FY2014

Project to Support the Large-Scale Formation of JCM Programs
to Realize Low-Carbon Societies in Asia

Report on

Ho Chi Minh City – Osaka City Cooperation Project

for Developing Low Carbon City

March 2015

Global Environment Centre Foundation

(GEC)

Ⅰ. Summery

1. Summary of Operations

1.1 Objectives

As a foundation for heretofore study results and memorandums related to the cooperation among municipal bodies in regards to the conception of a low-carbon city under the efforts of JCM with the mayor of Osaka City and Ho Chi Minh City,

① we shall discover and build JCM's large-scale initiatives as a package in total and export the system that integrates the administration structure and the remarkable environmental technology owned by Osaka city,

② we shall consolidate the operation and maintenance framework that forms the master plan of a low-carbon city and the launching of a cooperation between two cities that supports the large-scale developments of JCM's initiatives in an organized and systematic way,

③ we shall plan for the low carbonization of Ho Chi Minh City that currently has concerning environmental issues based on the three goals in the implementation of operations for 2015.

This shall be the model for other Asian megacities that are also experiencing the same issues.

1.2 Operation Outline

The operation outline is as follows.

① Assistance for climate change action plan

② Action on JCM feasibility study of project conception (that includes JCM methodology and the creation of the project design documents (PDD)

(1) Introduction of energy-saving technology for buildings

(2) Promotion to convert to eco-friendly and park-and-ride buses

③ Implementation of public and private organizations

④ Launching of symposiums

(1) Orientation session at Ho Chi Minh on JCM and this Project

(2) JCM symposium with Osaka-city and Ho Chi Minh'-city

⑤ Public relations activities

⑥ Cooperation on related operations

(1) Report and attendance on domestic progress debriefing sessions (2nd launching by MOE) (that includes the creation of necessary documents)

(2) Announcement and attendance of domestic meetings held before the launch of workshops at targeted locations (that includes the creation of necessary documents)

(3) Presentations at meetings designated by MOE (that does not include (1) and (2)) (that includes presentations and booth showcases)

- Once annually within Japan (once in the Kanto district)
- Once annually abroad (once in South America)

1.3 Workflow

The workflow is as follows.

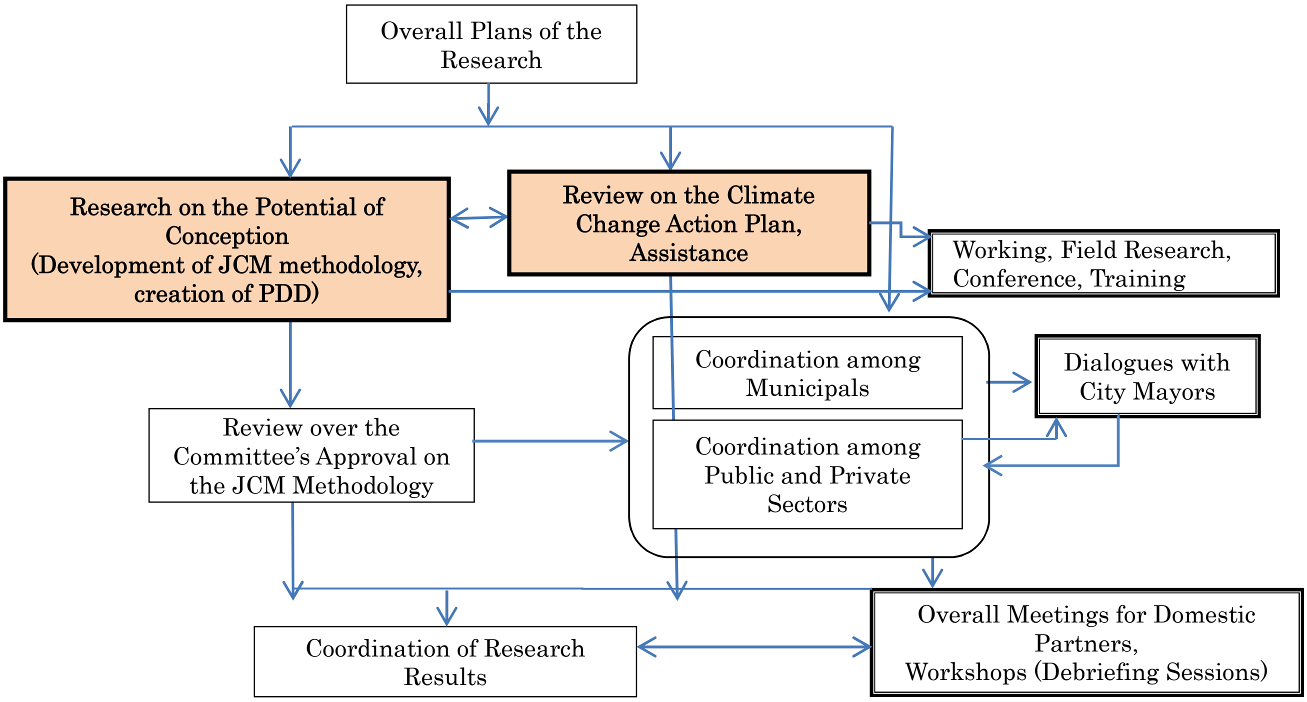

Chart: Operation Workflow

1.4 Implementation System

GEC, a public interest corporated foundation supported and launched joint conventions between the Osaka Headquarter of Support for the Development of a Low-Carbon City and Ho Chi Minh City Climate Change Committee (that includes 1 workshop and 2 review-working meeting).

Information in regards to the development and implementation of JCM projects in Ho Chi Minh City is shared among the Team Osaka consortium while carrying out feasibility studies by Nikken Sekkei Research Institute (NSRI) and Shimizu Corporation, creation of GHG inventories (that depict the actual conditions) by the Institute for Global Environmental Strategies (IGES) for the design of the climate change action plans in Ho Chi Minh City, applications of AIM models and future prospects by the National Institute for Environmental Studies (NIES) and the creation of comprehensive proposals that include measures by Chuo Fukken Consultants to achieve reduction targets.

To carry out the mentioned activities, the cooperation from Japan International Corporation Agency (JICA Kansai), New Energy and Industrial Technology Development Organization (NEDO), Japan External Trade Organization (Jetro)'s Ho Chi Minh City's administrators and Kansei Economic Federation (Kankeiren) has been obtained.

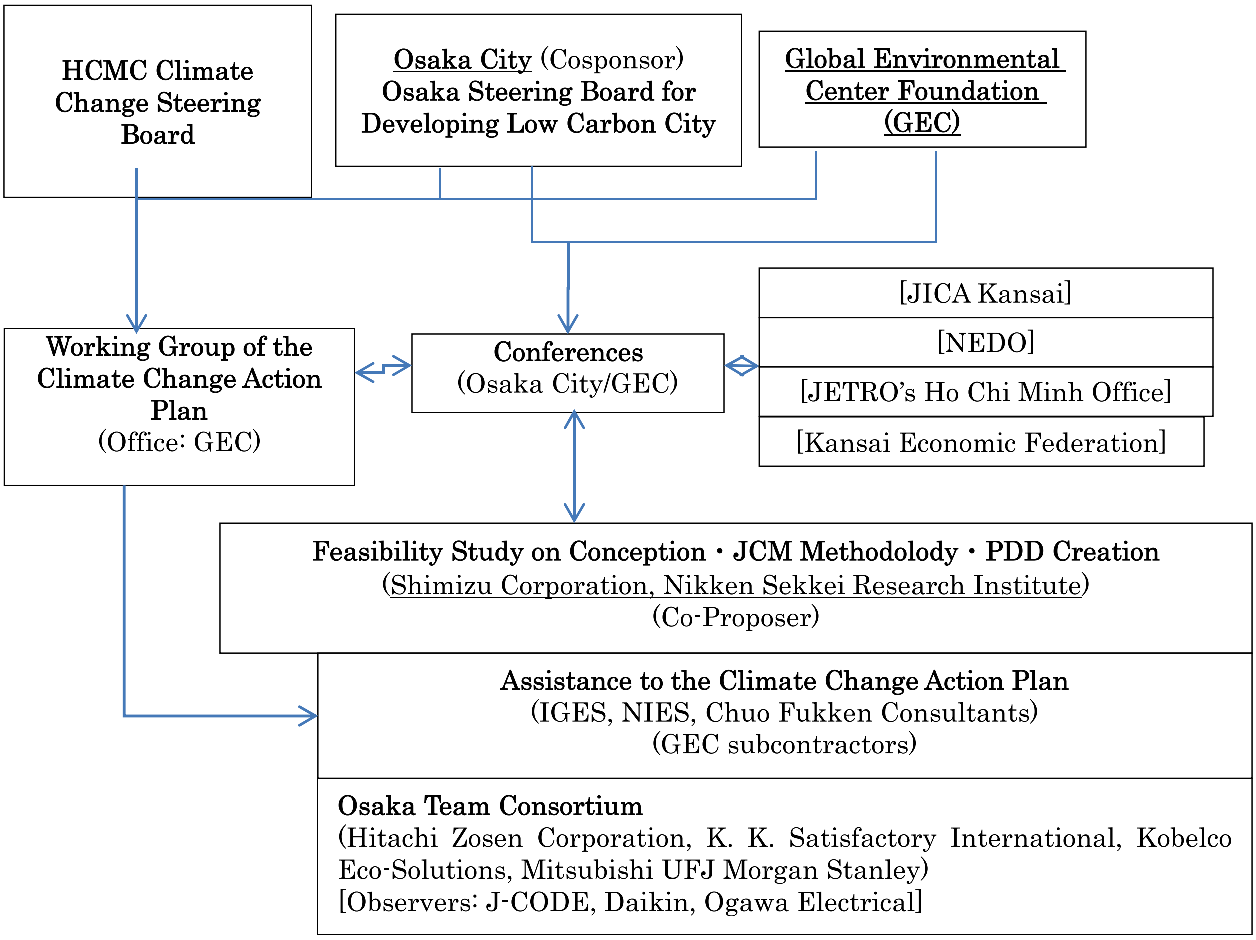

Chart: Implementation System of This Operations

2. Support for Climate Change Action Plan

The effects on climate change based on the geographical features of Ho Chi Minh City, the direction within Vietnam and in the international scene on the actual conditions of the climate change were summarized.

Firstly, we have gathered information on the GHG emission condition in Ho Chi Minh City and created an inventory on the amount of GHG emission in a year in Ho Chi Minh City. The creation of the GHG inventory took into consideration the condition of GHG emission in Osaka City and the condition of emission of other departments and the experience of creating the direction as written in the [Osaka City Global Warming Countermeasures Action Plan] that was formulated by Osaka City and the information on the maintenance of measures, policies and necessary systems will be shared with Ho Chi Minh City.

Based on the actual conditions in Ho Chi Minh City and the above-mentioned GHG inventory, the Ho Chi Minh City Climate Change Action Plan (proposal) has included reduction targets on the emission amount of GHG and stated reference years and annual targets. In regards to the future forecasts of the emission amount of GHG, together with the use of a climate change simulation model and the cooperation with NIES that has promoted the use of the model in developing nations (and provided the necessary skill developments for such purpose), conferences at Ho Chi Minh City were organized, that were directed at decisions on annual targets and how to achieve them, with much deliberation with Ho Chi Minh City towards the practical use of the results of future forecasts based on the Asia Pacific Integrated Model (AIM).

In regards to the climate change measures and its enforcement, conferences with Ho Chi Minh City have been held, 10 areas; land use planing, energy, transportation, waste management, water management, agriculture, healthcare, industry, construction and tourism were reviewed and listed systematically.

In addition, issues on the quality of Japanese technology and systems, applicable financial schemes and work applications were discussed that were related to the conception of JCM project to introduce the model project that utilizes JCM into immediate strategic fields that were decided during conferences with Osaka City and Ho Chi Minh City.

Such contents were used to create action plans (proposals) and to carry out detailed reviews during the Working Grooup Meetings (5 times in Ho Chi Minh City) that comprise of relevant participants. The action plan is expected to be approved in Vietnam within 2015 but meanwhile much support is still needed till the approval has been given.

In addition, to carry out the policies of the Climate Change Action Plan effectively in Ho Chi Minh City, invitations from Japan (that consists of 2 officers from Ho Chi Minh City every time) and opportunities to organize field working sessions will be utilized. Training in creating GHG inventories, estimates on future GHG emission amount based on AIM's activities, climate change action plans based on the experience of implementing the [Action Plan for Osaka City's Countermeasures against Global Warming] will be carried out to train the necessary human resources in Ho Chi Minh City.

2.1 Review-Working Meetings

(1) Outline

In regards to the plans of the Climate Change Action Plan (Proposal) as shown below, further studies have been carried out at Review-Working Meetings (in which 5 were in Ho Chi Minh City) that comprise of relevant participants. Also, the action plan is expected to be approved in Vietnam within 2015 but meanwhile, much support is still needed still the approval has been given.

Table　Outline on the Hosting of Review-Working Meetings

Meeting	Date	Attendees
Kick-off Meeting	13th (Tuesday) - 15th (Thursday) May 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies
1st Working Group Meeting	7th (Tuesday) - 11th (Friday) July 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies
2nd Working Group Meeting	19th (Tuesday) - 22nd (Friday) August 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies
Field Research	3rd (Monday) - 4th (Tuesday) November 2014	Ho Chi Minh Climate Change Bureau
Field Research	4th (Thursday) - 10th (Wednesday) December 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies

2.2 Training in Japan for Ho Chi Minh City Officials

For Ho Chi Minh City Official, training in Japan was conducted as follow.

[Objectives]:
- To facilitate the planning of Ho Chi Minh City Climate Change Action Plan, this training program focuses on the creation of future forecasts on GHG emission amount and annual GHG emission amount inventories that utilize AIM. It is also in line with the aim to realize the climate change action plan that is considered necessary for the future of Ho Chi Minh City.
- In regard to the format of this training, the core of the training will be lectures conducted by Japanese professionals but there will also be classes and discussion that encourage the trainees to participate and be involved independently in the planning of the climate change action plan and to develop their skills.

[Content]:

Date	Training Content	Venue
2nd June (Monday)	・Introduction on the activities held at the Center for Social and Environmental Systems Research at the National Institute for Environmental Studies ・Introduction on AIM study cases ・Introduction on the AIM End Course Model ・Introduction on the ExSS Model ・Adoption of AIM for a Low-Carbon Asia ・Adoption of AIM for Japan and Malaysia ・Introduction on the AIM Impact Analysis ・Introduction on the AFOLU Model ・Introduction on the Household Model	National Institute for Environmental Studies
3rd June (Tuesday)	・Hands-on practice on the ExSS Model ・Hands-on practice on the PDCA Model ・Easing measures on climate change in Ho Chi Minh City ・Overall deliberation	
4th June (Wednesday)	・Adoption of AIM for Ho Chi Minh City	Kyoto University
5th June (Thursday)	・Data collection and management for GHG Inventories ・[International Symposium on Climate Change and Waste]	Osaka City
6th June (Friday)	・Points in the planning of a climate change action plan ・Overall deliberation	

2.3 Climate Change Action Plan (Draft)

Climate Change Action Plan (Draft) was developed on the basis of following draft structure as a result of disucussion with Ho Chi Minh City.

The conclusion of the Climate Change Action Plan is expected to be in September 2015, with the aim of being approved by the end of 2015 to facilitate a smooth conclusion, continuous support is expected.

＜The Draft Structure for Climate Change Action Plan＞

1. Introduction
1.1 Background
1.2 Necessity
1.3 Purpose
1.4 Scope

2. Legal Framework & Policy and Implementation Period
2.1 Legal Basis
2.2 Upper Level Plan
2.3 Target Years

3. City Outlook and Related Plans
3.1 City Outlook
3.2 Related Plans

4. Past Activities for Climate Change
4.1 Implementation Status of National Missions
4.2 Implementation Status of International Cooperation Missions
4.3 Implementation Status of Climate Change Countermeasures

5. Current Situations and Future Prospects of Climate Change
5.1 Current Climate Change Conditions in Ho Chi Minh City
5.2 Future Prospects of Climate Change in Ho Chi Minh City

6. Plan Targets
6.1 Targets for Adaptation Measure Implementation
6.2 Targets for Adaptation Measure Implementation

7. Measures To Achieve Targets
7.1 Philosophy on Implementation Policy in Ho Chi Minh City
7.2 Measures in 10 Sectors

8. Climate Change Countermeasures by Area
8.1 Philosophy on Implementation Policy by Area
8.2 Measures for Different Areas

9. Specific Projects
9.1 Specific Projects by Area

10. Implementation of Action Plan
10.1 Financial Resources
10.2 Progress Management
10.3 Implementation Structure

3. The Implementation of JCM Project's Feasibility Study

Through the early implementation of expected projects, feasibility studies related to the following 3.1 and 3.2 initiatives that have a high probability in developing later similar initiatives were implemented. In the event of carrying out a subject project as a JCM project and the creation of Project Design Documents (PDD) and developments of applicable JCM methodology (like the creation of settings on eligibility criteria requirements, specification and calculation of reference emission amount, calculation of project emission amount, establishment on monitoring methods, settings of a default value and preconfigured value that is needed for the calculation and assessment on the reduction of emission amount, calculation sheets (Excel spreadsheets).

3. 1 Introduction of Building Energy Saving Technologies

(1) Outline of the Project

Electricity consumption in Vietnam skyrocketing at a rate of approximately 14% a year in line with economic development and improvement of living standards, and civilian uses account for roughly 40% of this consumption. Ho Chi Minh City accounts for 20% of all power consumed in Vietnam, and approximately 20% of this is consumed in office buildings, commercial facilities and the like. Introducing energy saving technologies to such buildings will help promote energy saving, reduce GHG emissions, extend the useful life of buildings, and contribute to environmental preservation.

The project, which targets an office building and hotel, etc. with total floor area of around 20,000m^2, aims to save energy and reduce GHG emissions through combining advanced Japanese products and technologies that were identified as promising technologies last fiscal year, for example, adsorption dehumidification type air conditioning, raising the temperature of air conditioning cold water, adoption of LED lights, introduction of smart BEMS and so on.

(2) Identification of applicable energy saving technologies and plan for introduction

Identification of applicable energy saving technologies is shown in following Table.

Table 2 Outline of Energy Saving Technologies

Type of Technology	Name of Technology	Outline of Technology
Air conditioning	Desiccant air treatment	When introducing hot and humid outside air, adsorption dehumidification, etc. is conducted without using a refrigerator.
	Raising the temperature of cold water	Temperature of the cold water used for cooling rooms can be changed from the conventional 7°C to 12°C, making it possible to improve refrigerator efficiency.
	Individual control of cold water flow in each floor	By installing air conditioning cold water pumps on each floor, flow can be kept to a minimum and energy can be saved.
Lighting	Adoption of LED lights	Through upgrading lighting equipment to LED and also adopting human sensors, lighting energy can be greatly reduced.
Control	Smart BEMS	Through monitoring energy use and conducting optimum operation of building equipment (air conditioning and electricity), energy can be saved.
Ventilation	Adoption of inverter fans for ventilation	For the large-capacity ventilation, on-off control of fans based on CO sensors, etc., and inverter capacity control can save energy consumption.

(3) GHG emissions reduction effect and feasibility assessment

The following table summarizes the energy saving effects that can be realized by the technologies described so far.

Table　Energy Saving Effect of Each Technology

Type of Technology	Name of Technology	Outline of Technology	Estimated Energy Saving Effect
Air conditioning	Desiccant air treatment	When incorporating hot and humid outside air, adsorption dehumidification, etc. is conducted without using a refrigerator.	16.84 %
	Raising the temperature of cold water	Temperature of the cold water used for cooling rooms can be changed from the conventional 7°C to 12°C, and refrigerator efficiency can be increased.	
	Floor-separate control of cold water flow	By installing air conditioning cold water pumps on each floor, flow can be kept to a minimum and energy can be saved.	
Lighting	Adoption of LED lights	Through upgrading lighting equipment to LED and also adopting human sensors, lighting energy can be greatly reduced.	12.72 %
Ventilation	Adoption of inverter fans for ventilation equipment, etc.	Through adopting large-capacity ventilation, starting and stopping of fans based on CO sensors, etc., and inverter capacity control, energy can be saved.	0.7%

30.23%

Through adopting these technologies, an energy saving effect of approximately 30% over the entire building can be anticipated. Since electric power accounts for almost all energy consumption in office buildings, the rate of reduction in electricity consumption will be translated almost directly into reduction of greenhouse gases.

In the target building, annual CO_2 emissions are 4,716 t-CO_2/year, and the reduction effect is estimated as follows: 4,716 t-CO_2/year x30.23%= 1,426 t-CO_2/year.

3. 2　Promotion to Convert to Eco-Friendly and Park-and-Ride Buses

(1) Outline of the Project

①Study background

Currently, in Ho Chi Minh mass transit public transportation modes such as subways, BRT, etc. have not yet been constructed, and buses are the only current form of public transportation. Since in Ho Chi Minh the development of 1 or 2 MRT lines is proceeding but the start of operation is not planned to be until around 2020, until that time buses are an important mode of public transportation.

Against this backdrop, from 2003 to 2012 Ho Chi Minh implemented plans to make their bus network more comprehensive, and this achieved a certain degree of success. During this period, the focus of activities was more on improving bus services than on increasing the number of buses owned in particular. In 2002, the bus transportation capacity was 36.2 million people per year, and by 2012 this had increased to 413 million people per year. Furthermore, in 2002, the average number of passengers for the 2,100 buses owned at that time was 20.2 people per bus, but in 2013 the average number of passengers for the 2,954 buses owned had increased to 54 people per bus. At the same time, in the current situation this means that it only around 10% of the city transportation demand is being supported.

Because of this, it is desirable to expand the system to handle 15% of transportation demand in 2015, and a bus transportation master plan is currently under consideration. It is important to note that in this plan, not only will the number of buses be increased, but improving bus services is also set as an important goal.

As stated above, in response to the rapid increase in the number of motorcycles and cars, Ho Chi Minh is actively working to shift transportation demand to buses, and these efforts are proceeding with activities focused on not only increasing the number of buses, but also on shifting transportation modes through improving bus services. This project is for supporting the transportation policies of Ho Chi Minh, and through the introduction of new transportation policy models developed by Japan, aims to contribute to reducing the CO2 from the city's transportation sector.

②Project overview

(ⅰ) Project content

This project in Ho Chi Minh, Vietnam aims to reduce GHG due to commuting traffic by encouraging citizens to switch from motorcycles and cars as their main mode of commuting to buses through the introduction of i) a Park-and-Bus-Ride (hereafter referred to as "P&BR") system utilizing commercial facilities and ii) a public transportation Eco Point system. The specifics of the project are as follows:

i) P&BR utilizing commercial facilities

This system has been introduced by the Aeon Group in Japan, in which customers who purchase shopping tickets (generally around ¥3,000 to ¥5,000 in Japan) at the store are allowed to utilize the store's parking lot as a P&BR parking lot. In the implementation of this project, it is necessary to secure parking spaces that can serve as P&BR spaces and areas for getting on and off buses. In addition, for the purposes of store security management, it is necessary to be able to specify the motorcycle or car used by the purchaser of shopping tickets. For this purpose, P&BR users will be required to submit a "P&BR usage application form" to enable their personal information such as vehicle license plate number, home address, etc. to be known.

ii) Public Transportation Eco Points

A system in which users of public transportation are awarded a fixed number of Eco Points in order to encourage customers to switch to public transportation. This has also already been introduced by the Aeon Group in Japan as "Green Score". For the realization of this project, it is necessary to accurately capture the public transportation usage history (date of use, number of times, etc.) and award points based on that history.

This project will be initially implemented at the Ho Chi Minh Aeon Store #1 (which opened in January 2014), but since it can be expanded to wherever there is a large commercial facility in the suburbs, the aim is to expand it to other stores (for example, to the Aeon Store #2 scheduled to open in October of the same year, etc.), and even to other cities and countries.

Since operators of bus services connecting P&BR stores and the city center are essential to this project, the Ho Chi Minh Department of Transportation (hereafter referred to as "DOT") becomes a counterpart. In addition, other partners include the owner of the commercial facility providing the store parking spaces for P&BR, the Japanese companies contributing funds for operating the transportation Eco Point system, etc.

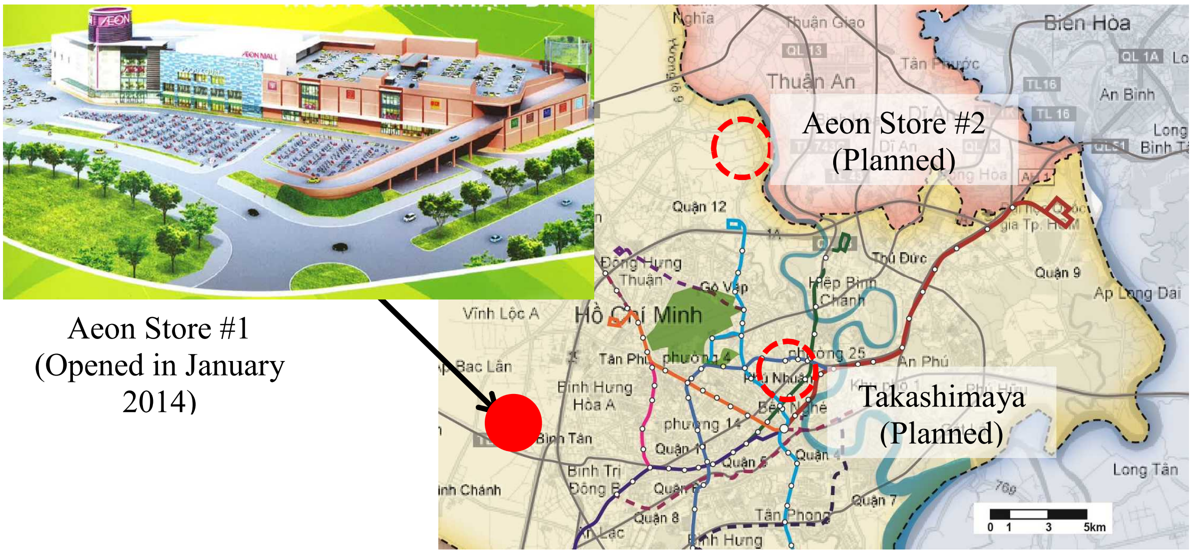

Figure: Planned openings of Japanese commercial facilities in Ho Chi Minh

(2) Estimation of project emission amounts

The result of estimation of project emission amounts is indicated as below.

Table　Conditions for each scenario

Scenario	Price of prepaid shopping ticket	Points awarded for number of times riding bus
Scenario ①	100,000 VND	10,000VND/20 times
Scenario ②	200,000 VND	10,000VND/20 times
Scenario ③	300,000 VND	10,000VND/20 times
Scenario ④	100,000 VND	20,000VND/30 times
Scenario ⑤	200,000 VND	20,000VND/30 times
Scenario ⑥	300,000 VND	20,000VND/30 times

Scenario ⑦	100,000 VND	30,000VND/40 times
Scenario ⑧	200,000 VND	30,000VND/40 times
Scenario ⑨	300,000 VND	30,000VND/40 times

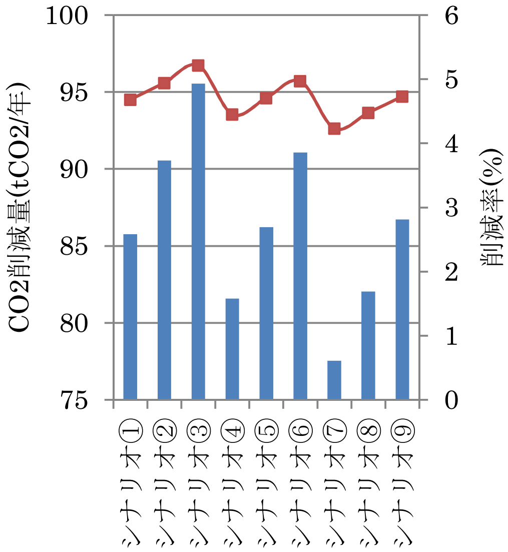

Figure: CO2 reduction amount/shift ratio results

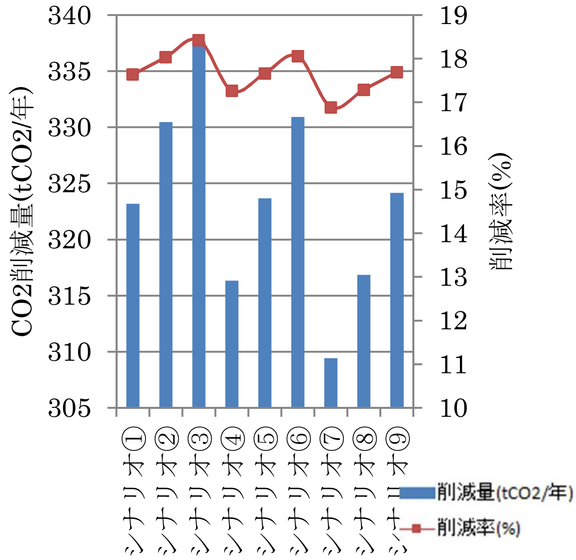

Figure: CO2 reduction amount/shift ratio results

Table4-3 GHG emission amounts and reduction effect (Scenario③)

Reference emission amounts	Project emission amounts		GHG reduction amount	Reduction ratio
4,960.73t-CO2/yr.	Minimum	4,702.77t-CO2/yr.	257.96t-CO2/yr.	5.2%/yr.
	Maximum	4,049.10t-CO2/yr.	911.63t-CO2/yr.	18.43%/yr.
	Average	4,375.94t-CO2/yr.	584.79t-CO2/yr.	11.82%/yr.

