agreed through the discussion of the symposium were summarized as the “Memorandum of Understanding on Developing Low-Carbon City Between Ho Chi Minh and Osaka,” and signed by Mr. Toru Hashimoto, mayor of Osaka; and Chairman Quan of Ho Chi Minh City on October 22.

5.3 2nd Workshop (February 2014)

The 2nd workshop to summarize the research conducted during this fiscal year was held. Approximately 50 concerned parties, including Mr. Kotaro Kawamata, Chief of the International Cooperation Office, Global Environment Bureau, Ministry of Environment; Mr. Minoda, General Manager of Facility Department, Environment Bureau of Osaka; and Mr. Sakai, Chief of Southern Vietnam Branch Office of JICA, attended the workshop. From the Vietnamese side, approximately 60 people, including Mr. Dao Anh Kiet, Director of the Department of Natural Resources and Environment; and persons from Ho Chi Minh City Energy Saving Center, Department of Trade and Industry, Department of Zoning and Architecture, and Department of Transport, as well as reporters, attended the workshop. As a result, more than 100 people attended the workshop, exceeding prior expectations.

Mr. Kawamata of the Ministry of Environment; Ms. Linh, Vice-Director of Ho Chi Minh City; and Mr. Sasaki of Osaka City respectively made presentations on Japan's support for development of low-carbon cities in developing countries (particularly in Asia) and specific efforts for such development, plans and problems of green growth and low-carbonization of Ho Chi Minh City, and an overview of support for development of a low-carbon city in the future Ho Chi Minh City with flood countermeasures at its core.

Subsequently, organizations which conducted the research released reports on their respective feasibility studies concerning JCM, and active discussions were held, including an exchange of opinions, for the expansion and improvement of the project and suggestion of ideas. Moreover, through the workshop, it was once again confirmed that the two cities would cooperate in the future for the establishment of the Ho Chi Minh action plan on climate change.

6. PR Activities

6.1 Website

A website was opened for disclosure of information concerning the surveys ([URL] <http://osaka-hcm-lcc.net/>).

6.2 Seminar for private companies (September 2013)

This seminar was held to introduce the purposes and activities of the “Ho Chi Minh City-Osaka City Cooperation Project for Developing Low Carbon City,” so that private companies would newly participate in the business for development of a low-carbon society.

Approximately 40 people from private and other companies attended the seminar. Explanations were given and opinions were exchanged on support from Osaka City and efforts by the Government of Japan for realizing a low-carbon society, as well as on the business assistance system of the Ministry of Environment utilizing the Joint Crediting Mechanism (JCM).

6.3 Side event at COP 19 (November 2013)

A side event was held on the eighth day (Monday, November 18) of the 19th Conference of the Parties (COP 19) of the United Nations Framework Convention on Climate Change (UNFCCC) held in Warsaw, Poland (from November 11 to 23, 2013) at the Japan Pavilion, with the cooperation from the Ministry of Environment, the Ministry of Natural Resources and Environment of Vietnam, and the Kansai Economic Federation.

Approximately 25 people attended the side event. GEC gave a brief explanation on the Joint Crediting Mechanism (JCM), and the Ministry of Environment introduced the “Ho Chi Minh City-Osaka City Cooperation Project for Developing a Low-Carbon City,” which had been adopted as one subject of the “FY 2013 Feasibility Survey on the Formation of a Large-Scale JCM Project for Realizing a Low-Carbon Society in Asia”, a survey by the Ministry of Environment. Three organizations in different positions made presentations, which were GEC, the Government of Vietnam, and the Kansai Economic Federation. Each of them mentioned the city-level efforts on NAMA, the results from the coordination of public and private sections and that of cities, from their respective perspectives. Explanations and discussions focusing on the importance and innovativeness of the project were conducted.