Note: Minimum: Proportion of persons answering "Will definitely use"
Maximum: Proportion of persons answering "Will use"

4. Promotion of the city-to-city cooperation and the public-private cooperation

Under the coordination between Ho Chi Minh City and Osaka City, through the support in planning the Climate Change Action Plan of Ho Chi Minh City, as we come to know the necessary elements needed in the realization of a low-carbon Ho Chi Minh City and in sustainable development efforts, we have promoted the framework of a detailed JCM project together with the promotion of information, know-how, technology and system transfer developed, managed and owned by Osaka City. As an objective to develop JCM Project, we encourage information sharing with the business operators from the private sector that are interested in the implementation of the JCM Project in Ho Chi Minh City ([5.1 Orientation Session at Ho Chi Minh on JCM and the Its Operations (July 2014)]. At the [Team Osaka Symposium] ([7.2 Presentations and Attendance of Domestic Meetings Held Before the Launch of Workshops at Targeted Locations]) under this operations, we also facilitated business operators from the public sector and coordinate the support from the public sector in regard to the implementation of this project.

5. Launching of Symposiums

5.1 Orientation Session at Ho Chi Minh on JCM and the Project (July 2014)

This orientation session was launched in July 2014 for Japanese companies that are set up in Vietnam and local Vietnamese companies with the aim to discover new initiatives for JCM operations and to introduce the system (that includes support systems related to fund-raising) and the operations.

During the session, there were about 14 participants from the public sector and a debriefing and a dialogue was held in regard to the operations support system by MOE that utilizes JCM (bilateral credit system), the support by Osaka City for the realization of a low-carbon city and the Japanese government framework.

5.2 JCM Joint Symposium With Osaka's and Ho Chi Minh City (January 2015)

In regard to the climate change measures in Ho Chi Minh City, in relation to the promotion of transferring information, know-how, technology and system owned by Osaka city and the private sector, and for the purpose of presenting a brief on the implementation situation of JCM Project and the progress in planning the Climate Change Action Plan, the [Ho Chi Minh City and Osaka City International Symposium for Developing Low Carbon City] was held in Ho Chi Minh City on 16th January 2015 (Friday).

In this symposium, from the Japan side, Mr. Tanaka (Vice mayor of Osaka City Government), Mr. Takano (Director for Environmental Policy, Environment Bureau of Osaka City) and 30 relevant parties participated. From the Vietnam side, There were about 70 participants including Mr. Ha who is Vice Minister of Ministry of Natural Resources and Environment Vietnam, Vice Chairman Cang of Ho Chi Minh City People's Committee, Mr. Kiet who is Director of Ho Chi Minh City Department of Natural Resources and Environment, and related departments and agencies in Ho Chi Minh City (Department of Industry and Trade, Department of Planninh and Architecture, Department of Transport, Department of Science and Technology etc.) and news media representatives, making the total number of participants to about 100.

In the beginning of the symposium, Mr. Cang (Vice Chairman of of Ho Chi Minh City People's Committee), Osaka City's Vice mayor, Mr. Tanaka and Mr. Ha Vice Minister of Ministry of Natural Resources and Environment Vietnam presented an opening remarks. An introduction by Mr. Kiet (Director of Ho Chi Minh City Department of Natural Resources and Environment) on the current (2013 – 2015) progress in the Ho Chi Minh City Climate Change Action Plan and the project developments followed. Mr.Chau who is Vice Manager of Ho Chi Minh City's Climate change Bureau presented on the outline of Ho Chi Minh City Climate Change Action Plan for the next term (2016 – 2020) and its future plans including the support given by Osaka City this year. After the mentioned presentations, Mr. Takano (Director for Environmental Policy, Environment Bureau of Osaka City) spoke on the measures and policies, plans and projects in detail that aimed to develop a low-carbon Ho Chi Minh City based on the experiences in Osaka City. With these presentations, the progress of specific efforts toward realizing a low-carbon Ho Chi Minh City was shared. Moreover, Ho Chi Minh City also benefited from the administrative perspective with the knowledge and information by Osaka City, by posing questions to the panel especially in regard to pressing issues like countermeasures against water exposure, floods and the construction of an underground railway that is associated with the construction of an underground city.

Later, each participating business operator was given the opportunity to present the JCM Model Project, successful case studies, initiatives behind the JCM Project Feasibility Study, and to also provide updates on the framework's consistent developments in the detailed implementation of the projects and the continuous cooperation by both cities in the future in line with the plans for 2015 for Ho Chi Minh City Climate Change Action Plan 2016 – 2020.

6. Public Relations Activities

6.1 Website

Sharing of information in regard to the contents of this study is done through the following website.

([URL] http://gec.jp/citycoop/osaka-hcm-lcc/index.html)

6.2 Orientation Session for the Industry (November 2014)

The Orientation Session for the Industry that introduces the objectives and the contents of the activities of [Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City] and with the aim of inviting new participants from the private sector in the efforts of creating low-carbon cities, was held on 6th November 2014 (Thursday).

On that day, 45 participants from various private enterprises attended the session. There were dialogues and presentations on support systems for MOE, NEDO and JICA's projects that utilize JCM (a bilateral credit system) and the framework of the Japanese government including the support from Osaka City in view of the efforts in creating a low-carbon city.

7. Cooperation in Related Operations

7.1 Reports and Presentations on Domestic Progress Debriefing Sessions

On 10th September 2014, at MOE, we attended an interim report meeting to provide the necessary updates.

7.2 Presentations and Attendance of Domestic Meetings Held Before the Launch of Workshops at Targeted Locations

In regard to the content of operations, enforcement policies and schedules, in order to share information and exchange opinions, a meeting was held between MOE, National Institute for Environmental Science (NIES), Team Osaka and the related parties.

7.3 Presentations at Meetings Designated by MOE

(1) JCM Workshop (October 2014)

On 29th October 2014, we attended the JCM Workshop in Yokohama City that was hosted by MOE (and co-hosted by IGES) and presented our operations from the Osaka side along with a display poster.

(2) COP20 Side Event (December 2014)

The 20th Session of the Conference of the Parties (COP20) to the United Nations Framework Convention on Climate Change (UNFCC) that was launched in Peru, Lima (1st – 12th December 2014) has a side event that was held on the 2nd day (2nd (Tuesday) December) at the Japan Pavilion with the cooperation from MOE, Ministry of Natural Resources Environment (MONRE, Vietnam).

Ⅱ. Main Text of the Report

– Table of Contents –

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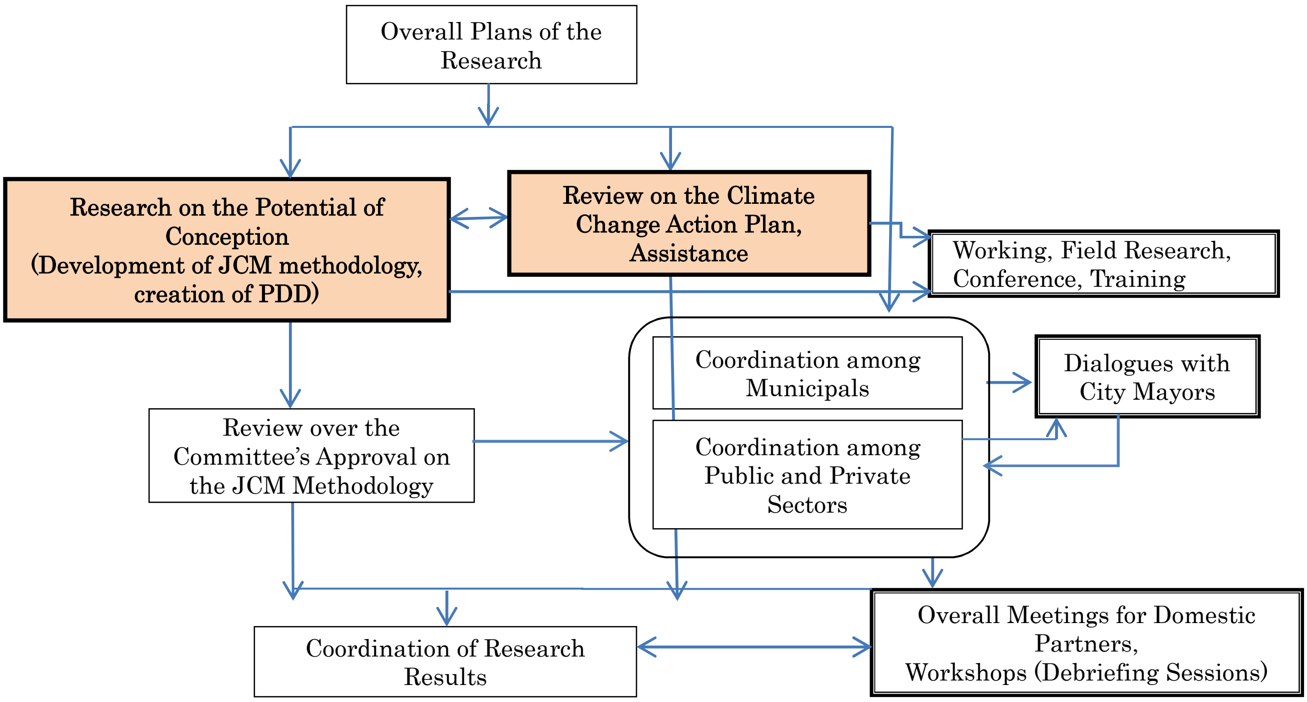


Chart　Operation Workflow

1.4 Implementation System

The implementation system of this operation is as follows.

(1) The implementation system of a low-carbon Ho Chi Minh City

The efforts towards a low-carbon Ho Chi Minh City will be the focus of and be implemented by Ho Chi Minh City Climate Change Steering board.

This committee is made up of director generals from each bureau in Ho Chi Minh City. In addition, there will be an Advisory Group (executive board) and the Secretariat of Ho Chi Minh Climate Change that act as subsidiary organizations and set within the Department of Natural Resources and Environment (DONRE).

(2) The implementation of a low-carbon city by Osaka City

Osaka City has established cross-cutting system "Osaka Steering Board for Developing Low Carbon City"on 11th July 2013 in focus with the start of technology cooperation among public and private sectors in the effort to conceive a low-carbon Ho Chi Minh City.

The support headquarter in its focus to conceive a low-carbon city with the cooperation from the Osaka government, will utilize the advanced technology of private sectors and based on the promotion of transferring comprehensive know-hows in city management and development owned by Osaka City, will provide solutions to urban issues faced in the Asian region, and will operate with the intention to vitalize the regional economy of Osaka.

(3) Implementation System of This Project

GEC, a public interest corporated foundation supported and launched joint conventions between the Osaka Headquarter of Support for the Development of a Low-Carbon City and Ho Chi Minh City Climate Change Committee (that includes 1 workshop and 2 review-working meeting).

Information in regards to the development and implementation of JCM projects in Ho Chi Minh City is shared among the Team Osaka consortium while carrying out feasibility studies by Nikken Sekkei Research Institute (NSRI) and Shimizu Corporation, creation of GHG inventories (that depict the actual conditions) by the Institute for Global Environmental Strategies (IGES) for the design of the climate change action plans in Ho Chi Minh City, applications of AIM models and future prospects by the National Institute for Environmental Studies (NIES) and the creation of comprehensive proposals that include measures by Chuo Fukken Consultants to achieve reduction targets.

To carry out the mentioned activities, the cooperation from Japan International Corporation Agency (JICA Kansai), New Energy and Industrial Technology Development Organization (NEDO), Japan External Trade Organization (Jetro)'s Ho Chi Minh City's administrators and Kansei Economic Federation (Kankeiren) has been obtained.

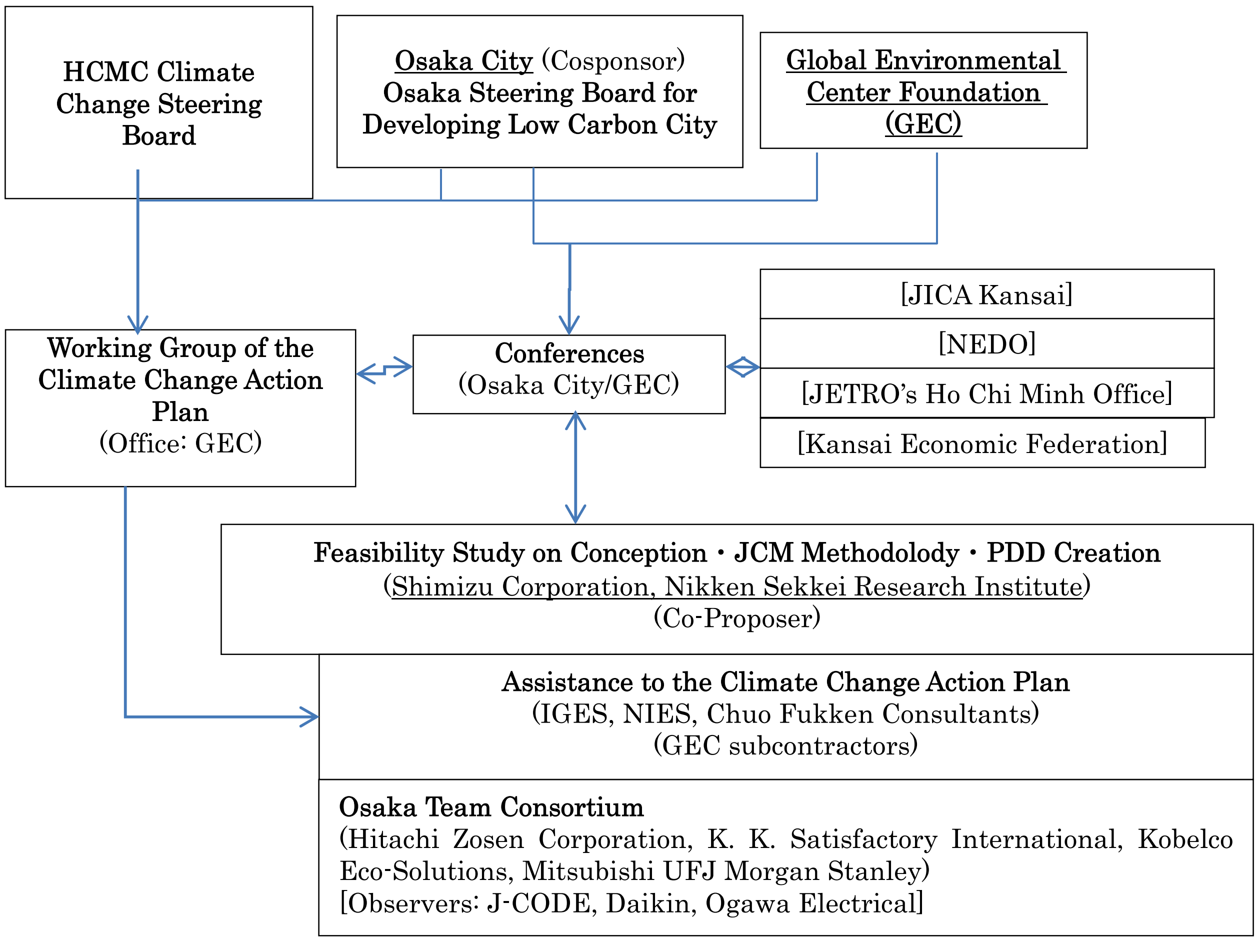


Chart　Implementation System of This Operations

2. Support for Climate Change Action Plan

The effects on climate change based on the geographical features of Ho Chi Minh City, the direction within Vietnam and in the international scene on the actual conditions of the climate change were summarized.

Firstly, we have gathered information on the GHG emission condition in Ho Chi Minh City and created an inventory on the amount of GHG emission in a year in Ho Chi Minh City. The creation of the GHG inventory took into consideration the condition of GHG emission in Osaka City and the condition of emission of other departments and the experience of creating the direction as written in the [Osaka City Global Warming Countermeasures Action Plan] that was formulated by Osaka City and the information on the maintenance of measures, policies and necessary systems will be shared with Ho Chi Minh City.

Based on the actual conditions in Ho Chi Minh City and the above-mentioned GHG inventory, the Ho Chi Minh City Climate Change Action Plan (proposal) has included reduction targets on the emission amount of GHG and stated reference years and annual targets. In regards to the future forecasts of the emission amount of GHG, together with the use of a climate change simulation model and the cooperation with NIES that has promoted the use of the model in developing nations (and provided the necessary skill developments for such purpose), conferences at Ho Chi Minh City were organized, that were directed at decisions on annual targets and how to achieve them, with much deliberation with Ho Chi Minh City towards the practical use of the results of future forecasts based on the Asia Pacific Integrated Model (AIM).

In regards to the climate change measures and its enforcement, conferences with Ho Chi Minh City have been held, 10 areas; land use planing, energy, transportation, waste management, water management, agriculture, healthcare, industry, construction and tourism were reviewed and listed systematically.

In addition, issues on the quality of Japanese technology and systems, applicable financial schemes and work applications were discussed that were related to the conception of JCM project to introduce the model project that utilizes JCM into immediate strategic fields that were decided during conferences with Osaka City and Ho Chi Minh City.

Such contents were used to create action plans (proposals) and to carry out detailed reviews during the Working Grooup Meetings (5 times in Ho Chi Minh City) that comprise of relevant participants. The action plan is expected to be approved in Vietnam within 2015 but meanwhile much support is still needed till the approval has been given.

In addition, to carry out the policies of the Climate Change Action Plan effectively in Ho Chi Minh City, invitations from Japan (that consists of 2 officers from Ho Chi Minh City every time) and opportunities to organize field working sessions will be utilized. Training in creating GHG inventories, estimates on future GHG emission amount based on AIM's activities, climate change action plans based on the experience of implementing the [Action Plan for Osaka City's Countermeasures against Global Warming] will be carried out to train the necessary human resources in Ho Chi Minh City.

2.1 Review-Working Meetings

(1) Outline

In regards to the plans of the Climate Change Action Plan (Proposal) as shown below, further studies have been carried out at Review-Working Meetings (in which 5 were in Ho Chi Minh City) that comprise of relevant participants. Also, the action plan is expected to be approved in Vietnam within 2015 but meanwhile, much support is still needed still the approval has been given.

Table　Outline on the Hosting of Review-Working Meetings

Meeting	Date	Attendees
Kick-off Meeting	13th (Tuesday) - 15th (Thursday) May 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies
1st Working Group Meeting	7th (Tuesday) - 11th (Friday) July 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies
2nd Working Group Meeting	19th (Tuesday) - 22nd (Friday) August 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies
Field Research	3rd (Monday) - 4th (Tuesday) November 2014	Ho Chi Minh Climate Change Bureau

Field Research	4th (Thursday) - 10th (Wednesday) December 2014	Ho Chi Minh Climate Change Bureau and other related department and agencies

(2) 2014 Kick-off Meeting (May 2014)

To share information and exchange opinions on the on the content of the operations for 2014, the policies, schedules and so forth, a kick-off meeting was launched with Ho Chi Minh Climate Change Bureau and other related department and agencies.

[Date] 13 (Tuesday) – 15th (Thursday) May 2014

[Attendees] Ho Chi Minh Climate Change Bureau, other related department
And agencies

[Agenda]

① The actual condition of Ho Chi Minh City

- Ho Chi Minh City (HCMC) is Vietnam's central city and is one of the top 10 cities in the world that is largely affected by climate change.
- HCMC is located at the lower region of the Saigon River and there are many waterways (that includes affluent), making it a hub for water transportation network. The sea level altitude at the North West of HCMC is 10 – 25m, and at the South West, it is 0 – 1.5m. Hence, based on climate change, a 75cm – 1m sea level rise can occur and cause 61% of the region to be submerged in water.
- Motorbikes make up a big portion of the travel mode choice because it is a light vehicle that can make turns in small radiuses. Also, motorbikes can cut through traffic congestion and park anywhere, making it a great match for the lifestyle of the people in HCMC. For the purpose of a model shift, a change in mentality would be necessary too. Also, there are 5 – 6 million motorbikes, 500 thousand cars (with an assumption that there is a 10% addition to that of unregistered vehicles in HCMC), 500 thousand cargo trucks, 1300 buses (with future plans of increasing another 300 more).
- City development plans in HCMC includes expanding the satellite city from the center of HCMC to all directions. In view of this, we expect a construction rush to happen and there will definitely be an increase in building materials and construction projects. In addition, we acknowledge the need to correspond with the climate change within the developments in each region.
- Possibility of floods in 154 villages and districts due to flood tides, heavy downpours, water discharge from dams
- The heat island phenomenon has been observed in HCMC urban region.
- The low awareness towards climate change among HCMC people is a big problem. Without the awareness, actual action cannot be carried out effectively. In view of this, public awareness activities are vital. Public awareness activities are not limited to public sectors and the people

but should also be conducted for the private sector.

・ It is also necessary to take into account climate change issues in related plans. For this, we will share Japan's experiences. In addition, we will not only limit it to Osaka City, as it is also important to promote wider international cooperation.

② Action plan, AIM, Inventory

・ An explanation was given on the creation of the action plan from Japan's side, AIM, and the enforcement policies behind the creation of the inventories.

・ It has been made aware that GHG inventories will play a vital role in the city's future policy planning. Even for content that is outside the jurisdiction of HCCB, it will be implemented into the action plan, and PR materials that talk about the importance of the operations will be utilized at other departments and agencies. (HCMC)

・ In regard to the results from the GHG inventories, there is a desire to carry out an evaluation from two perspectives; environmental (GHG reduction amount) and economical (B/C), placement of an order of priority and climate change measures. (HCMC)

・ There is a desire to create the GHG inventories in regard to 7 areas; energy, transportation, Industry, water management, waste management and land use planing and healthcare (with additional detailed approaches). Ho Chi Minh City is divided into 24 districts and each carries different features. In future, there is a desire to plan action plans for each district but at the moment, the districts have been groups into 6 districts (1 urban district, 4 satellite city districts, 1 agricultural district) and inventories and action plans will be created in regard to the 6 districts. The target for completion of the creation of the action plan is December 2015. (HCMC)

・ In the review of the action plan, in regard to the reviewed matters in the GHG inventory, we would like to introduce case studies and experiences in Japan (Osaka City). Osaka City is recognized as an excellent environmental city and we would like to introduce the development of the legal system, administrative management, challenges, experiences, solutions and corporate actions that led to this excellent environmental city. (HCMC)

・ Especially, the tax collection system in HCMC is broken and we cannot expect taxpayer-financed investments. To be able to utilized gained profits from the implementation of the climate change action plan (for example, the selling of generated electricity), it is necessary to make money from the following investments spent on the operations. We would also like to provide advice on the perspective of city management. (HCMC)

・ It is understood that there is a need to create the action plan on HCMC side, apply the policies that fill the gap of future forecasts and the actual conditions based on the use of AIM along with the creation of GHG inventories. (HCMC)

・ It is understood that the GHG inventories have the necessary and sufficient conditions to promote climate change measures (including action plan measures). However, it cannot be said that the degree of accuracy of the data in Vietnam is good. It is necessary to seriously consider on how to deduce the data. (HCMC)

- The inventory is a new approach. Thereupon, there are difficulties in understanding the actual conditions. With the experiences in Japan, it is still possible to build with the simulation methods but the collection of accurate data is preferable. Hence we propose either one of the following methods: (i) to limit it to easy-to-approach fields or (ii) direct it only to the main parts of main fields. (HCMC)

  -> GHG inventory is a strong tool for municipals to manage and enforce low carbon measures sustainably and will be a necessity in the future. Thereupon, it is vital to invest in manpower for a sustainable development. The methods will not be perfect but we will start from easy-to-handle parts and expand to other areas with ways that have been adopted actually in Japan. (Team Osaka)
- In regard to the necessary data for the creation of GHG inventories, we will request for a list to be created based on the results of this conference. It is necessary to standardize data from each year but how many sets of annual data can be collected? (Team Osaka)
- It is necessary for MRV to create living things. Up to recent years, Japan has well prepared statistical data. In HCMC, there is a necessity to unify the gathered statistical data. (Team Osaka)
- From the perspective of sustaining the action plan in the future, it is vital to include a data reporting system into the action plan. We are able to advise from Osaka City in regard to the creation of a data reporting and management system. (Team Osaka)
- In HCMC, there is an issue of a shortage in manpower. We would appreciate cooperation in the training of personnel for various fields. (HCMC)
- The 2016 – 2020 Climate Change Action Plan has been approved by the committee. It is necessary to plan a detailed action plan for this plan. For this, we envision a committee that comprises of related departments and agencies. We assume departments and agencies that have agreed to participate in the meetings to also participate in this committee (which will be related to the planning of a sustainable climate change action plan). (HCMC)

(3) 1st Working Group Meeting (July 2014)

To facilitate the planning of the climate change measure action plan, the 1st review-working meeting with Ho Chi Minh Climate Change Bureau and other related department and agencies was held.

[Date] 7th (Tuesday) - 11th (Friday) July 2014
[Attendees] Ho Chi Minh Climate Change Bureau, other related department and agencies
[Agenda]

① Outline

- A conference was held in relation to the confirmation on the progress behind the planning of [2016-2020 Ho Chi Minh City Climate Change Action Plan (HCMC CCAP 2016-2020)] and on the contents of both the Japan and Ho Chi Minh City (HCMC) proposal related to the building, contents and policies of CCAP.

・ An agreement has been reached in regard to the target period and its policy behind the description of each chapter, legal bases, fundamental concepts, background, settings of the proposed 1st menu list on the climate change action, program and operations and the confirmation of the structure of HCMC CCAP 2016 – 2020 (table of contents, chapter division).

・ This action plan is related to climate change measures and not easing measures. In regard to adaptive measures, each department and agency in Ho Chi Minh City has proposed interested measures.

② The structure of CCAP 2016-2020

・ We are in agreement in regards to Team Osaka's proposed framework but would like to have the following points added. (HCMC)

  ・ In the 6th Chapter (Objectives of the Plan), there are only targets related to easing measures. Request for an addition of objectives related to adaptive measures.

  *The policy of the central government is to focus on adaptive measures first.

  ・ Request for an addition of the principles behind the order of priority of measures and policies (the basis of selection, grading and so forth) In the 7th Chapter (Measures and Policies to Achieve Targets) and the 8th Chapter (Measures and Policies on Climate Change in Each District). (HCMC)

・ Adaptive measures for ground subsidence, floods and so forth have been included in CCAP. The 5th Chapter (Current Estimates and Future Forecasts on Greenhouse Gasses (GHG)) should be revised to draw links to easing measures. (HCMC)

・ In regard to the measures of organized fields in the 7th Chapter, we should consider the existence or non-existence and the insufficiency of statistical data and make the proper selection. In regard to the GHG emission amount, it should be made clear whether only the inventory or the survey would be used. In the event that the survey is selected, the workload will be a large-scale one. (HCMC)

・ In regard to the measure at each district as stated in the 8th Chapter, due to the different industrial development situation in each district, the unification of measures for all the districts would be impossible. In addition, the southern region of Nha Be and the 7th district have plans to be a special economic zone. Hence, it is necessary to take into consideration of such development plans. (HCMC)

・ Is the main objective of CCAP 2016 – 2020 about the climate change measures (adaptation) or developing a low-carbon city (mitigation)? (HCMC)

・ In the current framework proposal, the focus is on mitigation. However, if climate change measures were the main objectives, adaptation of breakwater preparation and breed improvement of agricultural crops from an agricultural perspective will also be included. (HCMC)

・ We will have to decide based on the CCAP principles as to which is more important; adaptation or mitigation. It would be great if the HCMC side will organize the CCAP principles and proceed in planning and cooperating with HCCB and related departments and agencies. (Team Osaka)
・ It is undeniable that in Japan, the focus has been on mitigation. Currently there is a keen interest in adaptation, and a committee for adaptation has been established within MOE. (Team Osaka)
・ It is recommended that HCMC define both adaptation and mitigation in CCAP. (Team Osaka)
・ In regard to the measures and policies of organized fields, 8 areas (energy, transportation, Industry, water management, waste management, agriculture, healthcare, land use planing) have been considered. We would like to add 2 more fields; construction and tourism, making the total number of fields, 10. (HCMC)
・ In addition to the current GHG emission amount, we would like to add a description in regard to the current climate change and its effects. (HCMC)
・ In the 5th Chapter, the current state and future forecast of Greenhouse gases have been clearly stated and we have gotten the impression that the content on measures and policies focuses on easing measures. However, is there a need to include in CCAP both adaptation and mitigation? (HCMC)

③ Measures and policies of HCMC CCAP

・ It is highly important in considering the order of priority of each measures. However, in doing so, the task of placing an emphasis on which perspective is a difficult issue. (Team Osaka)
・ In considering the order of priority of a measure, the following perspectives are important. (Team Osaka)
  ・Feasibility of the project
  ・Explicitness/visualization (by the citizens)
  ・Consistency with the country's or city's top priority plans
・ Based on the above-mentioned points, a detailed deliberation is possible from the cooperation towards the measures and policies menu (a refined list based on both the HCMC's information and Japan's experiences) proposed by Osaka City. (Team Osaka)
・ By district, to implement all the fields' measures in all the districts would be difficult. It is better to select effective measures for each district. (Team Osaka)
・ On reflection of CCAP 2015, there is a necessity to plan for CCAP 2016 – 2020. (In CCAP 2015, there were many planned measures but measures that were implemented were few) (HCMC)
・ We would like to focus on measures that have high feasibility and conduct them. (HCMC)
・ In regard to the health field, we hope that you will explain to us in detail, what you are referring to. (Team Osaka)

・ In the future, due to the effects of climate change, there is a possibility that new diseases will appear. Hence, there is a need to also consider the healtcare field. For example, whether it is linked to the effects of climate change or not, the fact is that now adults are exposed to the risk of diseases that only affected children in the past. (HCMC)

④ Division of districts

・ In regard to the organization of measures and policies based on districts, areas that are utilized within the progressive city center and government offices are categorized. However, the division of districts should be based on the features of the region. (HCMC)

・ For regions that share the same features, the effects of climate change can be considered similar and hence the same measures can be carried out. Hence, it is a must to divide areas based on districts that share the same features. (HCMC)

・ The definition of the term “district” may differ subtly and in regard to this, the HCMC side should review on that and establish a set definition. (HCMC)

・ In regard to priority districts, we would like to change its definition to “districts, where model projects are focused on” and not as “model districts”. (Team Osaka)

⑤ GHG Inventories

・ We have experienced insufficient data situations in other countries too. (Team Osaka)

・ At HCMC, there is data on the head-count of livestock but the data on production volume of fertilizer is unknown. With the country’s production volume used as a base, prorate HCMC’s portion and the necessary calculations can be performed. (Team Osaka)

⑥ Others

・ There are many measures that we would like to carry out early but due to strict budgets, we are unable to proceed. Hence, we are highly anticipating on PPP but we would like to know your opinions on this matter too. (HCMC)

・ There are responsibilities to be carried out by the private sectors on behalf of the public sectors, but at the end of the day, the responsibility is on the part of the public sectors. (Team Osaka)

・ Based on the experiences in Osaka City, though PPP executions were carried out efficiently but even so, the budget did not dramatically decrease. (Team Osaka)

・ From the development of infrastructures, new enterprises will appear and this will result in the increase in tax revenue. It is important to look at the income and expenditure of this operation as a whole and not separately. (Team Osaka)

(4) 2nd Working Group Meeting (August 2014)

To facilitate the planning of the climate change measure action plan, the 2nd review-working meeting with the Ho Chi Minh Climate Change Bureau and other related department and agencies was held. For the 2nd working Group meeting, we have had the pleasure of the attendance of the Vice Minister of MOEJ and the Japanese Consulate in Ho Chi Minh City as guests.

[Date] 19th (Tuesday) – 22nd (Friday) August 2014

[Attendees] Ho Chi Minh City Depertment of Natural Resource and Environment, Secretariat of Ho Chi Minh Climate Change Bureau, other related department and agencies

[Agenda]

① Outline

・ Confirmation on the progress in planning [Ho Chi Minh City Climate Change Action Plan 2016-2020 (HCMC CCAP 2016-2020)], deliberation in regard to Climate Change Project (proposal) that Team Osaka proposed and an announcement on the review of AIM and GHG inventories were carried out.

② Climate Change Action Plan (Proposal)

<Overall>

・ With Nha Be district and 4 other districts as model districts, there will be cooperation with Team Osaka within the 2016 – 2020 period to create a draft report on the action plan that has already been formally approved by the committee. In regard to the 4 districts, cooperation with Holland in the previous 2 – 3 months has been smooth, and hence directions from the committee have been given to expand to other 6 – 7 districts and not only to concentrate at Nha Be district and the 4 districts. However, in regard to Team Osaka, at the current moment, we would like them to concentrate at Nha Be district and the 4 districts.

<Transportation>

・ In regard to greening efforts of the roads, we would appreciate information sharing on the experiences in Osaka City.

・ In regard to the FS study conducted by Nikken Sekkei on the park and bus ride operations, we have applied to the Department of Transport for the development of a bus route that can be used for commuting and we would appreciate the cooperation in this matter. We are considering the use of this P&BR route only during commuting hours.

<Energy>

・ We have to create [2016-2025 Renewable Energy Master Plan] and [2016 – 2025 Ho Chi Minh City Development Plan].

・ For the implementation of energy conservation, blackout countermeasures and renewable energy, it is necessary to promote smart grid efforts.

・ The related departments and agencies in Ho Chi Minh City is required to build a climate change database that can impact data. We hope that Team Osaka will share the necessary information in a language that Ho Chi Minh City can understand as we would like to utilize the system format in Osaka City.

・ We would appreciate the cooperation in the transfer of technology for the continued use of the AIM model.

・ The biomass project that is worth about 5 million US dollars that was conducted by JICA for

Ho Chi Minh City University of Technology has concluded. We would appreciate the cooperation in continuing the facilities and maintenance of the system under a separate scheme.

<Water Management>

・ We would appreciate the cooperation in regard to flood countermeasures caused by climate change.

・ Reservoir and flood issues are the biggest issues in the planning of Ho Chi Minh City Development Master Plan. Flood countermeasures include building levees and reservoirs and raising ground level. In Ho Chi Minh City, reservoir building is the only countermeasure needed but in the other 4 districts, due to the low ground level, all three aforementioned countermeasures are required. During the infrastructure development of roads, it is realistic to use JICA's support that is related to infrastructure and to slowly promote the measures and hence to conduct all three countermeasures and the ability to show it as a model is important.

・ Procedures involve external water management (levee infrastructure) to internal water management (drainage water and so forth). Currently external water management is insufficient and seawater has infiltrated the ground below. Hence, it is premature to consider projects of laying electrical wires underground in the whole region. For districts that have external water management, it is necessary to execute underground infrastructure projects as model projects.

・ Japan's first underground city was developed in Osaka City and therefore, Osaka City is able to provide the support needed in relations to developing underground cities. To waterproof underground cities, Osaka City places the entrance to the underground city at a higher level than ground level and constructs waterproof barriers.

・ The project list IV-2 on the reuse of drainage treatment draws much attention in a city but since there is no standard of water-purity yet during its reuse, it is necessary to begin from developing regulations around it. Support from Osaka City may be necessary.

・ We would like to re-use rain water as water for washing in markets. There is no necessity to determine the standard of water-purity.

・ Underground water in the 4 districts is contaminated and cannot be used.

・ Projects at the 4th District primary school (observation in the morning on the same day)

  ・ In regard to the use of rain water and the system, negotiations with Japanese corporations will be presented to HCMC's side.

  ・ In regard to the use of tap water, we would appreciate it if data on the standard of water-purity for its use as drinking water and in daily life errands exists to be shared.

  ・ There are plans to install solar panels on the roof of the primary school.

  ・ Cost related to the installation of solar panels and use of rain water is to be calculated.

<Waste Management>

・ Solid waste is treated as waste. Hazardous waste and medical waste will also be categorized under the term waste.

- All treatment facilities in HCMC are small with adopted technology that is not modern and the heat recovery rate is bad. Gases formed when toxic substances have been removed are not properly exhausted. During a training course in Japan, the team went on an excursion to an excellent biogas treatment facility and was impressed.
- In regard to waste treatment, the main dissatisfaction of the people is the bad odor from the transitional facilities.
- Binh Dien Wholesale Market's raw garbage treatment is an issue and we are concerned with the raw garbage treatment operations at the market. Currently, garbage is being released into the river.
- In regard to the countermeasures against bad odor during the transportation of waste, with the improvements on the system and accuracy of the vehicle, as in the case of waste transportation in Japan, there is rarely any bad odor.
- With garbage incineration, the amount has reduced to 1/20 and both hygiene and administrative cost can be kept under control. We presume that the technology to control the occurrence of dioxin has been established.
- To reuse sewage sludge, would it be possible to reuse it as pavement materials?

  -> In Japan, sewage sludge is processed through incineration and melt treatment is and the resulting melted slag is used as construction material.
- There is a need for countermeasures against bad odor from the garbage collection transitional facilities.

  -> It is unsanitary to collect garbage from a transitional facility that is located close to a residential area. Organic garbage should be incinerated at a direct incineration facility without having to go through sorted collection at a household and a transitional site.

<Agriculture>

- Are the projects under this operation recognized as infrastructure development like hard projects or management (research, personnel training etc.) like soft projects? What about GHG easing projects? Are adaptive projects (quality improvement etc.) also included?

  -> It is not limited only to easing and infrastructure building. Although the work behind creating JCM projects has been entrusted by MOE, GHG reduction will still be the foundation of this operation.
- Would there be any problems in thinking that funds for each project are not limited to JCM but can be sourced from ODA, BOT and private funds?

  -> There would be no problems in doing so. The JCM operations are well supported by MOE.
- In regard to the purification of VI-2 agriculture discharge, would it be technically impossible to return it to the rivers?

  -> Japan is reducing the amount of agricultural chemicals and practice methods that do not to influence water quality.

・ There is an interest in technology that will improve river pollution, by reducing the amount of agriculture chemicals and fertilizers by applying them to the produce efficiently.

・ Around Ho Chi Minh City, there are large-scale chicken farms and pig farms that are privately managed. Would it be possible for installations of biogas electricity generator and heat supplier based on livestock waste? Can it start off as a pilot project? Is it realistic to consider it as an in-house power generator than a source of income by selling electricity to EDL?

-> As mitigation of climate change, it is already possible as a CDM to operate a biogas project based on livestock waste. However, to sell the power to EDL, it will require a large-scale facility (of 10,000 heads in a pig farm) or else the yield will be low. Also, in regard to the characteristics of biogases, because the elements fluctuate greatly, it would be a necessity to adopt high methane gas refinement technology. In this matter, wouldn't it be more realistic to adopt the in-house power generator?

<Land Use Planning>

・ [VII-8 Prevention of Landslides with Tree-Planting] should be incorporated into the agriculture field.

<Healthcare>

・ To solve the problem of insufficient numbers of hospitals, we expect construction support of new hospitals that are under the JICA scheme. In regard to personnel training, training is possible at Osaka City's university hospitals.

・ We would like to add new projects in light of the issue raised by the HCMC side on the need of appropriate treatment of hospital discharge and waste and the occurrence of diseases caused by climate change.

<Construction/Tourism>

・ We would appreciate it if the HCMC side would come up with the ideas.

(5) Field Research (November 2014)

To facilitate the planning of the climate change action plan, a separate consultation with the Secretariat of Ho Chi Minh Climate Change was held.

[Date] 3rd (Monday) – 4th (Tuesday) November 2014

[Attendees] Ho Chi Minh Climate Change Bureau

[Agenda]

① Outline

・ A discussion was held in regard to the coordination of the city mayor's symposium that is scheduled to be held in January, the planning of [Ho Chi Minh City Climate Change Action Plan 2016-2020 (HCMC CCAP 2016-2020)] and the list of projects proposed by Team Osaka.

② Planning of HCMC CCAP 2016-2020

・ The general meeting for the Communist Party of Vietnam will either be held in December

2015 or at the beginning of 2016. As it would be necessary to explain the CCAP to related departments and agencies from September to October, it would be necessary to plan the CCAP until June 2015. (HCMC)

・ We would like to announce the results of our data collection and arrangement as the data collection for the GHG inventories are about to conclude. (HCMC)

・ In regard to the presented materials on CCAP, we are moving into improving the PowerPoint presentation that was presented by HCCB at the August meeting. (HCMC)

・ In regard to the assessment criterion for the measures and policies, we hope to get more information on the experience and know-how that Osaka City has accumulated so far. We are aware that for the assessment criterion, objectivity is important. We would like to set a standard, where regardless of the evaluator, the assessment results will be valid. Hence, we are looking into a quantitative assessment. In the event that quantification is difficult, we shall consider a qualitative assessment. We would like to assess it in a manner, where the order of priority for operations and fields that are highly influenced by climate changes like temperature increase, high tides and heavy downpours are given a higher assessment. (HCMC)

・ The August briefing paper stated that the World Bank's CIP (Capital Investment Planning) and Self-Assessment Methods should be considered as a reference. If they can be used as an assessment criterion, we would like to do so. (HCMC)

・ The following 2 guidelines are found in the Ministry of Natural Resources Environment (MONRE) (Only available in Vietnamese). (HCMC)

① CCAP Planning Manual

② Assessment Manual on the Effects, Loss and Damage Caused by Climate Change

・ Among the 2 manuals, in regard to ①, there is no necessity in proceeding by following the manual religiously. On the other hand, in regard to ②, in the event of reviewing the assessment criterion for the set measures and policies in CCAP, its consideration is necessary. (HCMC)

・ In regard to the Support Program to Respond to Climate Change that is a part of the budget's framework, which is related to the climate change measures that was shown by the Vietnamese government, HCMC can apply for budgets. In the event that the necessity of a project has been acknowledged, it is possible to secure a budget. Hence, this is can be considered as an alternative in securing finances. (HCMC)

・ In regard to the measures and policies of the 10 fields organized in CCAP, we would like to have HCCB and related departments and agencies to deliberate with Team Osaka for a span of 5 days in the first half of December. (HCMC)

・ During the deliberation, we would like to give preference to the fields; energy, transportation, water management, waste and discharge, construction (environment-friendly construction materials). (HCMC)

・ Greening activities in land utilization field is important. (HCMC)

③ Project List

<Energy >

・ In regard to the project list of the energy field, HCCB has the following comments.

・ The outline of [Urban Energy-Saving System] is abstract.

・ The [Introduction of Energy-Saving Glass] is a measure and policy that we want to carry out.

・ There is insufficient wind power to implement wind power generation in HCMC.

・The order of priority for measures and policies thought up by HCCB is as below.

"High" order of priority

① [Energy efficiency technology applied to whole building]

② [Introduction of ESCO Project]

③ [Introduction of High Efficiency Lighting]

④ [Introduction of High Efficiency Air-Conditioners (Inverted Models)]

⑤ [Introduction of Energy-Saving Equipment for Small and Medium Enterprises]

"Medium" order of priority

① [Introduction of Solar Power Generation]

② [Introduction of Solar-Powered Water Heater]

③ [Introduction of Energy-Saving Glass]

④ [Greening of Roofs and Walls]

"Low" order of priority

① [Urban Energy-Saving System]

② [Introduction of Small Hydroelectric Generation]

③ [Introduction of Wind Power Generation]

・ The Department of Industry and Trade have plans to convert 2000 street lamps to LED lights in November.

・ Currently in the country, business operators are conducting audits in regard to energy consumption volume. Each business operator's energy consumption volume is converted to oil consumption volume. Business operators that have a consumption volume that is higher than the set standard will be subjected to the audits. In HCMC, currently, there are 200 operators that are being audited.

・ The Energy-Saving Center understands the framework in relation to HCMC's energy issues the most.

・ We are looking for a model project to carry out energy-saving methods for subject electronic factories. We would like to know which industrial is the place where electronic factories are usually gathered.

-> It is possible to think of the Saigon Hi-Tech Park at District 9 as a candidate.

<Waste Management>

・ In regard to the project list of the waste field, HCCB has the following comments.

・ [Sorted Treatment for Hazardous Waste] is already being implemented in HCMC.

- [Waste Management through an Electronic Manifesto] is not being implemented but waste management through the paper medium is being carried out. (For operators, whose hazardous waste exceeds the set standard, they are required to report it on paper. In regard to other waste, there is no compulsory reporting system).
- In regard to the [Waste Management through an Electronic Manifesto], we expect to implement it in a phased manner. In the event that HCMC takes the lead in the country by implementing the model project, other cities will be subjected to strict standards and the people from each region might complain.
- In regard to the [Commission of Collection of Sorted Raw Garbage], we will add the 4th district as a target.

・ When collecting garbage from households, at the moment, each household is charged a fixed amount (that does not depend on the number of people in each household). However, in the future, there are plans to set the amount based on the amount of garbage disposed. For this measure and policy, we would like to request an addition in the project list. In addition, we would appreciate guidance in a good billing method.

・ The order of priority of the measures and policies and the concept behind it by HCCB is as below.

Concept: ①The degree of important of the issue of the actual condition, ②Relevance to the measures and policies

① [Commission of Collection of Sorted Raw Garbage]
② [Biogas Electricity Generator]
③ [Solid Waste Electricity Generator]
④ [Sorted Treatment for Hazardous Waste]
⑤ [Waste Management through an Electronic Manifesto]
⑥ [Reduction and Reuse of Sewage Sludge]

<Water Management >

・ In regard to the project list of the water management field, HCCB has the following comments.

- In regard to the [Development of a Sewage Ledger System], we would like to know the contents and results of the detailed plans in the 1st District, Ben Nghe.
- The outline of [Prevention of External Water Infiltration] talks about the development of levees and reservoirs. However, levee developments as a countermeasure against external water and reservoir developments as countermeasures against internal water are separate measures.
- [Developments of Pumps and Watertight Gates] are being implemented in parts in HCMC.

・ In regard to the order or priority of the measures and policies, the order is categorized into ①measures and policies related to water supply, ②Countermeasures against discharge and floods, ③Others.

<Agriculture >

- In regard to the project list of the agriculture field, HCCB has the following comments.
  - [Introduction of Water-Saving Pumps that use Renewable Energy] and [Prevention of Landslides with Tree-Planting] are being implemented in parts by Department of Agriculture and Rural Development.
- The order of priority of the measures and policies by HCCB is as below.

  ① [Prevention of Landslides with Tree-Planting]

  ② [Introduction of Water-Saving Pumps that use Renewable Energy]

  ③ [Breed Development of Agricultural Crops that Correspond to Climate Change]

  ④ [Biogas Electricity Generation Based on Livestock Waste]

  ④ [Reduction in the Used Amount of Agriculture Chemicals and Fertilizers]

  ④ [Solar Power Generation in Agricultural Regions]

<Tourism>

- In regard to the tourism field, as the measures and policies overlap with other fields, we would like to review this field again.
- In regard to the project list of the tourism field, HCCB has the following comments.
  - Other departments and agencies are currently implementing the feasibility study on the water transport network system.
  - From a climate change measure perspective eco-tourism holds a negative impression as it will influence the ecology system.

(6) Field Research (December 2014)

To facilitate the planning of the climate change action plan, a separate consultation with the Secretariat of Ho Chi Minh Climate Change and other departments and agencies that were related to each field was held.

[Date] 4th (Thursday) – 10th (Wednesday) December 2014

[Attendees] Ho Chi Minh Climate Change Bureau

Energy Field: Development of Industry and Trade, Electricity of Vietnam (EVN)

Transportation Field: Department of Transport, Urban Civil Works Construction Investment Management Authority

Tourism Field: Department of Tourism

Water Management Field: Sai Gon Water Corporation, Urban Drainage Company

Healthcare Field: Ministry of Health portal, Department of Health

Construction, Land Use Planning Field: Department of Construction, Department of Planning and Architecture

[Agenda]

① Outline

・ Deliberation was held with the related departments and agencies of each field was held in regard to [Ho Chi Minh City Climate Change Action Plan 2016-2020 (HCMC CCAP 2016-2020)]'s progress and contents of the project list that Team Osaka has proposed.

② Contents of Project List

<Energy>

・ In regard to the review and development of the measures and policies, EVN has the following opinions.
  - ・ We should set the objectives of the action plan and review the measures and policies and operations needed to achieve the objectives.
  - ・ In regard to each measure and policy and operation, we should decide on the implementation period with each representative from the related department or agency.

・ For the project list, EVN has the following opinions and suggestions.
  - ・ In regard to II-6 (Introduction of Solar Power Generation), there is a need for a subsidy system. In addition, the current condition does not encourage foreign investors to explore the feasibility of this project.
  - ・ In regard to II-10 (Urban Energy-Saving System), considering the current situation in Ho Chi Minh City and how the implementation would be difficult, how about about removing this from the project list? Or else, we will have to give it our lowest priority. This project can be considered for new cities or regions where the development of infrastructure is ongoing.
  - ・ In regard to II-11 (Introduction of Small Hydroelectric Generation), besides water distributing places as targets, how about expanding it to water suppliers?
  - ・ We would like to include informative and awareness campaigns (education) and awareness raising programs for the people into the project list.
  - ・ For countermeasures against short circuits, we would like to include improvement on electrical power distribution equipment and substation into the project list.

・ In regard to the project list, HCCB has the following opinions.
  - ・ In regard to the awareness programs and the improvement of the efficiency of electric power transmission, such matters should be included into the project list.
  - ・ In regard to II-10 (Urban Energy-Saving System), II-10 (Introduction of Small Hydroelectric Generation), II-12 (Introduction of Wind Power Generation), implementing them at this moment is difficult but from a broad perspective, it should not be removed from the project list. II-10 should be implemented in a proactive manner and be given a high priority to be carried out mandatorily in new cities.

◆ Current Condition on the Efforts Related to Energy-Saving Approaches in Ho Chi Minh City

・ For 8 years since 2006, we have implemented the approaches in our appeal to the public to conserve electricity. As a result, our figures show that we managed to conserve 2 billion kilowatts/hour.

- For educational and awareness programs related to energy-saving, educational activities for children are carried out at educational centers.
- For enterprises, introduction of energy-saving technology and awareness raising programs are implemented.
- In order to understand the current situation of electricity consumption by business operators, a study on each business operator’s annual energy consumption volume (energy audit) is being carried out.
- Solar-powered water heaters are installed at 8000 locations.
- In regard to energy-saving equipment, there is a demand for those that can be installed at compact spaces.
- EVN offices nationwide are recognized and certified as the most energy-saving environment.
- The rate of demand for electricity/the rate of economic growth is 1.5 – 1.8 on a national scale and 0.5 – 0.7 in Ho Chi Minh City.

<Transportation>

- In regard to the project list, Department of Transport has the following opinions and suggestions.
    - In regard to the measures and policies proposed, we do not hold any different opinions.
    - We would like the transportation master plan to be confirmed. The measures and policies related to BRT are especially important.
    - There are already plans for III-12 (Construction of Bus Rapid Transportation System (BRT))
    - Part of the III-13 (Conversion to CNG Bus) are being implemented.
    - How about merging III-10 (Expansion of Bus Schedules and Routes) and III-11 (Construction of Bus Rapid Transportation System (BRT))?
    - In Vietnam, there is a difference in the meaning of [traffic] and [transportation]. [Traffic] is referred to as traffic facilities (roads, bridges, parking lots, traffic facilities), whereas [transportation] is referred to as modes of transportation (trains, taxis, boats and ships). Hence, how about classifying measures and policies that are meant for traffic and transportation separately?
    - One of the issues in Ho Chi Minh City that requires immediate attention is the countermeasure against traffic congestion. There is a need for a shift to a transportation system that focuses on a mass transit system. We are considering important measures that might require a change in the administrative setup.
- The concept behind the order of priority of the measures and policies is as below.
    - We cannot consider each measure and policy on its own. The relevance among them

is important. Hence, it is important to consider the order of priority of the measures and policies based on the relevance of the measures and policies.

◆ The Efforts from The City Traffic Infrastructure Project Managing Committee

・ As part of the efforts to reduce emission gas from any means of transportation, we are promoting Green Transport Development and introducing BRT as out main measure and policy.

・ The priorities related to the plans of introducing BRT are as follows.

  ・ There are plans to implement 30 BRT train cars that use liquefied natural gas.

  ・ Based on a study by the World Bank, the implementation of BRT has helped reduce C02 as much as 60%.

  ・ It is possible to obtain the approval on the introduction of BRT plans by the Communist Party of Vietnam by the end of this year (2014). In addition, as we proceed with detailed designs; we are scheduled to begin operations in the beginning of 2019.

  ・ The BRT will equip 5 routes in 2025 – 2030, making it a total of 6 routes.

  ・ In line with land utilization plans, it would be necessary to carry out various installations related to the introduction of BRT but at the moment there are no clear deadlines in the traffic master plan.

  ・ With the introduction of BRT, there will be plans to promote the introduction of fuel conversion, road space developments, PTPS facilities and IC cards. Also, there installation of park and ride parking lots at 9 locations are expected.

  ・ We aim to introduce an IC card system that allows its use for all public transportation services.

<Tourism >

・ In regard to the project list, Department of Tourism has the following opinions and suggestions.

  ・ Approval from the Communist Party of Vietnam on water tourism strategies has been obtained and we would like to include this into the measures and policies.

  ・ The preservation of mangroves and popularization of the concept of a pedestrian's paradise are currently being reviewed.

  ・ Dock facilities are dilapidated and we expect cooperation from private sectors.

  ・ We are also considering food and beverage facilities at conference halls.

  ・ We have not begun reviewing eco-tourism as part of a climate change measure.

<Water Management>

・ In regard to the project list, Ho Chi Minh City has the following opinions and suggestions.

  ・ It is necessary to classify the measures and policies into short, mid or long term projects.

  ・ Aren't awareness raising programs necessary after the creation of hazard maps?

- Permeable pavements are necessary but we cannot proceed because there are no specific locations that can be set as targets. If we are equipped with the technology and development support from Japan, we believe that the project is feasible. This would require a long-term operation.
- How about classifying awareness measures into water supply, discharge, securement of water source, preservation of water source, recycling water, water conservation?

・ In regard to the concept behind the order of priority of the measures and policies, Ho Chi Minh City has the following opinions and suggestions.

- In regard to the measures and policies related to water supply, the 3 important perspectives are ① the demand in the people's lives, ②feasibility, ③fund-raising capabilities.

◆ Others

・ SAWACO presented the following proposals to the Department of Natural Resources & Environment.

- Developments of water storage facilities downstream(as it is difficult to secure tap water supply from the rivers and salt pollution may occur)
- Development of levees downstream

<Healthcare >

・ In regard to the project list, Department of Health has the following opinions and suggestions.

- There is a need to build a medical-related database.
- Awareness programs for the people and medical staff are necessary. Currently, the people would still go to the hospital even for cases that do not require hospital treatment. Also, at times, doctors would transfer patients to the central hospital even if they do not require advanced medical treatment. Hence, it is important to convey the right information to the people and medical staff.

・ How about the following order of priority of measures and policies?

① VII-1 (Personnel Training for Hospital Medical Staff)

② Additional Measure and Policy (Information Collection and Management to Build a Database)

③ Additional Measure and Policy (Awareness Programs for the People and Medical Staff)

④ VII-3 (Improvements on the Hospital's Hygiene Management and Appropriate Treatment of Medical Discharge and Waste)

⑤ VII-2 (Countermeasures against Existing Diseases that Occurred in a Different Way)

◆ The Current Conditions in Relation to the Medical System in Ho Chi Minh City

・ In relation to climate change, Department of Health is dedicated in providing personnel training for medical staff as a climate change measure.

・ We would like to learn from the experiences in Osaka City as it is necessary to draw out regulations related to the countermeasures against diseases that are caused by climate change. In addition, we are considering establishing environment-related health centers.

・ The Communist Party of Vietnam has announced the construction of 5 hospitals that also include Cho Ray Hospital.

・ We would like to know more on the method of collecting data and the method of treating disease that are related to climate change from the experience in Osaka City.

・ The satellite environment program by WHO is not being implemented in Ho Chi Minh City.

・ For the purpose of personnel training in Ho Chi Minh City, the Communist Party of Vietnam recognized Pham Ngoc Thach University of Medicine in 2008. Upon its recognition, in the 1st year, there were 100 enrollments, 300 in the 2nd year and the number is expected to reach 1000 next year.

・ There are 37 municipal hospitals in Ho Chi Minh City.

<Construction >

・ In regard to the project list, the Department of Construction Management has the following opinions and suggestions.

  ・ Addition of plans on design criterion with a low impact on the environment.

  ・ The order of priority of measures and policies is as follows.

    ① Additional measure and policy (Plans on Design Criterion with a Low Impact on the Environment)

    ② IX-2 (Introduction on Energy-Saving Construction Materials)

    ③ IX-1 (Introduction on Incentives for Construction with a Low Impact on the Environment)

    ④ IX-3 (Extension of a Construction's Lifespan)

    ④ IX-4 (Introduction of Energy-Saving Construction Equipment)

    ⑥ IX-5 (Effective Use of Discharge and Waste)

◆ The Current Conditions in Relation to the Construction Field in Ho Chi Minh City

・ Vietnam does not have the same floor-area ratio concept as in Japan. In addition, the standard on construction that has low impact on the environment is not well formed and we would like to learn more from Japan's study cases and concepts.

・ Although we do have the Green Building concept that makes use of energy efficiently, however it is not standardized.

・ Tentatively, there is standard on the proportional use of bricks as a construction material. The standard allows underfired bricks to make up 30% of the whole structure but buildings that are built under this standard usually suffer cracks in their walls years after its construction and this reduces their lifespan.

・ We would like to create a construction criterion that has a low impact on the environment but Ho Chi Minh City is not capable of creating it on its own. There is a need to apply for it to the Central Government.

・ There are laws against illegal disposal of waste material but there are no standards related to the recycling of waste materials.

◆ Appointment of Model Districts for Countermeasures against High Tides, Floods

・ Among the climate change measures, in regard to countermeasures against high tides and floods, the Department of Planning and Architecture has the following opinions.

  ・ The ground at 7th district and Nha Be District does not have good support and is prone to high tides and floods caused by climate change. Hence, these measures and policies should be implemented at the 7th District and at Nha Be District and be considered as a model district for the climate change measures.

  ・ Urban development is ongoing in the 7th District with the development of residential areas and roads but as it is a low land, ground subsidence frequently occurs. Hence, it should be considered as a model district for mitigation.

  ・ The residential area around Nha Be District's Hiep Phuoc Port, is part of an ongoing urban development project and just like the 7th District, ground subsidence also occurs. Hence, it should be considered as a model district for adaptation.

  ・ The 4th District is being considered for adaptation with the support from Rotterdam City.

◆ Others

・ In regard to the environmental criterion for urban planning, the CBD (which makes up 930ha of the city's central area) will be the set subject and from there on, the same criterion will be expanded to the whole city.

・ We are considering the development of electrical wires・drainage in the ground, in relation to the development of an underground transportation system and an underground city.

・ How about considering the effective utilization of the underground space as a model project?

2.2 Training in Japan for Ho Chi Minh City Officials

(1) Trainees

Ms. Le Nguyen Que Huong (Ho Chi Minh Climate Change Bureau, Officer)

Dr. Nguyen Ky Phung (Ho Chi Minh City, Department of Science and Technology, Vice Director)

(2) Training Content

[Date]: 2nd (Monday) – 6th (Friday) June 2014

[Venue]: National Institute for Environmental Studies (Tsukuba City)
Environment Bureau of Osaka City (Osaka City)

[Objectives]: ・To facilitate the planning of Ho Chi Minh City Climate Change Action Plan, this training program focuses on the creation of future forecasts on GHG emission amount and annual GHG emission amount inventories that utilize AIM. It is also in line with the aim to realize the climate change action plan that is considered necessary for the future of Ho Chi Minh City.

・In regard to the format of this training, the core of the training will be lectures conducted by Japanese professionals but there will also be classes and discussion that encourage the trainees to participate and be involved independently in the planning of the climate change action plan and to develop their skills.

[Content]:

Date	Training Content	Venue
2nd June (Monday)	・Introduction on the activities held at the Center for Social and Environmental Systems Research at the National Institute for Environmental Studies ・Introduction on AIM study cases ・Introduction on the AIM End Course Model ・Introduction on the ExSS Model ・Adoption of AIM for a Low-Carbon Asia ・Adoption of AIM for Japan and Malaysia ・Introduction on the AIM Impact Analysis ・Introduction on the AFOLU Model ・Introduction on the Household Model	National Institute for Environmental Studies
3rd June (Tuesday)	・Hands-on practice on the ExSS Model ・Hands-on practice on the PDCA Model ・Easing measures on climate change in Ho Chi Minh City ・Overall deliberation	
4th June (Wednesday)	・Adoption of AIM for Ho Chi Minh City	Kyoto University
5th June (Thursday)	・Data collection and management for GHG Inventories ・[International Symposium on Climate Change and Waste]	Osaka City
6th June (Friday)	・Points in the planning of a climate change action plan ・Overall deliberation	

2.3 Climate Change Action Plan (Draft)

(1) Draft Structure for Climate Change Action Plan

After deliberating with Ho Chi Minh City, the draft structure for the set climate change action plan is as follow.

＜The Draft Structure for Climate Change Action Plan＞

1. Introduction
1.1 Background
1.2 Necessity
1.3 Purpose
1.4 Scope

2. Legal Framework & Policy and Implementation Period
2.1 Legal Basis
2.2 Upper Level Plan
2.3 Target Years

3. City Outlook and Related Plans
3.1 City Outlook
3.2 Related Plans

4. Past Activities for Climate Change
4.1 Implementation Status of National Missions
4.2 Implementation Status of International Cooperation Missions
4.3 Implementation Status of Climate Change Countermeasures

5. Current Situations and Future Prospects of Climate Change
5.1 Current Climate Change Conditions in Ho Chi Minh City
5.2 Future Prospects of Climate Change in Ho Chi Minh City

6. Plan Targets
6.1 Targets for Adaptation Measure Implementation
6.2 Targets for Adaptation Measure Implementation

7. Measures To Achieve Targets
7.1 Philosophy on Implementation Policy in Ho Chi Minh City
7.2 Measures in 10 Sectors

8. Climate Change Countermeasures by Area
8.1 Philosophy on Implementation Policy by Area

8.2 Measures for Different Areas

9. Specific Projects
9.1 Specific Projects by Area

10. Implementation of Action Plan
10.1 Financial Resources
10.2 Progress Management
10.3 Implementation Structure

(2) Climate Change Action Plan (Draft)

In this study, after deliberating with Ho Chi Minh City, the created Climate Change Action Plan (Draft) is as below.

The conclusion of the Climate Change Action Plan is expected to be in September 2015, with the aim of being approved by the end of 2015 to facilitate a smooth conclusion, continuous support is expected.

Climate Change Action Plan of Ho Chi Minh City 2016-2020(Draft)

1. Introduction

1.1 Background

Climate change

Climate change has been and is posing impacts on all aspects (economic, societal and environmental – natural and artificial) of Ho Chi Minh City (HCMC), especially in the coming decades. The speed of climatic changes and their impacts on HCMC in the short-term period (5-10 years) and long-term period (50-100 years) need to be identified basing on scenario projections. Therefore, it is necessary to analyze some projections in order to consider all development scenarios possible in the future.
Some phenomena of climate change impacts on HCMC are as below:

- Average and maximum atmospheric temperature has been increasing;
- There are little changes in annual average precipitation, but strong rainfalls occur more frequently with shorter period.
- Tropical storms occur in the East Sea (the area between Vietnam and the Philippines) more frequently and becoming stronger and stronger.

According to climate change and sea level rise scenarios in HCMC (average scenario B2), the atmospheric temperature of HCMC is projected to increase up to 1.4 degrees celsius by 2050 and up to 2.7 degrees celsius by 2100, excluding the impacts of urban heat island phenomenon; meanwhile, the sea level is predicted to rise up to 23-27 cm by 2050 and 59-75 cm by 2100 compared to the average sea level in the period 1980-1999. Also basing on climate change scenario in 2012, if the sea level rises 1 m, 20% of HCMC's area will probably be flooded and roughly 7% of the city population will be directly affected. Although the annual total precipitation does not change much (1,800-2,200 mm/year), the number of heavy rainfalls (more than 100 mm/rainfall) would probably occur more frequently. The precipitation is predicted to decrease in dry season and increase in rainy season. The duration of rainy season would be shorter and dry season may be longer. There would probably more tropical storms in East Sea and have direct impacts on the provinces in the Southern area of Vietnam in general and on HCMC in specific.

Impacts of climate change on Ho Chi Minh City

Climate change would affect strongly on HCMC if there is no responding action (adaptation and mitigation), and thence the safety and livelihood of citizens would be threatened. Flooding would be more serious due to co-effects by heavier rainfalls and the rise of river (sea) level, causing great damages to the infrastructure; manufacturing and social costs increase dramatically; the quality of water supply sources (surface and ground water) may seriously decrease due to pollution and salinity intrusion; atmospheric quality would be worsen when the temperature increases; agricultural productivity may be lessened; many types of diseases would probably increases; etc. Particularly, the loss of land and livelihood would lead to greater migration from Southern provinces to HCMC.

1.2 Necessity

Ho Chi Minh City is one of Vietnam's leading industrial regions while also being home to a large number of port facilities and other physical distribution functions, and serves as the core of Vietnam's economics and trade.

In recent years, increasing population has resulted in accelerated urban expansion and crowding of the city area which have in turn resulted a number of issues including reduction of "green" plant life areas and natural waterways; land subsidence due to excessive pumping of groundwater (drawing up of water in quantities exceeding the groundwater increment); air pollution due to waste processing and disposal, traffic congestion, and factory exhaust; and water pollution. In addition, the city faces increasing risk of natural disasters due to global scale climate changes resulting in elevated sea levels and more frequent heavy rain.

Consequently, in order for Ho Chi Minh City to maintain sustainable growth and future development, it must implement measures to adapt to climate change in order to respond to the increasing risk of natural disasters, as well as to alleviate and prevent the environmental issues which manifest in the course of further urbanization.

Various regions will have different and un-unified natural as well as economic-cultural-social specifications. Consequently, the impacts of climate change, the vulnerabilities and resilience capacity of each region will also be different. Under such circumstances, the common Climate change Action Plan of the city is needed to be specified into concrete action plans for the respective regions. This would be greatly helpful in improving international cooperation opportunities, investment calling, and technology exchange, etc.

Therefore, it is essential to develop and implement Climate change Action Plans for each specific region, focusing on concrete issues and socioeconomic development features so as to propose appropriate and more effective solutions.

1.3 Purpose

General objective

The Climate Change Action Plan 2016-2020 shall be established in order to construct a society which realizes economic growth with consideration for climate change effects, and to allow for sustainable growth for Ho Chi Minh City.

It is important to incorporate viewpoints from comprehensive urban planning when establishing the Climate Change Action Plan. In order to ensure continued comfortable and sound development without intensifying various environmental problems, comprehensive urban planning, which is in agreement with traffic policy, housing policy, industrial policy, etc., must be incorporated into the Climate Change Action Plan.

The general objective of HCMC Climate Change Action Plan 2016-2020 is to set adaptation and mitigation countermeasures for climate change in Ho Chi Minh City, considering current situations and future prospects of climate change in Ho Chi Minh City.

Specific objectives

The specific objectives of HCMC Climate Change Action Plan 2016-2020 are as follows:

- ✓ To organize and describe past activities for climate change adaptation and mitigation measures
- ✓ To illustrate current situations and future prospects of climate change in Ho Chi Minh City, including the estimation of current and future Greenhouse Gas emissions
- ✓ To set the short/med-/long-term targets for adaptation and mitigation measures
- ✓ To identify adaptation and mitigation measure in 10 sectors, considering priority order
- ✓ To identify adaptation and mitigation measures in 6 areas in Ho Chi Minh City with implementation policies for each area
- ✓ To suggest adaptation and mitigation projects (programs) in 6 areas
- ✓ To illustrate ways and means of implementation of HCMC Climate Change Action Plan, including financial resources, progress management, and implementation structure

1.4 Scope

The scopes of HCMC Climate Change Action Plan 2016-2020 include both adaptation and mitigation measures for climate change. Adaptation measures have been deeply studied by Rotterdam City in the recent years. Therefore, this Action Plan reflects these adaptation measures. On the other hand, this Action Plan identifies mitigation measures for climate change, including quantitative assessment of current and future GHG emissions in Ho Chi Minh City.

Applicable fields stretch across all aspects of social activity including land usage, energy, traffic, and waste, and this plan will be established through the cooperation of various Ho Chi Minh City related departments.

2. Legal Framework & Policy and Implementation Period

2.1 Legal Basis

The plan shall be prepared in accordance with the following noted legal codes.

- Decision No.1474/QĐ-TTg dated 10/05/2012 of Minister about publishing Climate Change Action Plan for the period 2012-2020.
- Resolution No. 24-NQ/TW the 7th Conference of the Central Executive Committee of the XIth actively respond to climate change, enhance resource management and environmental protection
- Resolution No. 08/NQ-CP dated 01.23.2014 issued by the Government on implementation of the action program Resolution 24-NQ/TW the 7th Conference of the Central Executive Committee of the initiative XI response to climate change, enhance resource management and environmental protection
- Action Plan of the City Commission 34-CTrHD/TU on the implementation of Resolution No. 24-NQ/TW of the Party Central Committee XI to actively respond to climate change, strengthen financial management Resources and environmental Protection
- The master plan of Ho Chi Minh City in 2025 by the Prime Minister approved the Decision dated 06/01/2010 24/QD-TTg;
- 2484/QD-UBND dated 15.05.2013 Decision of the Municipal People's Committee approving action plan to respond to climate change in the area of Ho Chi Minh City to 2015 period;
- Framework Plan guides action in response to climate change of the industry, together with the local dispatch dated 13/10/2009 3815/BTNMT-KTTVBDKH Ministry of Natural Resources and Environment;
- Document dated 19/03/2014 1909/VP-DTMT of the municipal People's Committee for approval Affairs Department of Natural Resources and Environment Action Plan for the city of Ho Chi Minh.

2.2 Upper Level Plan

The Vietnamese government has enacted the National Target Program to respond to climate change (NTP-RCC) which presents a basic framework for climate change countermeasures which include the division of labor between various agencies of the government, budget, scheduling, etc.

The first NTP-RCC was enacted in 2008 to cover the period from 2009 to 2015. Thereafter, a revised edition was enacted in 2012 covering the period from 2012 to 2015 reflecting that a 5 year plan National Target Program for 2011-2015 and National Climate Change Strategy were established in 2011.

In accordance with the NTP-RCC, each government agency and local administrative agency created action plans for each division and region. In addition, the Support Program to Respond to Climate Change (SP-RCC) was also established as a platform for coordinating support from other countries, and support is being received from sources including the World Bank, the Japan International Cooperation Agency and the French Agency for Development.

While the NTP-RCC illustrates mid-term policy and a basic framework covering all of national policy, the National Climate Change Strategy established in 2011 illustrates long term policy until 2050 and also set target values for energy consumption, renewable energy generation and other climate change alleviation measures for each department.

This strategy illustrates policy options for alleviation measures such as energy conservation promotion measures for each department, energy conservation and renewable energy oriented pricing systems, energy conservation product standard labeling systems, and setting of regulations and standards related to energy conservation for manufacturers.

The Green Growth Strategy established in 2012 illustrates more detailed alleviation measures than the National Climate Change Strategy such as target values for reduction of greenhouse gas emissions, manufacturing with low environmental burden, low environmental burden lifestyles, and promotion of sustainable consumption. The Ministry of Natural Resources and Environment (MONRE) is responsible for the NTP-RCC and National Climate Change Strategy, however the Ministry of Planning and Investment (MPI) and Ministry of Finance (MOF) are responsible for the Green Growth Strategy.

The NTP-RCC and National Climate Change Strategy cover a wide number of fields related to climate change, and are focused more on adaptation measures and research than on alleviation measures, while the Green Growth Strategy is focused more on activities related to reduction of greenhouse gas emissions. The strategies themselves only illustrate policy, with the specific implementation frameworks to be constructed over the period from 2011 to 2015. Standards and labeling systems, greenhouse gas emission credit systems, related product and service market construction and vitalization, funding, technical support and other items are presented as policy options.

In addition, in 2012, a management plan was approved for greenhouse gas emission and international carbon credit exchange. Reference is made to the construction of a carbon credit exchange system other than the Kyoto Protocol to be implemented by 2020, however no details on the system are provided. The implementation plan for up to 2020 mentions the formation of a carbon market in addition to construction of a framework for a Nationally Appropriate Mitigation Actions (NAMA) program and National Greenhouse Gas Inventory System. Targets set for greenhouse gas reductions by 2020 are based on 2005 total amounts and are 8% in the energy and transportation fields, 20% in the agricultural field, 20% in the land use, land use change and forestry fields (LULUCF) and 5% in the waste field.

2.3 Target Years

This plan focuses on a detailed project plan to be implemented between 2016 and 2020, and also mentions nonbinding targets for up to 2030 as reference.

3. City Outlook and Related Plans

Climate change countermeasures are being studied based upon the development frameworks and development direction as well as the infrastructure plan details and priorities in the Ho Chi Minh City Comprehensive Plan, district level comprehensive plans and other related plans.

3.1 City Outlook

With area of 2,095 km2 and the population of 10 million (including immigrants), HCM City is the second largest (after Hanoi) and the most populous city in Vietnam. As a special municipality, Ho Chi Minh City is the pioneer in the process of industrialization and urbanization and contributes increasingly into the development of the Region and the country. To govern this special and large city, the city government has a direction to divide Ho Chi Minh City into regions for development according to its own characteristics.
According to the draft Scheme of Municipal Government, Ho Chi Minh City suggests to divide the city's area into 1 central city including 13 inner districts and independent city quarters (East, South, West and North satellite towns) as follows:

- The East city quarter (or East City) includes District 2,9 and Thu Duc District with the area of 211km^2. The city center is a new urban area of Thu Thiem: Develop economy with the orientation of development of premium services and high technical services.
- The South city quarter (or South City) includes District 7, Nha Be District, a part of District 8 (south part of Te Canal) and a part of Binh Chanh District with the area of 194 km^2: Develop economy with the orientation of development of port service and commercial services.
- The North city quarter (or North City) includes District 12 and most of Hoc Mon District with the area of 149 km^2: Develop economy with the orientation of development of ecological services associated with high tech agriculture.
- The West city quarter (or West City) includes Binh Tan District, a part of District 8 and a part of Binh Chanh District with the area of 191 km^2: Develop economy with the orientation of development of commercial services and industrial zones.

According to the Master Plan of Socio- Economic Development of Ho Chi Minh city until 2020, vision to 2025, Ho Chi Minh city will be expanded and developed towards 4 directions with 6 areas of development:

◆ **04 urbanization directions**:

- The primary eastern direction lies a development corridor supported by Ho Chi Minh

City - Long Thanh - Dau Giay Expressway and Hanoi Highway.

- The primary southern direction has a development corridor along Nguyen Huu Tho Road, which focuses on promoting local river and water characteristics and has low construction density.
- The secondary northwest direction develops along National Assembly 22
- The secondary southwest takes the development corridor as Nguyen Van Linh Road

06 areas of development:

- The urban development zone (13 inner existing districts, 6 new districts, towns and new urban areas);
- Industrial development zone (new urban districts, Cu Chi, Hoc Mon, Binh Chanh and Nha Be districts);
- Ecological - tourism zone (along the Sai Gon, Nha Be and Dong Nai rivers, Can Gio mangrove ecosystem);
- Agricultural zone in combination with ecological belt (Cu Chi, Hoc Mon, Binh Chanh and Can Gio districts);
- Rural residential zone (Cu Chi, Hoc Mon, Binh Chanh, Nha Be and Can Gio districts);

Nature conservation zone (Can Gio mangrove forest, special-use protective forests in Cu Chi and Binh Chanh districts).

◆ The city space is also classified into **04 functional areas**:

- The existing urban area consists of 13 inner districts, covering a total area of approximately 14,200 ha and a tentative population of about 4.5 million by 2025.
- The expanded urban zone will include 06 new districts, covering 35,200 ha.
- Towns, rural residential zones and new urban zones in 05 suburban districts, covering an area of about 160,200 ha.
- Industrial zones and clusters including 01 high-tech park, 20 industrial zones and export processing zones and local industrial clusters with a total area of 8,792 ha.

3.2 Related Plans

This plan was devised with reference to related plans including the Climate Change Action Plan (2013-2015) (Resolution No. 24-NQ/TW), Climate Change Adaptation Strategy (CAS) and other past plans related to climate change, as well as Ho Chi Minh City urban planning, traffic, water resource master plans and other upper level plans in addition to the master plans each district.

4. Past Activities for Climate Change

4.1 Implementation Status of National Missions

The following programs are being implemented as national missions.

- Research and assessment on the effects of climate change on social economics and management
- Implementation of countermeasures for Ho Chi Minh City climate change alleviation and improvement of adaptation capabilities
- Educational activities for improvement of awareness related to climate change among city employees, political organizations, social organizations, businesses and community residents
- Management capability training on handling climate change for city employees

4.2 Implementation Status of International Cooperation Missions

The following programs are being implemented as international cooperation missions.

◆ Cooperation with Rotterdam, Netherlands

- Implementation of "Development of Coastlines Adapted to Ho Chi Minh City Climate Change" project

◆ Cooperation with Osaka, Japan

- Implementation of a "Low Carbon City" program through cooperation between Ho Chi Minh City and Osaka City based on a Joint Crediting Mechanism
- Implementation of an integrated solid waste management program which includes use of energy from waste

4.3 Implementation Status of Climate Change Countermeasures

Of the projects mentioned in the Climate Change Action Plan (2013-1015), the projects listed in the following table are being implemented.

There are a large number of programs which have not yet been able to be implemented according to plan due to mainly delays in work towards commercialization and financial limitations.

Table Implemented Projects

Project	Implementation Period
Introduction of 300 CNG buses	2012
Construction of subway line 1	2008-2018
Construction of subway line 2	2013
Construction of BRT 1 line on Vo Van Kiet - Mai Chi Tho roads	2014-2018
Project to reduce waterworks leak ratios	2006-2014
Investment project to reduce water leak ratios, expand water supply networks and reinforce SAWACO organizations	2011-2015
Planting of 500,000 trees along banks of rivers and canals	2011-2015
Project for forest preserves, and renewal and preservation of industrial woods in historical, cultural people's parks	2012-2016
Tree planting to prevent landslides in Can Gio region	2014

5. Current Situations and Future Prospects of Climate Change

5.1 Current Climate Change Conditions in Ho Chi Minh City

Greenhouse gas (GHG) emissions amounts in Ho Chi Minh City as of 2013 are shown in the following table.

Active mass information is mainly collected from managing organizations and as such is very accurate with a high degree of reliability. In addition, although the major industrial fields are covered, at present some fields, such as "industry" and "land use and forestry" have not been calculated, so not all fields can be covered.

Table Green House Gas (GHG) Emission Amounts in Ho Chi Minh City (As of 2013) [Estimates]

Field According to IPCC guidelines and Ho Chi Minh City reports	GHG Emission Amount (1,000 t-CO2) [Carbon Dioxide Equivalent]	Notes
Energy	16,716.47	21% of total for Vietnam (2005)
Fuel	5,191.83	
Electricity	11,524,65	
Hydroelectric generation related	116.18	Mainly from electricity use
Industry	Not yet calculated	
Agriculture	630.79	0.8% of total for Vietnam (2005)
Land use and forestry	Not yet calculated	
Waste treatment	822.91	10% of total for Vietnam (2005)
Waste treatment facilities	772.91	
Effluent treatment	Not yet calculated	Household effluent, industrial effluent, medical effluent
Other	50.00	Incineration, compost
GHG emission amounts Total	18,170.17	The energy, agriculture and waste treatment fields make up 8.9% of the total for Vietnam (2005)

Notes: Estimated by IGES based on data collected from the Ho Chi Minh City Department of Natural Resources and Environment, Climate Change Bureau. IPCC2006 guidelines used as reference. Results may be revised in the event of data additions or corrections. "Industry" and "Land Use and Forestry" fields are not yet calculated.

5.2 Future Prospects of Climate Change in Ho Chi Minh City

According to National Institute for Environmental Studies (NIES) provisional estimates, if CO2 reduction measures are not implemented (and current trends continue), the CO2 emissions for Ho Chi Minh City in 2030 are predicted to be 162Mt-CO2.

In addition, according to the same study, if CO2 emission reduction measures are implemented, provisional estimates show a potential decrease of 34.2Mt-CO2 (21%).

6. Plan Targets

6.1 Targets for Adaptation Measure Implementation

The plan aims for Ho Chi Minh City to adapt to future climate change in order to become a safer and more appealing place for resident living, as well as social and economic activities.

Regret-free Win-Win projects and activities for existing problems are promoted as adaptive measures. Even if strict alleviation measures are implemented, it is not possible to completely avoid the effects of present climate change, so adaptive measures are vital for the handling of near effects.

6.2 Targets for Mitigation Measure Implementation (Greenhouse Gas Reduction Targets)

GHG reduction targets for 2020 are an absolute target of 2 Mt-CO2 or higher, and a non-binding target of reduction of BaU ratio ●% for all of Ho Chi Minh City. In addition, the future target reduction for 2030 is ●%.

※ Absolute values and reduction ratios for GHG emission reduction targets are noted together. Calculation formulas and other details are included as supplements.

Reference Table Reduction Targets [Estimates (As of January 2015)]

Field	GHG Reduction Amount (1,000 t-CO2)	Notes
Land use	—	
Energy	—	
Fuel	91	
Electricity	1,056	
Traffic	—	
Industrial	—	
Water resources	—	
Waterworks	42	
Waste treatment	—	
Solid waste treatment	746	
Effluent treatment, etc.	—	
Agriculture	1,102	
Health	5	
Construction fields	53	
GHG reduction target totals	3,095	17% reduction of the emission amount [estimates] as of 2013
Minimum target values	2,000	11% reduction of same

7. Measures To Achieve Targets

7.1 Philosophy on Implementation Policy in Ho Chi Minh City

It is important to not only position climate change adaptation and alleviation measures in Ho Chi Minh City's major policies, but also for to implement a full-fledged approach for these measures. It is necessary for these measures to be considered important policy issues, and allocate personnel and budget on a priority basis, work towards conversion to social systems which are compatible with climate change, improvement the quality of resident lives, and work towards building a low carbon society built on twin foundations of economics and environment.

During the implementation of these measures, priority must studied to contribute to the security of safety and growth strategies for citizen lives with a scientific basis, such as economic rationality.

7.2 Measures for Actualization of Policy

Use of international cooperative frameworks to receive technical and financial support are indispensable for shifting towards a low carbon society in a single step while still maintaining economic development.

When implementing a climate change countermeasure project, JCMs (Joint Crediting Mechanism) and other frameworks are used at each stage, from agenda formation and feasibility studies (FS) to procurement of project funding.

7.3 Measures in 10 Sectors

In Ho Chi Minh City, the measures and policy for achieving greenhouse gas reduction targets are categorized into the following 10 fields, with efficient and effective promotion of climate change countermeasures through proactive and independent handling by the lead policy organizations in each field.

■10 Fields for Measures and Policy for Achievement of Greenhouse Gas Emission Reduction Targets

1	Land Use Sector
2	Energy Sector
3	Transportation Sector
4	Industrial Sector
5	Water Resources Management Sector
6	Waste Management Sector
7	Agricultural Sector
8	Health Sector
9	Construction Sector
10	Tourism Sector

(1) Land Use Sector

Aimed at improving city value and resolving policy issues through guided land use such as appropriate allocation of venous industry facilities, open spaces and wooded areas.

Table Measures in Land Use Sector

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of Land Use Regulations and its Operation	Legislation such as laws, regulations, codes, and ordinances for City Administration will be developed and taken into effect, and operated.	Urban areas	Appropriate facility allocation	Department of Planning & Architecture
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture
Medium	Selection of Model Region to implement measures	Model region will be set where integrated climate change mitigation measures in the 10 sectors.	District 4 Nha Be District	Precautionary and intensive response can be taken in the area with emergency.	Department of Planning & Architecture
Medium	Appropriate Management of Large-scale Green Lands	Large-scale green lands located in parks will be appropriately managed, through the tree thinning, revegetation, replantation, etc.	Nha Be District Can Gio District	- Enhancement of CO2 absorptions - Conservation of biodiversity - Good scenery	Department of Planning & Architecture
Medium	Afforestation and greening	Promotion of park maintenance and tree planting of road and pedestrian space in the urban area.	Urban areas	-Relaxation of the heat island effect -Increase in quantity of CO2 absorption. -Formation of good landscapes.	Department of Planning & Architecture
Medium	Build wind channels (green corridors)	The atmospheric cooling in a city center by building channels for wind from the suburbs.	Urban areas	-Reduction of energy and the CO2 of the air-conditioning system by the temperature drop.	Department of Planning & Architecture

(2) Energy Sector

Implements educational activities and promotes energy efficiency improvement programs in order to lead to an energy conservation society. Also reduces fossil fuel usage amounts and promotes use of renewable energies.

Table Measures in Energy Sector (1/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Energy efficiency technology applied to buildings	Energy saving equipment and control system will be installed as a package.	Commercial bldg. Industrial park Public bldg. & premises	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	ESCO Project	Cost saved through the reduced energy consumptions will cover the cost for the installation of energy saving/energy efficiency equipment. ESCO (Energy Saving Company) entity will first pay for the initial installation cost and be paid from the saved costs to reimburse the initial cost.	Commercial bldg. Industrial park Public bldg. & premises Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Lighting	CFL(compact fluorescent light) or LED(light emitting diode) lamps with less electricity consumption will replace existing lighting equipment.	Urban areas Commercial bldg. Industrial park Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Air Conditioners	High efficiency air conditioners with inverter control function or with air-cooled heat pump system will be introduced.	Commercial bldg. Shopping mall Industrial park Residential house Hospitals	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Energy Efficiency Improvement Facilities to be installed at Small/Medium Enterprises	High efficiency compressors, motors, lightings, fans/circulators, air conditioners, and OA equipments will be introduced.	Commercial bldg. Industrial park	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Introduction of Photovoltaic Power Generation	Photovoltaic power generation system (CO_2 free) will be introduced.	Shopping mall Industrial parks Residential house Public bldg. & premises Unused space Rented roof Ben Thanh Market Elementary school in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale - Installation of competitive Japanese technology evaluated by life cycle costs from purchase through OM, recycling, and disposal	Department of Industry & Trade
High	Introduction of Solar Water Heater	Solar water heater by using thermal energy from sunshine will be introduced to supply heated water.	Shopping mall Residential house Hospital in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Low installation costs compared to PV system	Department of Industry & Trade

Table Measures in Energy Sector (2/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Installation of Energy Saving Glasses	Efficiency of air conditioning system will be improved through the installation of energy saving glasses with high adiabaticity and high airtightness.	Commercial bldg. Public bldg. & premises Residential house	Light, fuel and water expenses are reduced by the improvement of adiabatic effect.	Department of Industry & Trade
Medium	Rooftop and/or Wall Greening	Greening on building rooftops and/or walls will contribute to limiting the increase of temperature of buildings.	Big buildings to be newly constructed Elementary school and hospital in District 4	- Increase of carbon sink in the urban area with limited space - Abatement of urban heat island effects resulting from environmental improvement - Reduction and/or slow down of rainfall flows - Improvement of urban scenery - Improvement of QUL due to creation of recreation area - Cleaning of air quality (such as absorption of NOx and SOx)	Department of Industry & Trade
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Introduction of Wind Power Generation	Wind power generation system (CO2 free) will be introduced.	Place with wind resources Suburban area	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

(3) Transportation Sector

Promotes educational programs related to appropriate traffic use. In addition, also aims to prepare and maintain public transportation facilities as well as traffic nodes to reduce automobile traffic, and ensure smooth connections.

Also introduces traffic systems which use clean energy.

Table Measures in Transportation Sector (1/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Construction of Subway	Modal shift to public transportation by construction of subway	Urban area	- Mitigation of traffic congestion - Improvement of air quality	Department of Transportation
High	Shift to CNG bus	Shift from gasoline bus to CNG bus which emits less CO2	Urban area	Reduction of CO2 emission	Department of Transportation
High	Restructuring of bus route network	Increase in frequencies, expansion of bus transportation services, and restructuring of bus network suitable for the use of subway will be implemented to enhance quality and convenience of public transportation service.	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
High	Introduction of Park & Bus Ride System	Introduction of Park & Bus Ride system and development of parkings to enhance quality and convenience of public transportation	Shopping mall Transportation hub (terminal) Aeon Mall #1	- Reduction of CO2 emissions and energy consumptions, due to increased users of energy efficient public transportation - Mitigation of traffic jams - Improvement of air quality - Increment of customers for shopping malls with transportation hubs	Department of Transportation
High	Development of Rapid Bus System (BRT)	Introduction of bus transport system with high-quanlity fanction including punctuality and rapidity and increased carrying capacity, by the integrated means of the introduction of 2-car buses, the introduction of PTPS (Public Transportation Priority System), and bus priority lanes, etc.	Urban area	- Reduction of energy and the CO2 by the use increase in public transport having high transportation energy efficiency - Mitigation of traffic congestion - Improvement of air quality	Department of Transportation
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation

Table Measures in Transportation Sector (2/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Traffic Demand Management	Optimization of traffic demand of private vehicle and public transportation is promoted, and smooth transportation flow is comprehensively ensured. Specifically, route guidance, traffic controls/regulations, and the provision of information on congestion and detour routes are executed to optimize traffic demands, by changes in means/route, changes in time, and effective use of vehicles (share-ride, car sharing, etc.).	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Medium	Development of underground malls	Creating pedestrian space in the underground area by developing underground malls	Urban area	- Mitigation of traffic jams - Pedestrian's safety - Development of underground malls	Department of Transportation
Medium	Promotion of Use of Subway	Promote the use of subway as an alternative transportation mode, to achieve modal shift to public transportation	Urban area	- Mitigation of traffic congestion - Improvement of air quality	Department of Transportation
Low	Collection and management of traffic information	Collect and manage information on traiffic volume, occurrence status of congestion, required travel time, etc. as basic information for traffic demand management	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Wide-range traffic control	Mitigate traffic congestion by traffic light cycle management by collecting information on traffic volume and congestion	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Road Improvement/Renovation (to mitigate traffic congestion)	Improve traveling performance and mitigate automobile traffic congestion by increasing traffic capacity through newly construction and widening of roads	Entire HCMC, especially District 4	- Reduction of CO2 emissions - Reduction of fuel costs	Department of Transportation
Low	Introduction of Electric Motorbikes	Modal shift from gasoline motorbikes to electric motorbikes (with less CO2 emissions) will be promoted. For this, plug-in stations will be necessarily constructed, to enhance convenience of electric motorbike use.	Shopping mall Transportation hub (terminal)	- Reduction of CO2 emissions - Reduction of fuel costs - Improvement of air quality	Department of Transportation
Low	Facilitation of Road Greening	Facilitate planting trees on roadside	Urban area Highway	- Improvement of air quality - Increase in CO2 absorption - Generation of leafy shade (against heat-island phenomenon) - Formation of landscape	Department of Transportation

(4) Industrial Sector

Aims to implement technology transfer and introduce new technologies as well as promote afforestation.

Table Measures in Industrial Sector

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Kiln Operation Technoniques/Technologies	Environmentally sound fuel will be used, and waste heat and/or waste material will be reused.	Factories	- Reduction of CO2 emissions - Use of waste heat	
High	Greening of factory sites and industrial parks	Factory sites and industrial parks will be greened through planting trees.	Factories and industrial parks	- Reduction of CO2 emissions - Improvement of landscape	

(5) Water Resources Management Sector

Promotes water conservation educational activities, leak countermeasures and water supply management in order to realize energy usage reductions and stable water supplies.

Table Measures in Water Resources Management Sector (1/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
High	Prevention of River Water Infiltration	Development of dikes	West coast in District 4 South coast in District 4 Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO
High	Development of stormwater reservoir	Development of stormwater reservoir	Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO

Table Measures in Water Resources Management Sector (2/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Introduction of Anti-Flood Facilities such as Pumps and Watertight Doors	Anti-flood facilities such as pumps and watertight doors will be introduced.	Buildings located in frequently flooded areas	- Mitigation of damages from flood and high tide due to sea level rise as one of climate change adverse effects - Safe urban area	SAWACO
Medium	Promotion of reuse of rainwater	Through maintenance of rainwater storage facilities and introduction of water storage and purification equipments, reuse of rainwater for tap water, toilet water, and other water use will be promoted	Frequently Flooded areas Districut 4 Nha Be District Industrial parks Market	- Prevention of flood disaster - Safe urban area - Prevention of land sinkage due to reuse of stored rainfall water - Reduced running cost resulting from the reduced clean water consumptions. - Response to water supply shortage	SAWACO
Medium	Development of Hazard Map	Hazard map of HCMC will be developed, to show the estimated flooded areas and flood damages, as well as information necessary for evacuation (routes and place).	Frequently flooded areas (in District 4 and Nha Be District, etc.)	Mitigation of damages	SAWACO
Medium	Levelling of Lands	Lands of lowlands (altitude 0) urban areas will be escalated by piled-up clay.	District 7 Frequently flooded areas (in District 4 and Nha Be District, etc.)	- Mitigation of damages from flood and high tide - Safe urban area	SAWACO
Medium	Promotion and Distribution of Water-Saving Equipment	Water-saving equipment will be installed to reduce clean water consumption.	Hotel Office Residential house	Response to water supply shortage	SAWACO
Low	Wastewater Treatment and Recycling (with Water Purification Equipment)	Sewage and rainfall water to be filtrated and sterilized will be reused for industrial use, for toilets, and for cleaning.	District 4 Nha Be District Industrial park	Response to water supply shortage	SAWACO
Low	Establishment of Sewage Ledger System	Properties for sewage treatment will be managed appropriately.	Ben Ghe ward in District 1	Appropriate properties (sewer culverts) management to achieve effective of operation and maintenance of properties	SAWACO
Low	Introduction of Permeable Pavement	Permeable pavement will be introduced on urban roads, to promote the groundwater recharge.	Urban area	Reduced the amount of wastewater treatment, by infiltration of rainfalls to underground	SAWACO

(6) Waste Management Sector

Ensures thorough separation and collection of household waste and promotes bio gas power generation and waste incineration power generation.

Table Measures in Waste Management Sector(1/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Commissions for Kitchen Waste Segregation and Collection (and Intermediate Treatment)	Organic waste emitted from households will be segregated and collected.	Residential house area District 1 District 4	- Prolonged lifetime of landfill site, and reduced amount of wastes - Environmental education (Citizens' awareness raising) - Energy recovery from waste as renewable energy sources - Expected dramatic waste amount reduction if many segregation categories are introduced.	Department of Natural Resources & Environment
High	Biogas-based Power Generation	Electricity is generated from biogas recovered through the methane digestion system, which ferments organic wastes such as food waste. Organic wastes should be segregated and collected in advance.	Binh Dien Wholesale Market District 1 (Da Phuac Solid Waste Treatment Complex in Binh Chanh) District 4	- Prolonged lifetime of landfill site, and reduced amount of wastes - Sanitary waste treatment - Energy gained from waste - Revenue from power sale	Department of Natural Resources & Environment
High	Electricity Generation from Solid Waste Incineration	Electricity generation system utilizing waste heat from solid waste incineration plant will be introduced.	Cu Chi Waste Treatment Complex at Tay Bac in Phuoc Hiep, Cu Chi	- Prolonged lifetime of landfill site, and reduced amount of wastes - Sanitary waste treatment - Energy gained from waste - Revenue from power sale - Appropriate waste treatment process fitting to the situation of high temperature and high humidity	Department of Natural Resources & Environment
High	Hazardous Waste Segregation and Collection	Strict regulations for hazardous waste segregation, collection, transportation, and disposal emitted from industrial factories should be introduced.	Industrial factories Hospitals	- Appropriate management of industrial and hospital/medical wastes - Security and safety	Department of Natural Resources & Environment
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment

Table Measures in Waste Management Sector(2/2)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

(7) Agricultural Sector

Promotes embankment construction and other adaptive measures as well as programs to reduce emissions in agricultural activities.

Table Measures in Agricultural Sector

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Prevention of Mudslides by Planting Trees	Planting trees on river embankments is promoted, to prevent mudslides at the river banks.	Binh Tahnh District 28 wards Can Gio District	Increased CO2 absorptions through appropriate management, such as tree thining and complementary planting	Department of Agriculture & Rural Development
High	Introduction of Water-saving Pumps with Utilization of Renewable Energy	Water-saving pumps with utilization of renewable energy will be introduced.	Dong Canal area in Cu Chi District (10ha of agricultural land)	- Reduction of fuel and light expenses - CO2 emission reduction	Department of Agriculture & Rural Development
Medium	Biogas-based Electric Power Generation from Livestock Manure	Biogas (mainly composed of methane gas) is recovered through the digestors (with anaerovic digestion) of livestock manure, and is utilized as fuel for cogenaration systems, to generate electricity.	Agricultural communities	- Reduction of utility costs - CO2 emission reduction - Income from electric power selling	Department of Agriculture & Rural Development
Medium	Reduction of Agricultural Chemicals and Fertilizers Usage	Use of agricultural chemicals and fertilizers is reduced.	Agricultural fields	0	Department of Agriculture & Rural Development
Medium	Improvemnet in Agricultural Product Varieties Resilient to Climate Change Effects	Climate change-resistant species of agricutural products will be developed, through the cultivar improvement and other methods.	Agricultural communities	- Conservation of farm and green lands - Create new agricultural revenue resources	Department of Agriculture & Rural Development
Medium	Promoting development of production technology of crops in response to climate change	Promoting cultivation of new varieties in farmland and experiments of new cultivation technology	Cu Chi District	- Presevation of agricultural lands - Creation of new revenue sources in agriculture	Department of Agriculture & Rural Development
Medium	Development of agricultural model that contribute to low-carbon and energy-saving	Development and operation of criteria that contribute to re-use and suppression of irrigation water, introduction of energy-saving equipments, and regulation of pesticides	Can Gio District Cu Chi District	- Reduction of utility costs	Department of Agriculture & Rural Development

(8) Health Sector

Implements personnel training, and appropriate management of effluents and wastes.

Table Measures in Health Sector

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Human Resources Development of Medical Personnel in Hospital	Hospital medical staff (such as doctors) will be sent to Japan and be trained, to obtain the up-to-date advanced madical technology.	Medical roffesional staff of new hospitals to be opened	Improvement of medical healthcare systems	Department of Health
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

(9) Construction Sector

Aims to lead to environmentally friendly construction and introduction of energy conservation materials.

Table Measures in Construction Sector

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction
High	Introduction of Energy Efficient Building Materials	The building materials with well insulation and high airtightness will be used, to improve efficiency of air-conditioning.	Public facilities Residence	Lower energy costs due to improvement of heat insulating effect	Department of Construction
Medium	Introduction of Incentive to Environmentally Sound Buildings	Increased floor area ration beyond the regulatied value as a bonus will be provided to the environmentall sound buildings, to promote to reduce environmental adverse impact on the construction.	Urban area	- Implementation of enviromental poilcy/measures with less public administrative expenditures - Lower energy costs and the reduction of CO2 emission	Department of Construction
Medium	Construction of Long-lived Building	Durability of buildings will be improved, through the introduction of new building standard in the construction regulations/ordinances.	Construction sites	Reduction of CO2 emissions due to the Improvement of durability and extention of building life-span	Department of Construction
Medium	Effective Use of Discharged Water and Solid Waste	Discharged wastewater, dredged sludge, and construction scrap materials from construction sites will be recycled and reused.	Construction sites	- Reduction of CO2 emissions - Limitation of waste emissions	Department of Construction
Medium	Introduction of Energy Efficient Constructing Machine	Hybrid construction vehicle and other machine will be introduced in the new construction sites.	Construction sites	- Reduction of CO2 emissions - Lower fuel cost due to the Improvement of fuel consumption - Improvement of air pollution	Department of Construction

(10) Tourism Sector

Aims to preserve eco-tourism areas and traditional villages and construct a waterway transportation network.

Table Tourism Sector

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Planning of eco resort	Promote the creation of tourism resources that is environment-friendly by promoting eco resort development	Can Gio District	- Reduction of CO_2 emissions -creation of new tourism resources	Department of Tourism
Medium	Promotion of ecotourism	Develop eco-tourism in villages along the coasts	District 9 Cu Chi District Hoc Mon Discrict Nha Be District Binh Chanh District	- Reduction of CO_2 emissions -creation of new tourism resources -Preservation of natural environment	Department of Tourism
Medium	Publicity of greeenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO_2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

8. Climate Change Countermeasures by Area

8.1 Philosophy on Implementation Policy by Area

The geographical features and district formation differ for different areas within Ho Chi Minh City, so the effects and potential damages of climate change also differ. For this reason, the climate change countermeasures and policy which must be prioritized also differ by area.

In this plan, Ho Chi Minh City is divided into 6 areas (1 city area, 4 satellite cities, 1 agricultural area) and the measures and policy established in the "Measures and Policy for Target Achievement" are reorganized for each area based on the area's current conditions and characteristics.

The range and regional characteristics of each of the 6 areas are shown below.

■Characteristics of Each Area

Area Name	Range	Characteristics
Area A	Ho Chi Minh City center (13 districts)	Area on which emphasis is placed in urban development
Area B	Ho Chi Minh City East [211 km^2] (District 2, District 9, Thu Duc District)	Area on which emphasis is placed for important luxury service industries and high tech industries
Area C	Ho Chi Minh City South [194 km^2] (District 7, Nah Be District, portions of District 8)	Area where ports and commercial services are concentrated
Area D	Ho Chi Minh City North [149 km^2] (District 12, Hoc Mon District)	Area on which emphasis is placed for eco service industries merged with high tech agriculture
Area E	Ho Chi Minh City West [191 km^2] (Binh Tan District, portions of District 8, Binh Chanh District)	Area where service industry and industrial zones are concentrated
Area F	Agricultural Zone (Portions of District 8, Cu Chi District, Can Gio District)	Agriculture and natural environment preservation area

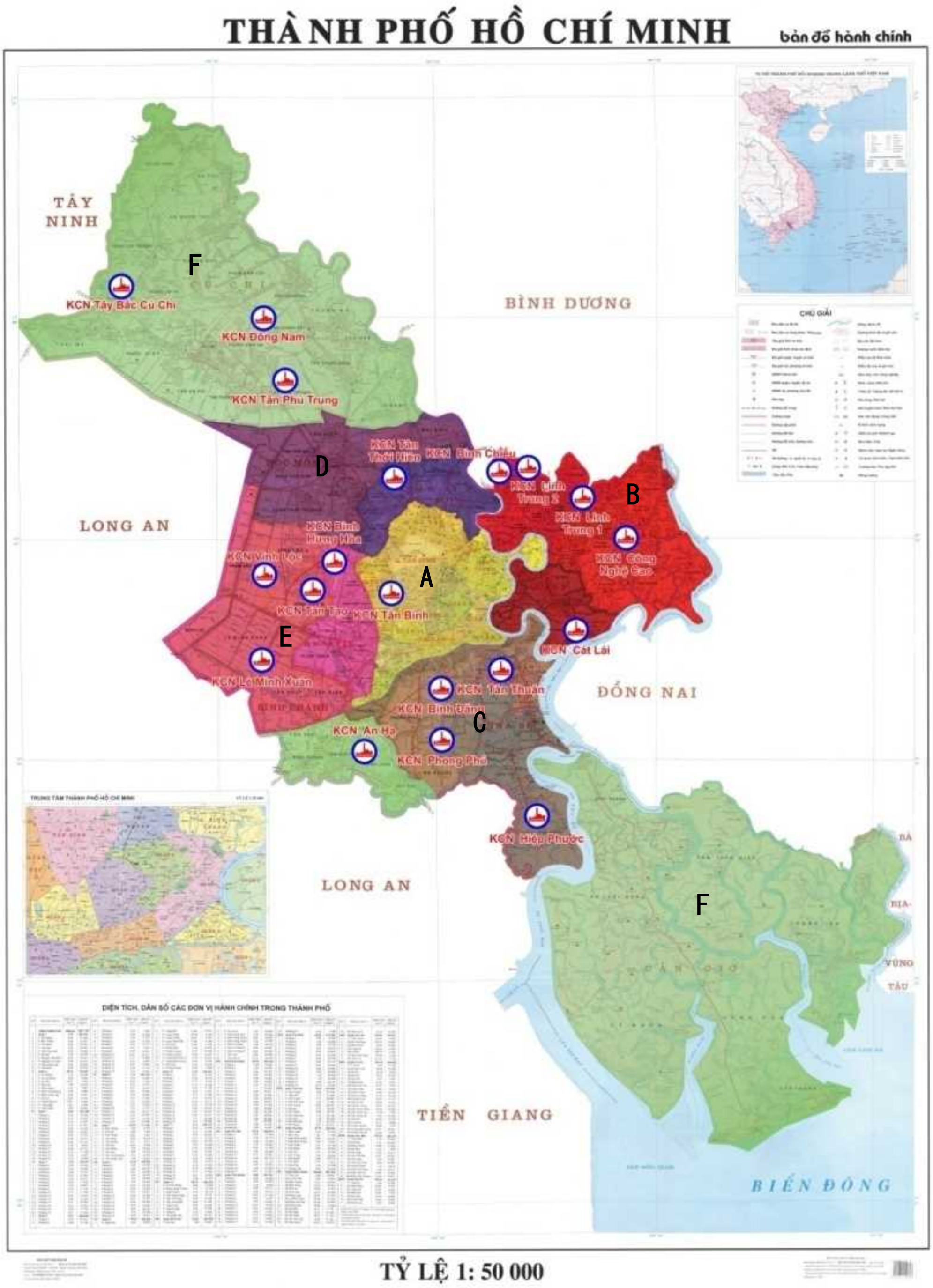


Figure 6 areas in Ho Chi Minh City

8.2 Measures for Different Areas

*Refer to the Policy for Different Areas List included in the appendix.

(1) Area A: Ho Chi Minh City center (13 districts)

This area is the area on which emphasis for urban development is placed as well as the area with the highest population concentration, so priority is placed on land use, energy, traffic, water resources management, waste and construction fields.

(2) Area B: Ho Chi Minh City East ((District 2, District 9, Thu Duc District)

This area is an area on which emphasis is placed for important luxury service industries and high tech industries, so priority is placed on energy, industrial, water resources management, and construction fields.

(3) Area C: Ho Chi Minh City South (District 7, Nah Be District, portions of District 8)

This area is an area where ports and commercial services are concentrated, so priority is placed on energy, water resources management, and construction fields.

(4) Area D: Ho Chi Minh City North (District 12, Hoc Mon District)

This area is an area on which emphasis is placed for eco service industries merged with high tech agriculture, so priority is placed on energy, waste, and construction fields.

(5) Area E: Ho Chi Minh City West (Binh Tan District, portions of District 8, Binh Chanh District)

This area is an area where service industry and industrial zones are concentrated, so priority is placed on energy, industrial, water resources management, waste, and construction fields.

(6) Area F: Agricultural Zone (Portions of District 8, Cu Chi District, Can Gio District)

This area is an agriculture and natural environment preservation area, so priority is placed on water resources management, agricultural and tourism fields.

9. Specific Projects

9.1 Specific Projects by Area

Detailed projects are promoted aimed at the achievement of the greenhouse gas reduction targets specified in this plan based on the policies established for each area.

Table Specific Projects for Area A (1/2)

Measure	Project	Project Summary	Implementation Effects	Agency	Target Year
Biogas-based Power Generation	Organic waste methane fermentation and gas utilization in the wholesale market	Provide biogas-based power by separately collecting arganic waste, performing anaerobic treatment with methane fermentation system, and recovering biogas at Bihn Dien Market		Department of Natural Resources and Environment	2016
Energy efficiency technology applied to buildings	Promotion of Green Hospital by energy-saving and environmetal improvement at state-run hospital	Achieve energy savings of hospitals and improve comfortability and air quality through energy management system (EMS) that effectively combines inverter air conditioners and total heat exchange ventilators	GHG Reduction Amount: Approximately 40%/yr.		2016
Energy efficiency technology applied to buildings	Introduction of energy-efficient technology to buildings	Achieve energy savings of the entire building through optimization of air conditioning system and lighting equipment as well as energy management and control with smart BEMS	CO2 Reduction Amount: 1,585 t/yr.		2017
Introduction of Park & Bus Ride System	Promotion of bus use by park-and-bus-ride and eco-point system in cooperation with private commercial facility	Promote park-and-bus-ride (P&BR) through implementing P&BR at Ieon Store and providing traffic eco-points to bus users (targeting motorcycle commuters)	CO2 Reduction Amount: 585 t/yr.	Department of Transportation	2015
Comissions for Kitchen Waste Segregation and Collection (and Intermediate Treatment)	Development of garbage circulation system	Develop garbage circulation system through sorting and collecting household garbage, and utilizing resides of methane fermentation power generation as organic fertilizer			2015
Promotion of reuse of rainwater	Rainwater reuse at elementary school in District 4	Through maintenance of rainwater storage facilities and introduction of water storage and purification equipments, reuse of rainwater for tap water, toilet water, and other water use will be promoted		Department of Natural Resources and Environment	2015

Table Specific Projects for Area A (2/2)

Measure	Project	Project Summary	Implementation Effects	Agency	Target Year
Introduction of photovoltaic power generation	Introduction of photovoltaic power generation at elementary school in District 4	Introduce photovoltaic power generation equipment at elementary school in District 4, and educate students and promote energy-saving of school facility		Department of Natural Resources and Environment	
Construction of subway	Construction of subway	Construction of subway in District 1		Department of Transportation	2018
Development of rapid bus system (BRT)	Introduction of BRT	Introductionof BRT in District 1		Department of Transportation	2018
	Construct incineration plant for solid waste treatment with the capacity of 2.000 tons/day	Promote waste reduction by constructing incineration facilities for solid waste		Department of Natural Resources and Environment	
	Construct hazardous waste treatment plant with the capacity of 2.000 tons/day			Department of Natural Resources and Environment	
	Energy recovery from landfill gas of Phuoc Hiep 2 landfill site			Department of Natural Resources and Environment	

Table Specific Projects for Area F

Measure	Project	Project Summary	Implementation Effects	Agency	Target Year
Electricity Generation from Solid Waste Incineration	Integrated Waste Power Generation Project	Collect and sort municipal waste, generate power by methene fermentation of organic waste, and generate power by incinerating non-organic waste	GHG Reduction Amount: 42,000 t/yr.	Department of Natural Resources and Environment	2017
Promotion of Eco-Driving with Digital Tachographs	Eco-Drive Project utilizing digital tachographs	The digital tachograph is attached to the track, to collect data for refueling quantity mileage and other driving behavior, to enlighten the eco & safe driving by continuously feeds back the analysis result to the driver.	CO2 Reduction Amount: 310 ton/yr.	Department of Transportation	2015
Prevention of River Water Infiltration	Upgrade the dykes and embankments system in Can Gio district	Suppress the flood damage by renovating embankment		People's Committee of Can Gio	
Development of agricultural model that contribute to low-carbon and energy-saving	Develop water-saving irrigation model towards modernization in combination with utilising pumping equipment using renewable energy sources			Department of Agriculture and Rural Development	
Prevention of Mudslides by Planting Trees	The Program of planting trees in riverbank and coastal areas to avoid tides erosion in Can Gio district	Prevent landslides of riverbank by planting trees to river embankment		Department of Agriculture and Rural Development	

Table Other Specific Projects (Area Not Yet Specified)

Measure	Project	Project Summary	Implementation Effects	Agency	Target Year
Energy efficiency technology applied to buildings	Promotion of energy-saving hotels through development of BEMS	Reduce energy consumption in typical hotels by introducing air conditioning heat source management, lighting system, and hot water supply system	GHG Reduction Amount: 12%/yr.		2016
Development of Hazard Map	Develop flood-risk warning map	Hazard map of HCMC will be developed to show the estimated flooded areas and flood damages, as well as information necessary for evacuation		Steering Center of the Urban Flood Control Program Ho Chi Minh City	
Development of design criteria of eco-friendly buildings	Develop and publish Technical Manual for housing construction to adapt to climate change in the city and train urban management officers of districts and wards.	Develop and publish Technical Manual for housing construction to adapt to climate change in the city and train urban management officers of districts and wards.		Department of Construction	
	Develop and publish Technical Manual for urban planning to adapt to climate change in the city and train urban management officers districts and wards.			Department of Zoning and Architecture	
	Apply energy efficient measures in urban life to reduce CO2 emissions; conduct pilot campaigns to promote energy efficient appliances in households.			Department of Industry and Trade	
	Develop economical and efficient use of energy in enterprises to reduce GHG emissions and conduct study on using clean and renewable energy in business.			Department of Industry and Trade	
High Efficiency Lighting	Replace and renovate lighting system in alleys using high power consumption street lights to the power saving ones.			Department of Industry and Trade	
	Technical assistance project in the implementation of climate change national target program in transportation and energy sectors			Department of Natural Resources and Environment	
Biogas-based Power Generation	Pilot study of constructing the biogas powerplants to recover energy from waste of wholesale markets in HCM city.			Department of Industry and Trade	
Introduction of photovoltaic power generation	Pilot study of contructing solar power system for 100 households.			Department of Industry and Trade	

Table Other Specific Projects (Area Not Yet Specified)

Measure	Project	Project Summary	Implementation Effects	Agency	Target Year
	Renewable energy plan in HCMC			Department of Industry and Trade	
- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases	Assess the impacts of climate change on the variety of diseases, seasonal epidemics and diseases to urban people and the possibility of other risks.			Department of Health	
Development of stormwater reservoir	Design and construct reservoirs at Go Dua area, Thu Duc district			Steering Center of the Urban Flood Control Program Ho Chi Minh City	

10. Implementation of Action Plan

10.1 Financial Resources

The National Target Program to respond to climate change (NTP-RCC) established by the Vietnamese government presents a basic framework for funding related to climate change countermeasures.

In this framework, the Support Program to Respond to Climate Change (SP-RCC) was also established as a platform for coordinating support from other countries, and support is being received from sources including the World Bank, the Japan International Cooperation Agency and the French Agency for Development.

In order to realize this plan, projects will be promoted under international cooperation frameworks such as SP-RCC support and JCM (Joint Crediting Mechanisms) in addition to funding from Ho Chi Minh City.

10.2 Progress Management

During the establishment of the plan, activities were implemented with consideration for the PDCA cycle: Plan (establish a plan), Do (implement), Check (understand and verify implementation status and measure effects), Action (feedback activities).

GHG reduction targets are set based on GHG emission amounts (inventory studies, etc.) accompanying current economic activities, and policy is planned (Plan) to reduce GHG emissions. Next, each field's projects are implemented (Do) which allows for determination of GHG reduction effects and assessment of target achievement (Check). And finally, these assessment results are used as feedback (Action) to revise inventory study details and GHG emission reduction measures and further improve the accuracy of the plan.

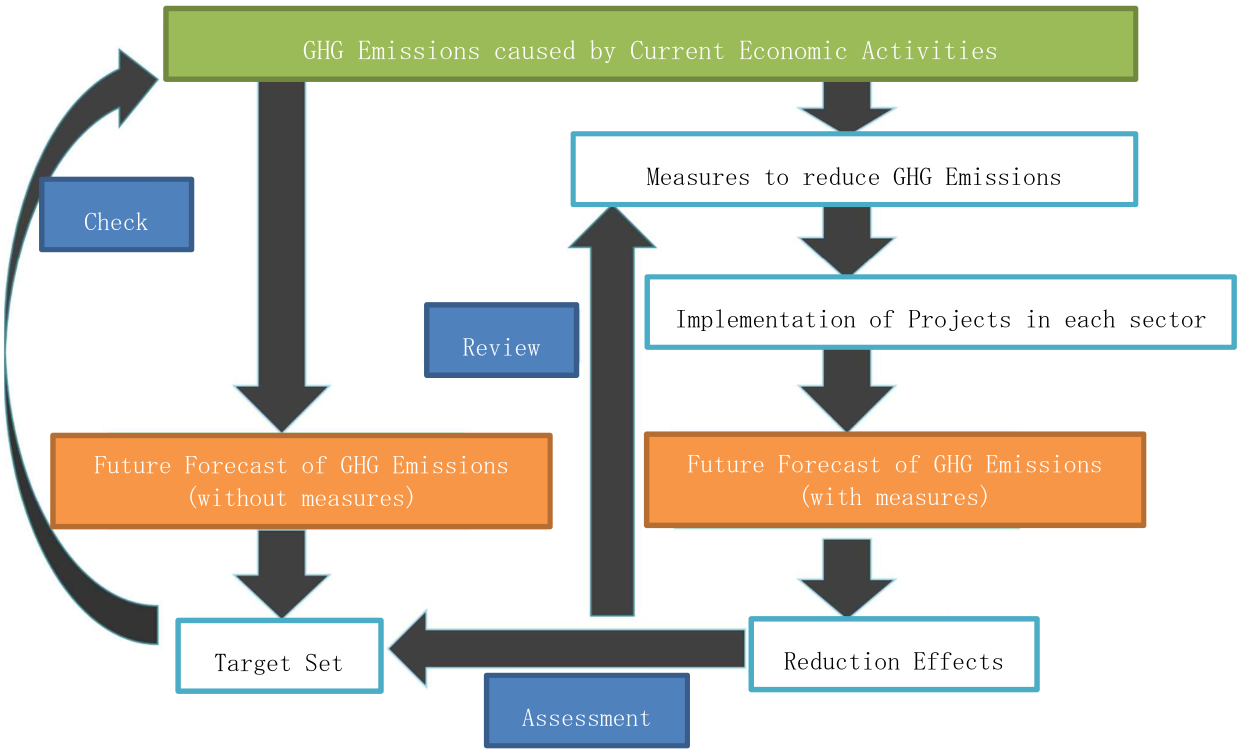


Figure Progress Management

10.3 Implementation Structure

Global warming countermeasures are implemented while coordinating to ensure compatibility with the achievement of urban planning, agricultural promotion planning and other policies related to control of greenhouse gas emissions, and as such promotion must be carried out in cooperation with the various departments and divisions of Ho Chi Minh City.

For this reason, in order to cooperate and coordinate with a variety of parties including those involved in planning coordination, urban planning, traffic, agriculture, waste, and energy, advisory groups carry out management of plan progress at each department and area level, and education and private business representatives are also gradually included in promotion organizations.

In addition, comprehensive personnel training and research and development are carried out in order to improve capabilities related to climate change, while environmental learning and educational activities aimed at residents are also implemented to improve environmental awareness.

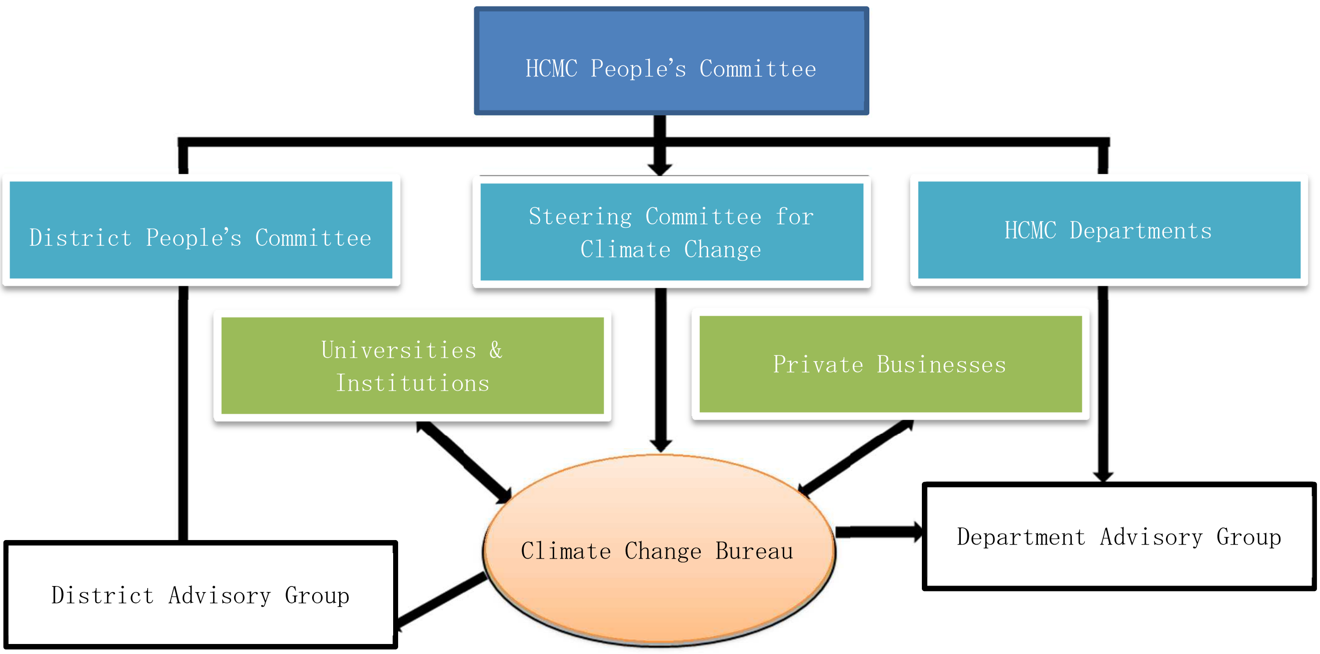


Figure Implementation Structure

Appendix: Measures for Different Areas

(1) Measures for Area A

Table Measures for Area A (Land Use Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of Land Use Regulations and its Operation	Legislation such as laws, regulations, codes, and ordinances for City Administration will be developed and taken into effect, and operated.	Urban areas	Appropriate facility allocation	Department of Planning & Architecture
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture
Medium	Selection of Model Region to implement measures	Model region will be set where integrated climate change mitigation measures in the 10 sectors.	District 4 Nha Be District	Precautionary and intensive response can be taken in the area with emergency.	Department of Planning & Architecture
Medium	Afforestation and greening	Promotion of park maintenance and tree planting of road and pedestrian space in the urban area.	Urban areas	-Relaxation of the heat island effect -Increase in quantity of CO2 absorption. -Formation of good landscapes.	Department of Planning & Architecture
Medium	Build wind channels (green corridors)	The atmospheric cooling in a city center by building channels for wind from the suburbs.	Urban areas	-Reduction of energy and the CO2 of the air-conditioning system by the temperature drop.	Department of Planning & Architecture

Table Measures for Area A (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Energy efficiency technology applied to buildings	Energy saving equipment and control system will be installed as a package.	Commercial bldg. Industrial park Public bldg. & premises	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	ESCO Project	Cost saved through the reduced energy consumptions will cover the cost for the installation of energy saving/energy efficiency equipment. ESCO (Energy Saving Company) entity will first pay for the initial installation cost and be paid from the saved costs to reimburse the initial cost.	Commercial bldg. Industrial park Public bldg. & premises Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Lighting	CFL(compact fluorescent light) or LED(light emitting diode) lamps with less electricity consumption will replace existing lighting equipment.	Urban areas Commercial bldg. Industrial park Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Air Conditioners	High efficiency air conditioners with inverter control function or with air-cooled heat pump system will be introduced.	Commercial bldg. Shopping mall Industrial park Residential house Hospitals	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Energy Efficiency Improvement Facilities to be installed at Small/Medium Enterprises	High efficiency compressors, motors, lightings, fans/circulators, air conditioners, and OA equipments will be introduced.	Commercial bldg. Industrial park	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Introduction of Photovoltaic Power Generation	Photovoltaic power generation system (CO_2 free) will be introduced.	Shopping mall Industrial parks Residential house Public bldg. & premises Unused space Rented roof Ben Thanh Market Elementary school in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale - Installation of competitive Japanese technology evaluated by life cycle costs from purchase through OM, recycling, and disposal	Department of Industry & Trade
High	Introduction of Solar Water Heater	Solar water heater by using thermal energy from sunshine will be introduced to supply heated water.	Shopping mall Residential house Hospital in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Low installation costs compared to PV system	Department of Industry & Trade

Table Measures for Area A (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Installation of Energy Saving Glasses	Efficiency of air conditioning system will be improved through the installation of energy saving glasses with high adiabaticity and high airtightness.	Commercial bldg. Public bldg. & premises Residential house	Light, fuel and water expenses are reduced by the improvement of adiabatic effect.	Department of Industry & Trade
Medium	Rooftop and/or Wall Greening	Greening on building rooftops and/or walls will contribute to limiting the increase of temperature of buildings.	Big buildings to be newly constructed Elementary school and hospital in District 4	- Increase of carbon sink in the urban area with limited space - Abatement of urban heat island effects resulting from environmental improvement - Reduction and/or slow down of rainfall flows - Improvement of urban scenery - Improvement of QUL due to creation of recreation area - Cleaning of air quality (such as absorption of NOx and SOx)	Department of Industry & Trade
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

Table Measures for Area A (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Construction of Subway	Modal shift to public transportation by construction of subway	Urban area	- Mitigation of traffic congestion - Improvement of air quality	Department of Transportation
High	Shift to CNG bus	Shift from gasoline bus to CNG bus which emits less CO2	Urban area	Reduction of CO2 emission	Department of Transportation
High	Restructuring of bus route network	Increase in frequencies, expansion of bus transportation services, and restructuring of bus network suitable for the use of subway will be implemented to enhance quality and convenience of public transportation service.	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
High	Introduction of Park & Bus Ride System	Introduction of Park & Bus Ride system and development of parkings to enhance quality and convenience of public transportation	Shopping mall Transportation hub (terminal) Aeon Mall #1	- Reduction of CO2 emissions and energy consumptions, due to increased users of energy efficient public transportation - Mitigation of traffic jams - Improvement of air quality - Increment of customers for shopping malls with transportation hubs	Department of Transportation
High	Development of Rapid Bus System (BRT)	Introduction of bus transport system with high-quanlity fanction including punctuality and rapidity and increased carrying capacity, by the integrated means of the introduction of 2-car buses, the introduction of PTPS (Public Transportation Priority System), and bus priority lanes, etc.	Urban area	- Reduction of energy and the CO2 by the use increase in public transport having high transportation energy efficiency - Mitigation of traffic congestion - Improvement of air quality	Department of Transportation
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation

Table Measures for Area A (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Traffic Demand Management	Optimization of traffic demand of private vehicle and public transportation is promoted, and smooth transportation flow is comprehensively ensured. Specifically, route guidance, traffic controls/regulations, and the provision of information on congestion and detour routes are executed to optimize traffic demands, by changes in means/route, changes in time, and effective use of vehicles (share-ride, car sharing, etc.).	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Medium	Development of underground malls	Creating pedestrian space in the underground area by developing underground malls	Urban area	- Mitigation of traffic jams - Pedestrian's safety - Development of underground malls	Department of Transportation
Medium	Promotion of Use of Subway	Promote the use of subway as an alternative transportation mode, to achieve modal shift to public transportation	Urban area	- Mitigation of traffic congestion - Improvement of air quality	Department of Transportation
Low	Collection and management of traffic information	Collect and manage information on traiffic volume, occurrence status of congestion, required travel time, etc. as basic information for traffic demand management	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Wide-range traffic control	Mitigate traffic congestion by traffic light cycle management by collecting information on traffic volume and congestion	Urban area	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Road Improvement/Renovation (to mitigate traffic congestion)	Improve traveling performance and mitigate automobile traffic congestion by increasing traffic capacity through newly construction and widening of roads	Entire HCMC, especially District 4	- Reduction of CO2 emissions - Reduction of fuel costs	Department of Transportation
Low	Introduction of Electric Motorbikes	Modal shift from gasoline motorbikes to electric motorbikes (with less CO2 emissions) will be promoted. For this, plug-in stations will be necessarily constructed, to enhance convenience of electric motorbike use.	Shopping mall Transportation hub (terminal)	- Reduction of CO2 emissions - Reduction of fuel costs - Improvement of air quality	Department of Transportation
Low	Facilitation of Road Greening	Facilitate planting trees on roadside	Urban area Highway	- Improvement of air quality - Increase in CO2 absorption - Generation of leafy shade (against heat-island phenomenon) - Formation of landscape	Department of Transportation

Table Measures for Area A (Industrial Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Kiln Operation Technoniques/Technologies	Environmentally sound fuel will be used, and waste heat and/or waste material will be reused.	Factories	- Reduction of CO2 emissions - Use of waste heat	
High	Greening of factory sites and industrial parks	Factory sites and industrial parks will be greened through planting trees.	Factories and industrial parks	- Reduction of CO2 emissions - Improvement of landscape	

Table Measures for Area A (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO_2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
High	Prevention of River Water Infiltration	Development of dikes	West coast in District 4 South coast in District 4 Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO
High	Development of stormwater reservoir	Development of stormwater reservoir	Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO

Table Measures for Area A (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Introduction of Anti-Flood Facilities such as Pumps and Watertight Doors	Anti-flood facilities such as pumps and watertight doors will be introduced.	Buildings located in frequently flooded areas	- Mitigation of damages from flood and high tide due to sea level rise as one of climate change adverse effects - Safe urban area	SAWACO
Medium	Promotion of reuse of rainwater	Through maintenance of rainwater storage facilities and introduction of water storage and purification equipments, reuse of rainwater for tap water, toilet water, and other water use will be promoted	Frequently Flooded areas Districut 4 Nha Be District Industrial parks Market	- Prevention of flood disaster - Safe urban area - Prevention of land sinkage due to reuse of stored rainfall water - Reduced running cost resulting from the reduced clean water consumptions. - Response to water supply shortage	SAWACO
Medium	Development of Hazard Map	Hazard map of HCMC will be developed, to show the estimated flooded areas and flood damages, as well as information necessary for evacuation (routes and place).	Frequently flooded areas (in District 4 and Nha Be District, etc.)	Mitigation of damages	SAWACO
Medium	Levelling of Lands	Lands of lowlands (altitude 0) urban areas will be escalated by piled-up clay.	District 7 Frequently flooded areas (in District 4 and Nha Be District, etc.)	- Mitigation of damages from flood and high tide - Safe urban area	SAWACO
Medium	Promotion and Distribution of Water-Saving Equipment	Water-saving equipment will be installed to reduce clean water consumption.	Hotel Office Residential house	Response to water supply shortage	SAWACO
Low	Wastewater Treatment and Recycling (with Water Purification Equipment)	Sewage and rainfall water to be filtrated and sterilized will be reused for industrial use, for toilets, and for cleaning.	District 4 Nha Be District Industrial park	Response to water supply shortage	SAWACO
Low	Establishment of Sewage Ledger System	Properties for sewage treatment will be managed appropriately.	Ben Ghe ward in District 1	Appropriate properties (sewer culverts) management to achieve effective of operation and maintenance of properties	SAWACO
Low	Introduction of Permeable Pavement	Permeable pavement will be introduced on urban roads, to promote the groundwater recharge.	Urban area	Reduced the amount of wastewater treatment, by infiltration of rainfalls to underground	SAWACO

Table Measures for Area A (Waste Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Commissions for Kitchen Waste Segregation and Collection (and Intermediate Treatment)	Organic waste emitted from households will be segregated and collected.	Residential house area District 1 District 4	- Prolonged lifetime of landfill site, and reduced amount of wastes - Environmental education (Citizens' awareness raising) - Energy recovery from waste as renewable energy sources - Expected dramatic waste amount reduction if many segregation categories are introduced.	Department of Natural Resources & Environment
High	Biogas-based Power Generation	Electricity is generated from biogas recovered through the methane digestion system, which ferments organic wastes such as food waste. Organic wastes should be segregated and collected in advance.	Binh Dien Wholesale Market District 1 (Da Phuac Solid Waste Treatment Complex in Binh Chanh) District 4	- Prolonged lifetime of landfill site, and reduced amount of wastes - Sanitary waste treatment - Energy gained from waste - Revenue from power sale	Department of Natural Resources & Environment
High	Electricity Generation from Solid Waste Incineration	Electricity generation system utilizing waste heat from solid waste incineration plant will be introduced.	Cu Chi Waste Treatment Complex at Tay Bac in Phuoc Hiep, Cu Chi	- Prolonged lifetime of landfill site, and reduced amount of wastes - Sanitary waste treatment - Energy gained from waste - Revenue from power sale - Appropriate waste treatment process fitting to the situation of high temperature and high humidity	Department of Natural Resources & Environment
High	Hazardous Waste Segregation and Collection	Strict regulations for hazardous waste segregation, collection, transportation, and disposal emitted from industrial factories should be introduced.	Industrial factories Hospitals	- Appropriate management of industrial and hospital/medical wastes - Security and safety	Department of Natural Resources & Environment
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

Table Measures for Area A (Health Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Human Resources Development of Medical Personnel in Hospital	Hospital medical staff (such as doctors) will be sent to Japan and be trained, to obtain the up-to-date advanced madical technology.	Medical roffesional staff of new hospitals to be opened	Improvement of medical healthcare systems	Department of Health
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

Table Measures for Area A (Construction Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction
High	Introduction of Energy Efficient Building Materials	The building materials with well insulation and high airtightness will be used, to improve efficiency of air-conditioning.	Public facilities Residence	Lower energy costs due to improvement of heat insulating effect	Department of Construction
Medium	Introduction of Incentive to Environmentally Sound Buildings	Increased floor area ration beyond the regulatied value as a bonus will be provided to the environmentall sound buildings, to promote to reduce environmental adverse impact on the construction.	Urban area	- Implementation of enviromental poilcy/measures with less public administrative expenditures - Lower energy costs and the reduction of CO2 emission	Department of Construction
Medium	Construction of Long-lived Building	Durability of buildings will be improved, through the introduction of new building standard in the construction regulations/ordinances.	Construction sites	Reduction of CO2 emissions due to the Improvement of durability and extention of building life-span	Department of Construction
Medium	Effective Use of Discharged Water and Solid Waste	Discharged wastewater, dredged sludge, and construction scrap materials from construction sites will be recycled and reused.	Construction sites	- Reduction of CO2 emissions - Limitation of waste emissions	Department of Construction
Medium	Introduction of Energy Efficient Constructing Machine	Hybrid construction vehicle and other machine will be introduced in the new construction sites.	Construction sites	- Reduction of CO2 emissions - Lower fuel cost due to the Improvement of fuel consumption - Improvement of air pollution	Department of Construction

Table Measures for Area A (Tourism Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Publicity of greeenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

(2) Measures for Area B

Table Measures for Area B (Land Use Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture

Table Measures for Area B (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Energy efficiency technology applied to buildings	Energy saving equipment and control system will be installed as a package.	Commercial bldg. Industrial park Public bldg. & premises	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	ESCO Project	Cost saved through the reduced energy consumptions will cover the cost for the installation of energy saving/energy efficiency equipment. ESCO (Energy Saving Company) entity will first pay for the initial installation cost and be paid from the saved costs to reimburse the initial cost.	Commercial bldg. Industrial park Public bldg. & premises Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Lighting	CFL(compact fluorescent light) or LED(light emitting diode) lamps with less electricity consumption will replace existing lighting equipment.	Urban areas Commercial bldg. Industrial park Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Air Conditioners	High efficiency air conditioners with inverter control function or with air-cooled heat pump system will be introduced.	Commercial bldg. Shopping mall Industrial park Residential house Hospitals	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Energy Efficiency Improvement Facilities to be installed at Small/Medium Enterprises	High efficiency compressors, motors, lightings, fans/circulators, air conditioners, and OA equipments will be introduced.	Commercial bldg. Industrial park	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Introduction of Photovoltaic Power Generation	Photovoltaic power generation system (CO_2 free) will be introduced.	Shopping mall Industrial parks Residential house Public bldg. & premises Unused space Rented roof Ben Thanh Market Elementary school in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale - Installation of competitive Japanese technology evaluated by life cycle costs from purchase through OM, recycling, and disposal	Department of Industry & Trade
High	Introduction of Solar Water Heater	Solar water heater by using thermal energy from sunshine will be introduced to supply heated water.	Shopping mall Residential house Hospital in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Low installation costs compared to PV system	Department of Industry & Trade

Table Measures for Area B (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Installation of Energy Saving Glasses	Efficiency of air conditioning system will be improved through the installation of energy saving glasses with high adiabaticity and high airtightness.	Commercial bldg. Public bldg. & premises Residential house	Light, fuel and water expenses are reduced by the improvement of adiabatic effect.	Department of Industry & Trade
Medium	Rooftop and/or Wall Greening	Greening on building rooftops and/or walls will contribute to limiting the increase of temperature of buildings.	Big buildings to be newly constructed Elementary school and hospital in District 4	- Increase of carbon sink in the urban area with limited space - Abatement of urban heat island effects resulting from environmental improvement - Reduction and/or slow down of rainfall flows - Improvement of urban scenery - Improvement of QUL due to creation of recreation area - Cleaning of air quality (such as absorption of NOx and SOx)	Department of Industry & Trade
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Introduction of Wind Power Generation	Wind power generation system (CO_2 free) will be introduced.	Place with wind resources Suburban area	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

Table Measures for Area B (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Introduction of Electric Motorbikes	Modal shift from gasoline motorbikes to electric motorbikes (with less CO_2 emissions) will be promoted. For this, plug-in stations will be necessarily constructed, to enhance convenience of electric motorbike use.	Shopping mall Transportation hub (terminal)	- Reduction of CO_2 emissions - Reduction of fuel costs - Improvement of air quality	Department of Transportation

Table Measures for Area B (Industrial Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Kiln Operation Technoniques/Technologies	Environmentally sound fuel will be used, and waste heat and/or waste material will be reused.	Factories	- Reduction of CO_2 emissions - Use of waste heat	
High	Greening of factory sites and industrial parks	Factory sites and industrial parks will be greened through planting trees.	Factories and industrial parks	- Reduction of CO_2 emissions - Improvement of landscape	

Table Measures for Area B (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
High	Development of stormwater reservoir	Development of stormwater reservoir	Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO
Medium	Promotion of reuse of rainwater	Through maintenance of rainwater storage facilities and introduction of water storage and purification equipments, reuse of rainwater for tap water, toilet water, and other water use will be promoted	Frequently Flooded areas Districut 4 Nha Be District Industrial parks Market	- Prevention of flood disaster - Safe urban area - Prevention of land sinkage due to reuse of stored rainfall water - Reduced running cost resulting from the reduced clean water consumptions. - Response to water supply shortage	SAWACO
Medium	Promotion and Distribution of Water-Saving Equipment	Water-saving equipment will be installed to reduce clean water consumption.	Hotel Office Residential house	Response to water supply shortage	SAWACO
Low	Wastewater Treatment and Recycling (with Water Purification Equipment)	Sewage and rainfall water to be filtrated and sterilized will be reused for industrial use, for toilets, and for cleaning.	District 4 Nha Be District Industrial park	Response to water supply shortage	SAWACO

Table Measures for Area B (Waste Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Hazardous Waste Segregation and Collection	Strict regulations for hazardous waste segregation, collection, transportation, and disposal emitted from industrial factories should be introduced.	Industrial factories Hospitals	- Appropriate management of industrial and hospital/medical wastes - Security and safety	Department of Natural Resources & Environment
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

Table Measures for Area B (Agricultural Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Prevention of Mudslides by Planting Trees	Planting trees on river embankments is promoted, to prevent mudslides at the river banks.	Binh Tahnh District 28 wards Can Gio District	Increased CO2 absorptions through appropriate management, such as tree thining and complementary planting	Department of Agriculture & Rural Development

Table Measures for Area B (Health Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Human Resources Development of Medical Personnel in Hospital	Hospital medical staff (such as doctors) will be sent to Japan and be trained, to obtain the up-to-date advanced madical technology.	Medical roffesional staff of new hospitals to be opened	Improvement of medical healthcare systems	Department of Health
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

Table Measures for Area B (Construction Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction
High	Introduction of Energy Efficient Building Materials	The building materials with well insulation and high airtightness will be used, to improve efficiency of air-conditioning.	Public facilities Residence	Lower energy costs due to improvement of heat insulating effect	Department of Construction
Medium	Construction of Long-lived Building	Durability of buildings will be improved, through the introduction of new building standard in the construction regulations/ordinances.	Construction sites	Reduction of CO2 emissions due to the Improvement of durability and extention of building life-span	Department of Construction
Medium	Effective Use of Discharged Water and Solid Waste	Discharged wastewater, dredged sludge, and construction scrap materials from construction sites will be recycled and reused.	Construction sites	- Reduction of CO2 emissions - Limitation of waste emissions	Department of Construction
Medium	Introduction of Energy Efficient Constructing Machine	Hybrid construction vehicle and other machine will be introduced in the new construction sites.	Construction sites	- Reduction of CO2 emissions - Lower fuel cost due to the Improvement of fuel consumption - Improvement of air pollution	Department of Construction

Table Measures for Area B (Tourism Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Promotion of ecotourism	Develop eco-tourism in villages along the coasts	District 9 Cu Chi District Hoc Mon Discrict Nha Be District Binh Chanh District	- Reduction of CO2 emissions -creation of new tourism resources -Preservation of natural environment	Department of Tourism
Medium	Publicity of greeenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

(3) Measures for Area C

Table Measures for Area C (Land Use Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture
Medium	Selection of Model Region to implement measures	Model region will be set where integrated climate change mitigation measures in the 10 sectors.	District 4 Nha Be District	Precautionary and intensive response can be taken in the area with emergency.	Department of Planning & Architecture
Medium	Appropriate Management of Large-scale Green Lands	Large-scale green lands located in parks will be appropriately managed, through the tree thinning, revegetation, replantation, etc.	Nha Be District Can Gio District	- Enhancement of CO2 absorptions - Conservation of biodiversity - Good scenery	Department of Planning & Architecture

Table Measures for Area C (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Energy efficiency technology applied to buildings	Energy saving equipment and control system will be installed as a package.	Commercial bldg. Industrial park Public bldg. & premises	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	ESCO Project	Cost saved through the reduced energy consumptions will cover the cost for the installation of energy saving/energy efficiency equipment. ESCO (Energy Saving Company) entity will first pay for the initial installation cost and be paid from the saved costs to reimburse the initial cost.	Commercial bldg. Industrial park Public bldg. & premises Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Lighting	CFL(compact fluorescent light) or LED(light emitting diode) lamps with less electricity consumption will replace existing lighting equipment.	Urban areas Commercial bldg. Industrial park Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Air Conditioners	High efficiency air conditioners with inverter control function or with air-cooled heat pump system will be introduced.	Commercial bldg. Shopping mall Industrial park Residential house Hospitals	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Energy Efficiency Improvement Facilities to be installed at Small/Medium Enterprises	High efficiency compressors, motors, lightings, fans/circulators, air conditioners, and OA equipments will be introduced.	Commercial bldg. Industrial park	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Introduction of Photovoltaic Power Generation	Photovoltaic power generation system (CO2 free) will be introduced.	Shopping mall Industrial parks Residential house Public bldg. & premises Unused space Rented roof Ben Thanh Market Elementary school in District 4	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale - Installation of competitive Japanese technology evaluated by life cycle costs from purchase through OM, recycling, and disposal	Department of Industry & Trade
High	Introduction of Solar Water Heater	Solar water heater by using thermal energy from sunshine will be introduced to supply heated water.	Shopping mall Residential house Hospital in District 4	- Reduction of fuel and light expenses - CO2 emission reduction - Low installation costs compared to PV system	Department of Industry & Trade

Table Measures for Area C (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Installation of Energy Saving Glasses	Efficiency of air conditioning system will be improved through the installation of energy saving glasses with high adiabaticity and high airtightness.	Commercial bldg. Public bldg. & premises Residential house	Light, fuel and water expenses are reduced by the improvement of adiabatic effect.	Department of Industry & Trade
Medium	Rooftop and/or Wall Greening	Greening on building rooftops and/or walls will contribute to limiting the increase of temperature of buildings.	Big buildings to be newly constructed Elementary school and hospital in District 4	- Increase of carbon sink in the urban area with limited space - Abatement of urban heat island effects resulting from environmental improvement - Reduction and/or slow down of rainfall flows - Improvement of urban scenery - Improvement of QUL due to creation of recreation area - Cleaning of air quality (such as absorption of NOx and SOx)	Department of Industry & Trade
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Introduction of Wind Power Generation	Wind power generation system (CO2 free) will be introduced.	Place with wind resources Suburban area	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

Table Measures for Area C (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Introduction of Electric Motorbikes	Modal shift from gasoline motorbikes to electric motorbikes (with less CO_2 emissions) will be promoted. For this, plug-in stations will be necessarily constructed, to enhance convenience of electric motorbike use.	Shopping mall Transportation hub (terminal)	- Reduction of CO_2 emissions - Reduction of fuel costs - Improvement of air quality	Department of Transportation

Table Measures for Area C (Industrial Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Kiln Operation Technoniques/Technologies	Environmentally sound fuel will be used, and waste heat and/or waste material will be reused.	Factories	- Reduction of CO_2 emissions - Use of waste heat	
High	Greening of factory sites and industrial parks	Factory sites and industrial parks will be greened through planting trees.	Factories and industrial parks	- Reduction of CO_2 emissions - Improvement of landscape	

Table Measures for Area C (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO_2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
High	Prevention of River Water Infiltration	Development of dikes	West coast in District 4 South coast in District 4 Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO
High	Development of stormwater reservoir	Development of stormwater reservoir	Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO

Table Measures for Area C (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Introduction of Anti-Flood Facilities such as Pumps and Watertight Doors	Anti-flood facilities such as pumps and watertight doors will be introduced.	Buildings located in frequently flooded areas	- Mitigation of damages from flood and high tide due to sea level rise as one of climate change adverse effects - Safe urban area	SAWACO
Medium	Promotion of reuse of rainwater	Through maintenance of rainwater storage facilities and introduction of water storage and purification equipments, reuse of rainwater for tap water, toilet water, and other water use will be promoted	Frequently Flooded areas Districut 4 Nha Be District Industrial parks Market	- Prevention of flood disaster - Safe urban area - Prevention of land sinkage due to reuse of stored rainfall water - Reduced running cost resulting from the reduced clean water consumptions. - Response to water supply shortage	SAWACO
Medium	Development of Hazard Map	Hazard map of HCMC will be developed, to show the estimated flooded areas and flood damages, as well as information necessary for evacuation (routes and place).	Frequently flooded areas (in District 4 and Nha Be District, etc.)	Mitigation of damages	SAWACO
Medium	Levelling of Lands	Lands of lowlands (altitude 0) urban areas will be escalated by piled-up clay.	District 7 Frequently flooded areas (in District 4 and Nha Be District, etc.)	- Mitigation of damages from flood and high tide - Safe urban area	SAWACO
Medium	Promotion and Distribution of Water-Saving Equipment	Water-saving equipment will be installed to reduce clean water consumption.	Hotel Office Residential house	Response to water supply shortage	SAWACO
Low	Wastewater Treatment and Recycling (with Water Purification Equipment)	Sewage and rainfall water to be filtrated and sterilized will be reused for industrial use, for toilets, and for cleaning.	District 4 Nha Be District Industrial park	Response to water supply shortage	SAWACO

Table Measures for Area C (Waste Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Hazardous Waste Segregation and Collection	Strict regulations for hazardous waste segregation, collection, transportation, and disposal emitted from industrial factories should be introduced.	Industrial factories Hospitals	- Appropriate management of industrial and hospital/medical wastes - Security and safety	Department of Natural Resources & Environment
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

Table Measures for Area C (Health Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Human Resources Development of Medical Personnel in Hospital	Hospital medical staff (such as doctors) will be sent to Japan and be trained, to obtain the up-to-date advanced madical technology.	Medical roffesional staff of new hospitals to be opened	Improvement of medical healthcare systems	Department of Health
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

Table Measures for Area C (Construction Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction
High	Introduction of Energy Efficient Building Materials	The building materials with well insulation and high airtightness will be used, to improve efficiency of air-conditioning.	Public facilities Residence	Lower energy costs due to improvement of heat insulating effect	Department of Construction
Medium	Construction of Long-lived Building	Durability of buildings will be improved, through the introduction of new building standard in the construction regulations/ordinances.	Construction sites	Reduction of CO2 emissions due to the Improvement of durability and extention of building life-span	Department of Construction
Medium	Effective Use of Discharged Water and Solid Waste	Discharged wastewater, dredged sludge, and construction scrap materials from construction sites will be recycled and reused.	Construction sites	- Reduction of CO2 emissions - Limitation of waste emissions	Department of Construction
Medium	Introduction of Energy Efficient Constructing Machine	Hybrid construction vehicle and other machine will be introduced in the new construction sites.	Construction sites	- Reduction of CO2 emissions - Lower fuel cost due to the Improvement of fuel consumption - Improvement of air pollution	Department of Construction

Table Measures for Area C (Tourism Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Promotion of ecotourism	Develop eco-tourism in villages along the coasts	District 9 Cu Chi District Hoc Mon Discrict Nha Be District Binh Chanh District	- Reduction of CO2 emissions -creation of new tourism resources -Preservation of natural environment	Department of Tourism
Medium	Publicity of greeenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

(4) Measures for Area D

Table Measures for Area D (Land Use Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture

Table Measures for Area D (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Energy efficiency technology applied to buildings	Energy saving equipment and control system will be installed as a package.	Commercial bldg. Industrial park Public bldg. & premises	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	ESCO Project	Cost saved through the reduced energy consumptions will cover the cost for the installation of energy saving/energy efficiency equipment. ESCO (Energy Saving Company) entity will first pay for the initial installation cost and be paid from the saved costs to reimburse the initial cost.	Commercial bldg. Industrial park Public bldg. & premises Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Lighting	CFL(compact fluorescent light) or LED(light emitting diode) lamps with less electricity consumption will replace existing lighting equipment.	Urban areas Commercial bldg. Industrial park Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Air Conditioners	High efficiency air conditioners with inverter control function or with air-cooled heat pump system will be introduced.	Commercial bldg. Shopping mall Industrial park Residential house Hospitals	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Energy Efficiency Improvement Facilities to be installed at Small/Medium Enterprises	High efficiency compressors, motors, lightings, fans/circulators, air conditioners, and OA equipments will be introduced.	Commercial bldg. Industrial park	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Introduction of Photovoltaic Power Generation	Photovoltaic power generation system (CO_2 free) will be introduced.	Shopping mall Industrial parks Residential house Public bldg. & premises Unused space Rented roof Ben Thanh Market Elementary school in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale - Installation of competitive Japanese technology evaluated by life cycle costs from purchase through OM, recycling, and disposal	Department of Industry & Trade
High	Introduction of Solar Water Heater	Solar water heater by using thermal energy from sunshine will be introduced to supply heated water.	Shopping mall Residential house Hospital in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Low installation costs compared to PV system	Department of Industry & Trade

Table Measures for Area D (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Installation of Energy Saving Glasses	Efficiency of air conditioning system will be improved through the installation of energy saving glasses with high adiabaticity and high airtightness.	Commercial bldg. Public bldg. & premises Residential house	Light, fuel and water expenses are reduced by the improvement of adiabatic effect.	Department of Industry & Trade
Medium	Rooftop and/or Wall Greening	Greening on building rooftops and/or walls will contribute to limiting the increase of temperature of buildings.	Big buildings to be newly constructed Elementary school and hospital in District 4	- Increase of carbon sink in the urban area with limited space - Abatement of urban heat island effects resulting from environmental improvement - Reduction and/or slow down of rainfall flows - Improvement of urban scenery - Improvement of QUL due to creation of recreation area - Cleaning of air quality (such as absorption of NOx and SOx)	Department of Industry & Trade
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Introduction of Wind Power Generation	Wind power generation system (CO2 free) will be introduced.	Place with wind resources Suburban area	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

Table Measures for Area D (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Introduction of Electric Motorbikes	Modal shift from gasoline motorbikes to electric motorbikes (with less CO2 emissions) will be promoted. For this, plug-in stations will be necessarily constructed, to enhance convenience of electric motorbike use.	Shopping mall Transportation hub (terminal)	- Reduction of CO2 emissions - Reduction of fuel costs - Improvement of air quality	Department of Transportation

Table Measures for Area D (Industrial Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Kiln Operation Technoniques/Technologies	Environmentally sound fuel will be used, and waste heat and/or waste material will be reused.	Factories	- Reduction of CO2 emissions - Use of waste heat	
High	Greening of factory sites and industrial parks	Factory sites and industrial parks will be greened through planting trees.	Factories and industrial parks	- Reduction of CO2 emissions - Improvement of landscape	

Table Measures for Area D (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
Medium	Promotion and Distribution of Water-Saving Equipment	Water-saving equipment will be installed to reduce clean water consumption.	Hotel Office Residential house	Response to water supply shortage	SAWACO
Low	Wastewater Treatment and Recycling (with Water Purification Equipment)	Sewage and rainfall water to be filtrated and sterilized will be reused for industrial use, for toilets, and for cleaning.	District 4 Nha Be District Industrial park	Response to water supply shortage	SAWACO

Table Measures for Area D (Waste Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Hazardous Waste Segregation and Collection	Strict regulations for hazardous waste segregation, collection, transportation, and disposal emitted from industrial factories should be introduced.	Industrial factories Hospitals	- Appropriate management of industrial and hospital/medical wastes - Security and safety	Department of Natural Resources & Environment
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

Table Measures for Area D (Agricultural Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Improvemnet in Agricultural Product Varieties Resilient to Climate Change Effects	Climate change-resistant species of agricutural products will be developed, through the cultivar improvement and other methods.	Agricultural communities	- Conservation of farm and green lands - Create new agricultural revenue resources	Department of Agriculture & Rural Development

Table Measures for Area D (Health Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Human Resources Development of Medical Personnel in Hospital	Hospital medical staff (such as doctors) will be sent to Japan and be trained, to obtain the up-to-date advanced madical technology.	Medical roffesional staff of new hospitals to be opened	Improvement of medical healthcare systems	Department of Health
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

Table Measures for Area D (Construction Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction
High	Introduction of Energy Efficient Building Materials	The building materials with well insulation and high airtightness will be used, to improve efficiency of air-conditioning.	Public facilities Residence	Lower energy costs due to improvement of heat insulating effect	Department of Construction
Medium	Construction of Long-lived Building	Durability of buildings will be improved, through the introduction of new building standard in the construction regulations/ordinances.	Construction sites	Reduction of CO2 emissions due to the Improvement of durability and extention of building life-span	Department of Construction
Medium	Effective Use of Discharged Water and Solid Waste	Discharged wastewater, dredged sludge, and construction scrap materials from construction sites will be recycled and reused.	Construction sites	- Reduction of CO2 emissions - Limitation of waste emissions	Department of Construction
Medium	Introduction of Energy Efficient Constructing Machine	Hybrid construction vehicle and other machine will be introduced in the new construction sites.	Construction sites	- Reduction of CO2 emissions - Lower fuel cost due to the Improvement of fuel consumption - Improvement of air pollution	Department of Construction

Table Measures for Area D (Tourism Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Promotion of ecotourism	Develop eco-tourism in villages along the coasts	District 9 Cu Chi District Hoc Mon Discrict Nha Be District Binh Chanh District	- Reduction of CO2 emissions -creation of new tourism resources -Preservation of natural environment	Department of Tourism
Medium	Publicity of greeenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

(5) Measures for Area E

Table Measures for Area E (Land Use Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture

Table Measures for Area E (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Energy efficiency technology applied to buildings	Energy saving equipment and control system will be installed as a package.	Commercial bldg. Industrial park Public bldg. & premises	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	ESCO Project	Cost saved through the reduced energy consumptions will cover the cost for the installation of energy saving/energy efficiency equipment. ESCO (Energy Saving Company) entity will first pay for the initial installation cost and be paid from the saved costs to reimburse the initial cost.	Commercial bldg. Industrial park Public bldg. & premises Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Lighting	CFL(compact fluorescent light) or LED(light emitting diode) lamps with less electricity consumption will replace existing lighting equipment.	Urban areas Commercial bldg. Industrial park Residential house	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	High Efficiency Air Conditioners	High efficiency air conditioners with inverter control function or with air-cooled heat pump system will be introduced.	Commercial bldg. Shopping mall Industrial park Residential house Hospitals	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Energy Efficiency Improvement Facilities to be installed at Small/Medium Enterprises	High efficiency compressors, motors, lightings, fans/circulators, air conditioners, and OA equipments will be introduced.	Commercial bldg. Industrial park	Reduction of operation costs due to electric savings	Department of Industry & Trade
High	Introduction of Photovoltaic Power Generation	Photovoltaic power generation system (CO_2 free) will be introduced.	Shopping mall Industrial parks Residential house Public bldg. & premises Unused space Rented roof Ben Thanh Market Elementary school in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale - Installation of competitive Japanese technology evaluated by life cycle costs from purchase through OM, recycling, and disposal	Department of Industry & Trade
High	Introduction of Solar Water Heater	Solar water heater by using thermal energy from sunshine will be introduced to supply heated water.	Shopping mall Residential house Hospital in District 4	- Reduction of fuel and light expenses - CO_2 emission reduction - Low installation costs compared to PV system	Department of Industry & Trade

Table Measures for Area E (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Installation of Energy Saving Glasses	Efficiency of air conditioning system will be improved through the installation of energy saving glasses with high adiabaticity and high airtightness.	Commercial bldg. Public bldg. & premises Residential house	Light, fuel and water expenses are reduced by the improvement of adiabatic effect.	Department of Industry & Trade
Medium	Rooftop and/or Wall Greening	Greening on building rooftops and/or walls will contribute to limiting the increase of temperature of buildings.	Big buildings to be newly constructed Elementary school and hospital in District 4	- Increase of carbon sink in the urban area with limited space - Abatement of urban heat island effects resulting from environmental improvement - Reduction and/or slow down of rainfall flows - Improvement of urban scenery - Improvement of QUL due to creation of recreation area - Cleaning of air quality (such as absorption of NOx and SOx)	Department of Industry & Trade
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Introduction of Wind Power Generation	Wind power generation system (CO_2 free) will be introduced.	Place with wind resources Suburban area	- Reduction of fuel and light expenses - CO_2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

Table Measures for Area E (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation
Low	Introduction of Electric Motorbikes	Modal shift from gasoline motorbikes to electric motorbikes (with less CO2 emissions) will be promoted. For this, plug-in stations will be necessarily constructed, to enhance convenience of electric motorbike use.	Shopping mall Transportation hub (terminal)	- Reduction of CO2 emissions - Reduction of fuel costs - Improvement of air quality	Department of Transportation

Table Measures for Area E (Industrial Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Kiln Operation Technoniques/Technologies	Environmentally sound fuel will be used, and waste heat and/or waste material will be reused.	Factories	- Reduction of CO2 emissions - Use of waste heat	
High	Greening of factory sites and industrial parks	Factory sites and industrial parks will be greened through planting trees.	Factories and industrial parks	- Reduction of CO2 emissions - Improvement of landscape	

Table Measures for Area E (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
Medium	Promotion and Distribution of Water-Saving Equipment	Water-saving equipment will be installed to reduce clean water consumption.	Hotel Office Residential house	Response to water supply shortage	SAWACO
Low	Wastewater Treatment and Recycling (with Water Purification Equipment)	Sewage and rainfall water to be filtrated and sterilized will be reused for industrial use, for toilets, and for cleaning.	District 4 Nha Be District Industrial park	Response to water supply shortage	SAWACO

Table Measures for Area E (Waste Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Hazardous Waste Segregation and Collection	Strict regulations for hazardous waste segregation, collection, transportation, and disposal emitted from industrial factories should be introduced.	Industrial factories Hospitals	- Appropriate management of industrial and hospital/medical wastes - Security and safety	Department of Natural Resources & Environment
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

Table Measures for Area E (Health Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Human Resources Development of Medical Personnel in Hospital	Hospital medical staff (such as doctors) will be sent to Japan and be trained, to obtain the up-to-date advanced madical technology.	Medical roffesional staff of new hospitals to be opened	Improvement of medical healthcare systems	Department of Health
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

Table Measures for Area E (Construction Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction
High	Introduction of Energy Efficient Building Materials	The building materials with well insulation and high airtightness will be used, to improve efficiency of air-conditioning.	Public facilities Residence	Lower energy costs due to improvement of heat insulating effect	Department of Construction
Medium	Construction of Long-lived Building	Durability of buildings will be improved, through the introduction of new building standard in the construction regulations/ordinances.	Construction sites	Reduction of CO2 emissions due to the Improvement of durability and extention of building life-span	Department of Construction
Medium	Effective Use of Discharged Water and Solid Waste	Discharged wastewater, dredged sludge, and construction scrap materials from construction sites will be recycled and reused.	Construction sites	- Reduction of CO2 emissions - Limitation of waste emissions	Department of Construction
Medium	Introduction of Energy Efficient Constructing Machine	Hybrid construction vehicle and other machine will be introduced in the new construction sites.	Construction sites	- Reduction of CO2 emissions - Lower fuel cost due to the Improvement of fuel consumption - Improvement of air pollution	Department of Construction

Table Measures for Area E (Tourism Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Promotion of ecotourism	Develop eco-tourism in villages along the coasts	District 9 Cu Chi District Hoc Mon Discrict Nha Be District Binh Chanh District	- Reduction of CO2 emissions -creation of new tourism resources -Preservation of natural environment	Department of Tourism
Medium	Publicity of greeenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

(6) Measures for Area F

Table Measures for Area F (Land Use Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Appropriate Site Allocation of Venous Industry Infrastructure	Venous industry infrastructures necessary for urban development will be allocated in advance in a appropriate manner.	4 satellite cities suburban region District 4	- Appropriate and smooth transportation and treatment of waste, due to the appropriate facility allocation. - Construction of necessary infrastructure before other urban exploration.	Department of Planning & Architecture
Medium	Appropriate Management of Large-scale Green Lands	Large-scale green lands located in parks will be appropriately managed, through the tree thinning, revegetation, replantation, etc.	Nha Be District Can Gio District	- Enhancement of CO2 absorptions - Conservation of biodiversity - Good scenery	Department of Planning & Architecture

Table Measures for Area F (Energy Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	Introduction of Small-scale Hydropower Generation	Unused energy by small-scale hydropower generation will be utilized, through the utilization of remaining pressure in flowing water into service reservoir.	Water distribution stations Canals	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Introduction of Wind Power Generation	Wind power generation system (CO2 free) will be introduced.	Place with wind resources Suburban area	- Reduction of fuel and light expenses - CO2 emission reduction - Revenue from power sale	Department of Industry & Trade
Low	Regional Energy Supply System	Urban energy supply system with high energy efficiency will be introduced. The system is composed of intensive management of electricity and thermal energy generated from cogeneration utilizing waste heat from buildings and river waters, at block level.	Coastal areas	Reduction of operation costs due to electric savings	Department of Industry & Trade

Table Measures for Area F (Transportation Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Promotion of Eco-Driving with Digital Tachographs	Promote eco-driving of logistic truck/vehicle drivers through the eco-driving programme based on the collection and analysis of data of fuel consumptions, run distance, driving attitude, etc.	Entire HCMC	- Improvement of fuel efficiency - Reduction of traffic accidents	Department of Transportation
Low	Modernization of road system	Facilitate smooth traffic flows by separation of pedestrians and automobile, establishment of traffic regulations, and traffic education programme, etc.	Entire HCMC	- Mitigation of traffic jams - Improvement of air quality	Department of Transportation

Table Measures for Area F (Water Resources Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Stable Water Intake Facility	Water-resource development Lake Tri An and Lake Dau Tieng, both of which are located at upstream of current water source rivers (Saigon River and Dong Nai River)	Areas where water is supplied by SAWACO	Tapped water quality improvement	SAWACO
High	Improvement of Leakage from Clean Water Pipe Networ	Implement the effective measures to prevent water leakage from pipelines.	Areas where water is supplied by SAWACO	- Effective water use promoted through the water leakage improvement - Leakage ratio: 35%	SAWACO
High	Introduction of Water Distribution Management to Improve Water Supply System	The construction of water distribution facilities and the introduction of water distribution management achieve the appropriate management of water pressures within the city, to ensure the quality of supplied tapped water.	Entire HCMC	- Optimization of pump energy use in whole water supply system, through appropriate infrastructure arrangement for water distribution - Save of pump energy use at individual hoseholds, through ensuring the appropriate water pressures - Reduction of CO2 emissions from manufacturing and transporting bottled waters, by curving the consumptions of bottled water resulted from the stable supply of safe tapped water	SAWACO
High	Prevention of River Water Infiltration	Development of dikes	West coast in District 4 South coast in District 4 Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO
High	Development of stormwater reservoir	Development of stormwater reservoir	Frequently flooded areas (such as Nha Be District, etc.)	Mitiagation of flood damages	SAWACO
Medium	Introduction of Anti-Flood Facilities such as Pumps and Watertight Doors	Anti-flood facilities such as pumps and watertight doors will be introduced.	Buildings located in frequently flooded areas	- Mitigation of damages from flood and high tide due to sea level rise as one of climate change adverse effects - Safe urban area	SAWACO
Medium	Promotion of reuse of rainwater	Through maintenance of rainwater storage facilities and introduction of water storage and purification equipments, reuse of rainwater for tap water, toilet water, and other water use will be promoted	Frequently Flooded areas Distrincut 4 Nha Be District Industrial parks Market	- Prevention of flood disaster - Safe urban area - Prevention of land sinkage due to reuse of stored rainfall water - Reduced running cost resulting from the reduced clean water consumptions. - Response to water supply shortage	SAWACO
Medium	Development of Hazard Map	Hazard map of HCMC will be developed, to show the estimated flooded areas and flood damages, as well as information necessary for evacuation (routes and place).	Frequently flooded areas (in District 4 and Nha Be District, etc.)	Mitigation of damages	SAWACO
Medium	Levelling of Lands	Lands of lowlands (altitude 0) urban areas will be escalated by piled-up clay.	District 7 Frequently flooded areas (in District 4 and Nha Be District, etc.)	- Mitigation of damages from flood and high tide - Safe urban area	SAWACO

Table Measures for Area F (Waste Management Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Electric Manifest for Waste Management	Through the electric manifest for waste management, the industrial waste flow is grasped based on the reports on type and treatment measures obliged to be submitted by waste emitters, and the reports on waste transportation and disposal completion by waste treating entities, to prevent illegal waste disposal and to ensure appropriate industrial waste treatment.	Entire HCMC	- Appropriate waste management - Security and safety - Prevention of illegal waste disposal	Department of Natural Resources & Environment
Medium	Reduction and Reuse of Sewage Sludge	Sewage sludge is incinerated and melted, to recycle them as construction materials.	Sewage plants	- Life extension of landfill sites - Reduction of amount of wastes - Sanitary waste treatment - Reuse of dissolved slag as paver	Department of Natural Resources & Environment
Medium	Systematic revision of charging fees for waste collection	Reduction of the waste by charging each household for waste collection according to the amount of garbage	Entire HCMC	-Life extension of landfill sites (reduction of solid waste)	Department of Natural Resources & Environment

Table Measures for Area F (Agricultural Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Prevention of Mudslides by Planting Trees	Planting trees on river embankments is promoted, to prevent mudslides at the river banks.	Binh Tahnh District 28 wards Can Gio District	Increased CO2 absorptions through appropriate management, such as tree thining and complementary planting	Department of Agriculture & Rural Development
High	Introduction of Water-saving Pumps with Utilization of Renewable Energy	Water-saving pumps with utilization of renewable energy will be introduced.	Dong Canal area in Cu Chi District (10ha of agricultural land)	- Reduction of fuel and light expenses - CO2 emission reduction	Department of Agriculture & Rural Development
Medium	Biogas-based Electric Power Generation from Livestock Manure	Biogas (mainly composed of methane gas) is recovered through the digestors (with anaerovic digestion) of livestock manure, and is utilized as fuel for cogenaration systems, to generate electricity.	Agricultural communities	- Reduction of utility costs - CO2 emission reduction - Income from electric power selling	Department of Agriculture & Rural Development
Medium	Reduction of Agricultural Chemicals and Fertilizers Usage	Use of agricultural chemicals and fertilizers is reduced.	Agricultural fields	0	Department of Agriculture & Rural Development
Medium	Promoting development of production technology of crops in response to climate change	Promoting cultivation of new varieties in farmland and experiments of new cultivation technology	Cu Chi District	- Presevation of agricultural lands - Creation of new revenue sources in agriculture	Department of Agriculture & Rural Development
Medium	Development of agricultural model that contribute to low-carbon and energy-saving	Development and operation of criteria that contribute to re-use and suppression of irrigation water, introduction of energy-saving equipments, and regulation of pesticides	Can Gio District Cu Chi District	- Reduction of utility costs	Department of Agriculture & Rural Development

Table Measures for Area F (Health Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
Medium	- Improvement of hygiene management at hospitals - Appropriate treatment of medical/hospital waste and wastewater	Improvement of hygienic environment in hospitals will be promoted, and waste and/or wastewater with the risk of infectious diseases emitted from hospitals will be appropriately treated, to secure good health of patients and neighborhood residents.	Entire HCMC	- Ensuring health of patients - Conservation of water quality in public waters - Securement of good health of neighborhood residents	Department of Health
Medium	- Countermeasures against Existing Diseases whose Occuration in a Different Manner - Countermeasures against New Infectuous Diseases - Countermeasures agains Ailen Species - Decrease in Morbidity (Rate of Illnesses)	New infections will be investigated, and emergency medical facilities will be established.	Entire HCMC	Ensuring health and security of citizens	Department of Health

Table Measures for Area F (Construction Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Development of design criteria of eco-friendly buildings	By developing design criteria of eco-friendly buildings, environmental impact of new buildings will be reduced	Entire HCMC	- Reduction of CO2 emissions and utilities costs	Department of Construction

Table Measures for Area F (Tourism Sector)

Priority	Measure	Summary	Target Area	Implementation Effects	Agency
High	Improvement of Water Traffic Network	Ships/boats will be operated as an alternative transport mode to ground transportation.	Rivers and Canals	- Mitigation of road traffic - Creation of new tourism resource such as cruise ships	Department of Tourism
Medium	Planning of eco resort	Promote the creation of tourism resources that is environment-friendly by promoting eco resort development	Can Gio District	- Reduction of CO2 emissions -creation of new tourism resources	Department of Tourism
Medium	Promotion of ecotourism	Develop eco-tourism in villages along the coasts	District 9 Cu Chi District Hoc Mon Discrict Nha Be District Binh Chanh District	- Reduction of CO2 emissions -creation of new tourism resources -Preservation of natural environment	Department of Tourism
Medium	Publicity of greenhouse gas absorption effects of protected forests	Promote the preservation of natural environment and awareness building of the citizen for climate change by publicizing the CO2 absorption effects of protected forests in Can Gio District	Entire HCMC	-Preservation of natural environment -awareness building for climate change	Department of Tourism

3. The Implementation of JCM Project's Feasibility Study

Through the early implementation of expected projects, feasibility studies related to the following 3.1 and 3.2 initiatives that have a high probability in developing later similar initiatives were implemented. In the event of carrying out a subject project as a JCM project and the creation of Project Design Documents (PDD) and developments of applicable JCM methodology (like the creation of settings on eligibility criteria requirements, specification and calculation of reference emission amount, calculation of project emission amount, establishment on monitoring methods, settings of a default value and preconfigured value that is needed for the calculation and assessment on the reduction of emission amount, calculation sheets (Excel spreadsheets).

In regard to JCM Methodology, its development proceeds with the aim of obtaining an approval from the JCM Joint Committee, based on the [Guidelines for Developing Proposed Methodology (JCM_VN_GL_PM_ver01.0)]. In addition, in the even that there are any instructions from MOE, we are ready to provide guidance to the JCM Joint Committee at once.

In addition, PDD was created based on [Joint Crediting Mechanism Guidelines for Developing Project Design Document (PDD) and Monitoring Report (JCM_VN_GL_PDD_MR_ver01.0)] and the developed JCM Methodology. In addition, in the even that there are any instructions from MOE, the JCM Joint Committee will be ready to provide the necessary confirmation to a third party evaluator (TPE).

3. 1 Introduction of Building Energy Saving Technologies

(1) Outline of the Project

Electricity consumption in Vietnam skyrocketing at a rate of approximately 14% a year in line with economic development and improvement of living standards, and civilian uses account for roughly 40% of this consumption. Ho Chi Minh City accounts for 20% of all power consumed in Vietnam, and approximately 20% of this is consumed in office buildings, commercial facilities and the like. Introducing energy saving technologies to such buildings will help promote energy saving, reduce GHG emissions, extend the useful life of buildings, and contribute to environmental preservation.

The project, which targets an office building and hotel, etc. with total floor area of around 20,000m^2, aims to save energy and reduce GHG emissions through combining advanced Japanese products and technologies that were identified as promising technologies last fiscal year, for example, adsorption dehumidification type air conditioning, raising the temperature of air conditioning cold water, adoption of LED lights, introduction of smart BEMS and so on.

①Outline of the Target Building

For this study, the following building has been targeted out of existing office buildings. It is a medium-size building of a type commonly found in Ho Chi Minh City, and has been selected with a view to extending the results of study to other cases.

Table 1 Outline of the Target Building

Building structure and use	Reinforced concrete structure
Completed year	1997
Total floor area	Approx. 20,000m²
Floors	21 floors
Air conditioning heat source	Air-cooled chiller
Air conditioning system	FCU (fan coil unit)on each floor
Lighting system	Fluorescent lights (no dimming)
Ventilation system	Outside air treatment unit + exhaust on each floor
Control, instrumentation, etc.	Local room temperature control
Building exterior	

Figure 1 shows the trend of electricity consumption in the target building in 2012.

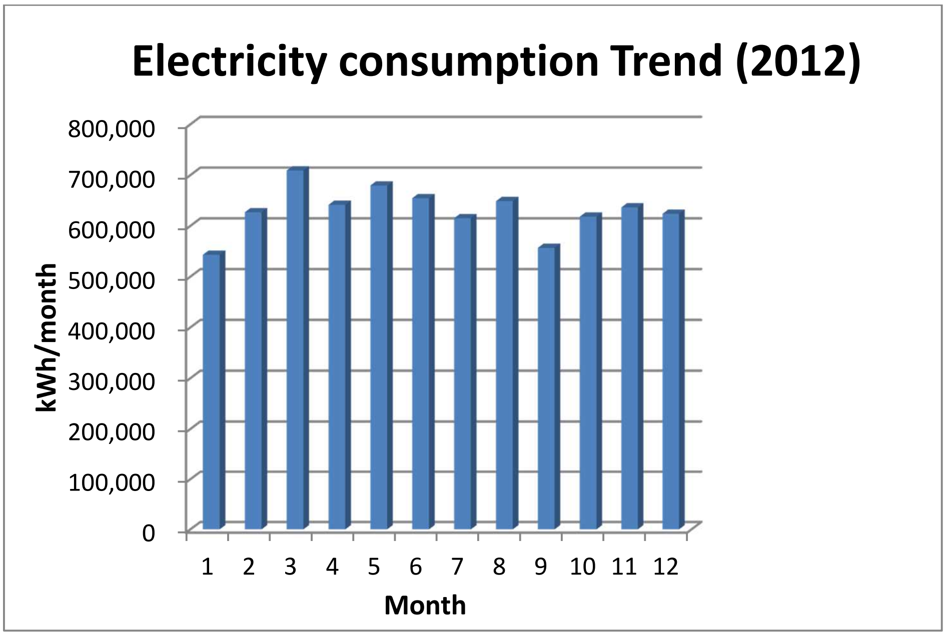


Figure 1　Electricity consumption Trend in the Target Building

Annual electricity consumption is 7,553MWh/year, corresponding to 378kWh/m^2/year in terms of unit area. Based on this, the quantity of CO_2 emissions is 4,716 t-CO_2/year or 236 kg-CO_2/m^2/year, which is more than 2.3 times higher than the value in a standard office building in Japan.

7,553MWh/year×0.6244 t-CO_2/MWh※= 4,716 t-CO_2/year

4,716 t-CO_2/year÷20,000m^2= 236 kg-CO_2/m^2/year

*　Grid power emission factor (CM): Source – IGES Market Mechanism Country-based Handbook (March 2014)

②Identification of applicable energy saving technologies and plan for introduction

Since individual building energy saving technologies can be expected to produce an energy saving effect of only a few percent, sometimes less than even 1%, there is no way to secure a significant effect with only one technology. Rather, a certain effect can be anticipated through introducing a number of technologies in combination.

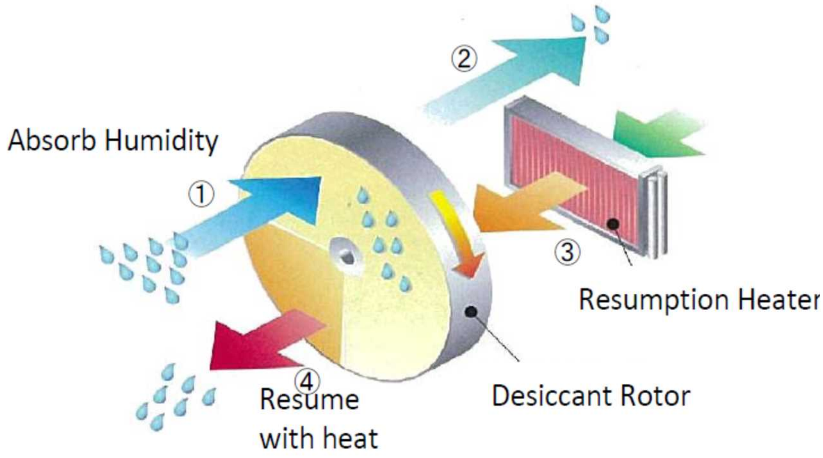
More than 30 technologies were found to be applicable to the target building, and these were narrowed down to the following that have a relatively large energy saving effect and can be expected to also be effective in relation to investment.

Table 2 Outline of Energy Saving Technologies

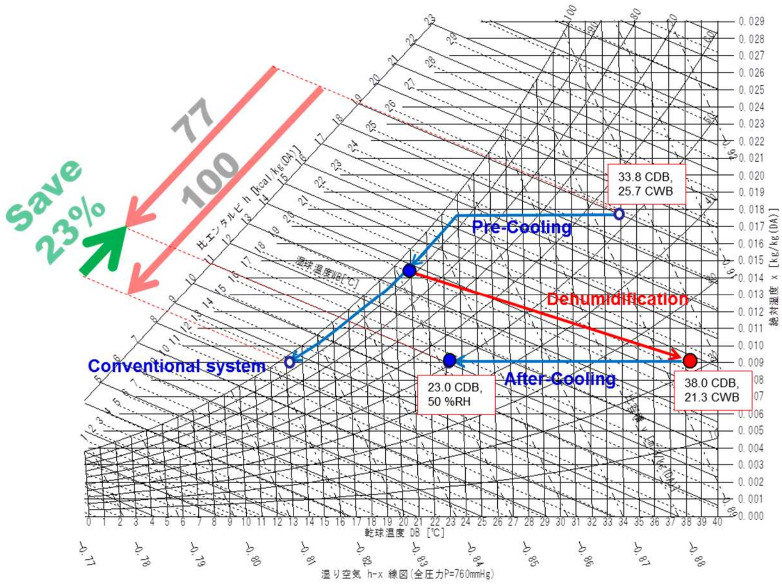
Type of Technology	Name of Technology	Outline of Technology
Air conditioning	Desiccant air treatment	When introducing hot and humid outside air, adsorption dehumidification, etc. is conducted without using a refrigerator.
	Raising the temperature of cold water	Temperature of the cold water used for cooling rooms can be changed from the conventional 7°C to 12°C, making it possible to improve refrigerator efficiency.
	Individual control of cold water flow in each floor	By installing air conditioning cold water pumps on each floor, flow can be kept to a minimum and energy can be saved.
Lighting	Adoption of LED lights	Through upgrading lighting equipment to LED and also adopting human sensors, lighting energy can be greatly reduced.
Control	Smart BEMS	Through monitoring energy use and conducting optimum operation of building equipment (air conditioning and electricity), energy can be saved.
Ventilation	Adoption of inverter fans for ventilation	For the large-capacity ventilation, on-off control of fans based on CO sensors, etc., and inverter capacity control can save energy consumption.

The following paragraphs give outline descriptions of these technologies.

In conventional air conditioning systems, when hot and humid outside air is introduced, cold water of around 7°C is manufactured in a refrigerator and condensation is formed on the cold water coil surface in order to control humidity; however, in desiccant air treatment, the humidity (moisture content) of outside air is adsorbed to rotor adsorbent, and this moisture content is expelled with the air discharged from rooms, thereby recycling the rotor.



Principles of Dehumidification Air Conditioning



Design of Air Conditions

① Adsorption type dehumidification

Humidity (moisture content) of outside air is adsorbed to adsorbent of the desiccant rotor.

②Air intake to room

Dehumidified outside air is cooled and fed to rooms (temperature of cold water can be raised).

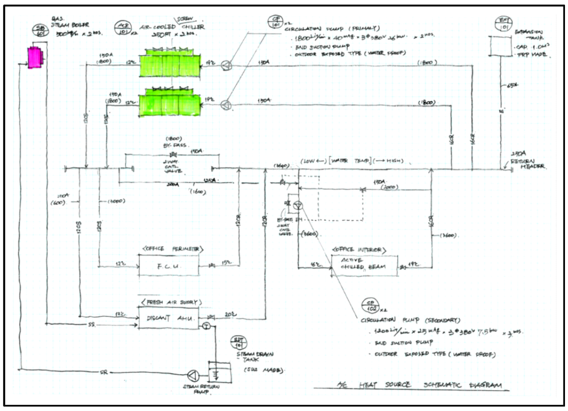
③ Heating of room exhaust air

Exhaust air is heated in order to separate the adsorbed moisture.

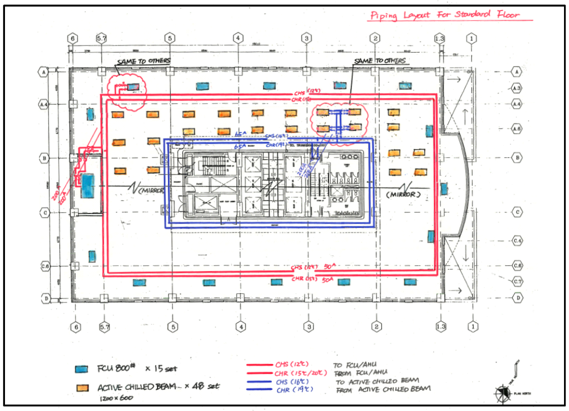
④Rotor recycling

Heated air is used to recycle the moisture-filled rotor.

Figure 2 Mechanism of Desiccant Air Treatment



Heat Source System Diagram



Standard Floor Plan

Figure 3　Examination of Cold Water Temperature Raising

Raising the temperature of cold water is an effective technology when used in combination with desiccant humidity control. In conventional systems, it is essential to have water at a temperature of around 7°C in order to reduce humidity, however, water of around 12°C is sufficient to reduce temperature only, and because this allows the refrigerator outlet temperature to be increased, it is possible to downsize the refrigerator and improve operating efficiency. Through adopting the above-mentioned desiccant air treatment and raising the temperature of cold water, an energy saving of approximately 16.84% can be anticipated over the entire building.

In terms of lighting, through adopting high-efficiency LED lights and also adopting human sensors, an energy saving of approximately 12.72% can be anticipated over the entire building.

Concerning introduction of the energy management system, rather than a simple equipment operation support system, a smart BEMS that incorporates equipment control and building control with environmental control that includes comfort is considered to be suitable for this type of building upgrade.

In addition, the adoption of inverter fans for ventilation equipment is thought to be effective. Large-capacity ventilation fans are used for ventilating buildings, however, because these operate around the clock, it is possible to save energy while maintaining functions through introducing inverter control in combination with CO sensors and so on.

③ GHG emissions reduction effect and feasibility assessment

The following table summarizes the energy saving effects that can be realized by the technologies described so far.

Table 3　Energy Saving Effect of Each Technology

Type of Technology	Name of Technology	Outline of Technology	Estimated Energy Saving Effect
Air conditioning	Desiccant air treatment	When incorporating hot and humid outside air, adsorption dehumidification, etc. is conducted without using a refrigerator.	16.84%
	Raising the temperature of cold water	Temperature of the cold water used for cooling rooms can be changed from the conventional 7°C to 12°C, and refrigerator efficiency can be increased.	
	Floor-separate control of cold water flow	By installing air conditioning cold water pumps on each floor, flow can be kept to a minimum and energy can be saved.	
Lighting	Adoption of LED lights	Through upgrading lighting equipment to LED and also adopting human sensors, lighting energy can be greatly reduced.	12.72%
Ventilation	Adoption of inverter fans for ventilation equipment, etc.	Through adopting large-capacity ventilation, starting and stopping of fans based on CO sensors, etc., and inverter capacity control, energy can be saved.	0.7%

30.23%

Through adopting these technologies, an energy saving effect of approximately 30% over the entire building can be anticipated. Since electric power accounts for almost all energy consumption in office buildings, the rate of reduction in electricity consumption will be translated almost directly into reduction of greenhouse gases.

In the target building, annual CO_2 emissions are 4,716 t-CO_2/year, and the reduction effect is estimated as follows: 4,716 t-CO_2/year x30.23%= 1,426 t-CO_2/year.

Discussions are currently being held with the building owners regarding the contents and costs of upgrading, however, the initial cost for the abovementioned equipment upgrades (upgrade works cost) is expected to be around 300 million yen.

(2) Study Implementation Structure

The building owners (the stakeholders) and Shimizu Corporation have a good relationship concerning the target building, and the owners greatly anticipate that high-degree energy saving upgrading better than expected can be achieved through implementing the project. Based on the study findings in this fiscal year, it is intended to implement the project in fiscal 2015.

The following table shows the company's implementation structure and role of contractors.

The study is conducted under this structure in cooperation with the building owner.

Table 4 Company Structure (Shimizu Corporation)

Division	Main Roles	Members
Managing engineer	Project overall management	Vice Director: Kenji Nozaki
Supervising team	Project overall coordination Ministry of Environment, GEC window Project overall coordination	Director: Hiroyuki Kurita Vice Director: Kenji Nozaki Group Leader: Akira Yashio
Design team	Compilation of upgrading plan, detailed design	(Sustainable Green Business Promotion Division) (Design Department, International Division)
Ho Chi Minh Office	Compilation of building survey plan Compilation of upgrading plan, cost estimation	(Ho Chi Minh Office, International Division)
Review of MRV methodology	Review of JCM methodology	Manager: Ayumu Take Manager: Junichi Takeshita
Field survey contractor	Building field survey	TONETS Corporation
MRV methodology preparation assisting contractor	MRV methodology preparation assistance	POLYTECH ADD, Inc.

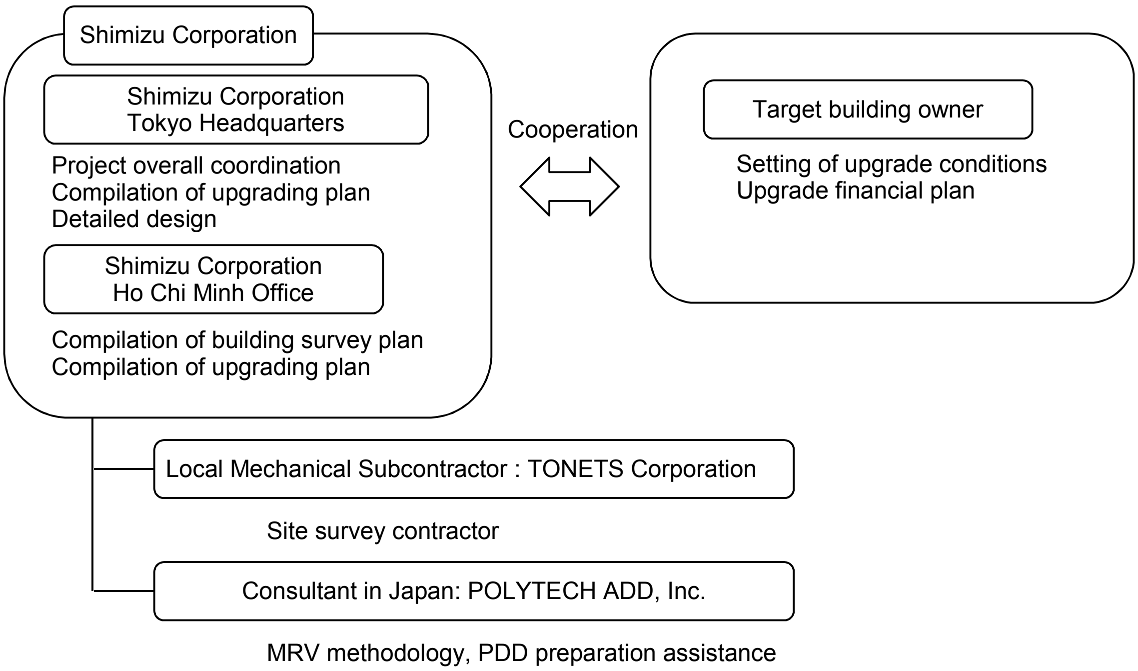


Figure 4 Implementation Structure

(3) Study Implementation Contents

①Implementation Items

In this fiscal year, the Sustainable Green Business Promotion Division of Shimizu Corporation obtained cooperation from the Ho Chi Minh Office, etc. to select the target building from buildings that have previously been built or renovated by Shimizu Corporation while ascertaining the timing of renovating, conduct detailed survey of energy use, survey of deterioration in equipment and piping, survey of new equipment installation locations, measurements of inside and outside CO_2 concentrations, etc., and compile the energy saving upgrading plan.

Moreover, concerning the financial plan necessary for the renovation, coordination and review including schedule are being conducted with the building owners with a view to realize the project in fiscal 2015.

Study Implementation Contents

May 7, 2014: Attendance at the first general meeting (Osaka)

- Confirmation of the study contents with the FS implementing partner

End of May: Selection of Sun Wah Tower as the target building following discussions with Shimizu Corporation Ho Chi Minh Office

June 1~5: Field trip

- Meeting with the owners of Sun Wah Tower and securing of consent to implement the building survey of this fiscal year. Building preliminary inspection was also implemented.

Figure 5 Exterior View of Sun Wah Tower

Figure 6 Sun Wah Tower Rooftop

Figure 7 Rooftop Refrigerator

Figure 8 Rooftop Outside Air Intake

Figure 9　Rooftop Primary Cold Water Pumps

Figure 10　Lighting Equipment (Fluorescent Lights) of a Tenant

June 20: Attendance at the second general meeting (Osaka)

- Confirmation of progress with the FS implementing partner

July 1~August 1: First field survey of the target building

- The first field survey of Sun Wah Building was implemented during the local rainy season, and measurements were taken of building electricity consumption and environmental items such as indoor and outdoor humidity, air quality, etc.

Table 5 Detailed Items of the First Field Survey

No.	Field Survey Items	Survey Results	Reflection in the Upgrade Plan
1	Measurement of outside NOX concentration. Around the outside air inlets of the outside air conditioning units on 3F and RF, 8:00am~, 12:00pm~, 18:00pm~ (3times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
2	Measurement of inside NOX concentration. Tenants, GF lobby, tenant corridors (2 sites each), 8:00am~, 12:00pm~, 18:00pm~ (3 times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
3	Measurement of outside SOX concentration. Around the outside air inlets of the outside air conditioning units on 3F and RF, 8:00am~, 12:00pm~, 18:00pm~ (3times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
4	Measurement of inside SOX concentration. Tenants, GF lobby, tenant corridors (2 sites each), 8:00am~, 12:00pm~, 18:00pm~ (3times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
5	Measurement of outside temperature and humidity. Around the outside air inlets of the outside air conditioning units on 3F and RF, every hour Monday through Sunday	Outside air conditions of high temperature and high humidity were confirmed in the rainy season.	For energy saving, desiccant air conditioning is proposed.
6	Measurement of inside temperature and humidity. Tenants, GF lobby, tenant corridor (2 sites each), every hour Monday through Sunday	It was confirmed that the current air conditioning system maintains indoor design conditions, although energy consumption is high.	For energy saving, desiccant air conditioning is proposed.
7	Measurement of cold water circulation flow (main pipes). Confirmation to see whether or not design flow is secured.	It was confirmed that flow is secured.	Energy saving is proposed by means of pumps equipped with inverters.
8	Measurement of cold water circulation flow (branch pipes). Confirmation to see whether or not design flow is secured.	It was confirmed that flow is secured.	Energy saving is proposed by means of pumps equipped with inverters.
9	Measurement of ventilation flow on each floor. Confirmation to see whether or not design flow is secured.	It was confirmed that flow is secured.	Energy saving is proposed through installing motor dampers on each floor.
10	Investigation of amount of power use by each tenant. Every hour Monday through Sunday	Detailed data for each tenant was acquired.	This will be used in the detailed design.
11	Sampling of cold water pipes. 1 main and 1 branch pipe	The degree of pipe corrosion was small and not a problem.	No countermeasures required
12	Confirmation of the desiccant dehumidifier and additional chiller installation locations	It was confirmed that installation sites exist.	Desiccant dehumidifier and additional chillers are proposed.
13	Investigation of deterioration in	It was confirmed that	Replacement of No. 3

No.	Field Survey Items	Survey Results	Reflection in the Upgrade Plan
	existing chillers. Electric current measurement, amount of electric power used, COP, etc.	efficiency is dramatically down in the No. 3 chiller.	chiller with a new high-efficiency model is proposed.
14	Investigation of deterioration in existing cold water pumps. Electric current measurement, pump efficiency, etc.	It was confirmed that flow is secured.	Energy saving is proposed by means of pumps equipped with inverters.

Figure 11　Temperature and Humidity Measurement on a Tenant Floor

Figure 12　Flow Measurement in Primary Cold Water Pipes on Rooftop

Figure 13　Measurement of Electric Power used in a Tenant Distribution Panel

Figure 14　Measurement of Air Quality in a Tenant Floor Corridor

July 8~12: Field trip

- Introduction of Shimizu Corporation project cases at an explanation meeting (July 10) on project development under the JCM for businesses in Vietnam

August 20~22: Field trip

- Participation as an observer at a workshop attended by Ho Chi Minh City, the Japanese Minister of the Environment, and Osaka City, etc. on August 21.

October 15~17: Field trip

- Meeting with the owners of Sun Wah Building to explain the building renovation plan

December 15, 2014~January 18, 2015: Second field survey of target building

- The second field survey of Sun Wah Building was implemented during the local dry season, and measurements were taken of building electricity consumption and environmental items such as indoor and outdoor humidity, air quality, etc.

Table 6 Detailed Items of the Second Field Survey

No.	Field Survey Items	Survey Results	Reflection in the Upgrade Plan
31	Measurement of outside NOX concentration. Around the outside air inlets of the outside air conditioning units on 3F and RF, 8:00am~, 12:00pm~, 18:00pm~ (3times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
2	Measurement of inside NOX concentration. Tenants, GF lobby, tenant corridor (2 sites each), 8:00am~, 12:00pm~, 18:00pm~ (3 times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
3	Measurement of outside SOX concentration. Around the outside air inlets of the outside air conditioning units on 3F and RF, 8:00am~, 12:00pm~, 18:00pm~ (3times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
4	Measurement of inside SOX concentration. Tenants, GF lobby, tenant corridors (2 sites each), 8:00am~, 12:00pm~, 18:00pm~ (3times), Monday through Sunday	Values are within Vietnamese environmental standards, so there is no problem in particular.	No countermeasures required
5	Measurement of outside temperature and humidity. Around the outside air inlets of the outside air conditioning units on 3F and RF, every hour Monday through Sunday	Outside air conditions of high temperature and low humidity were confirmed in the dry season.	For energy saving, desiccant air conditioning is proposed.
6	Measurement of inside temperature and humidity. Tenants, GF lobby, tenant corridor (2 sites each), every hour Monday through Sunday	It was confirmed that the current air conditioning system maintains indoor design conditions, although energy consumption is high.	For energy saving, desiccant air conditioning is proposed.
7	Investigation of amount of power use by each tenant. Every hour Monday through Sunday	Detailed data for each tenant was acquired.	This will be used in the detailed design.

January 14~18, 2015: Field trip

- The project was introduced at an international symposium for formation of low-carbon cities that was staged by Ho Chi Minh City and Osaka City on January 16.

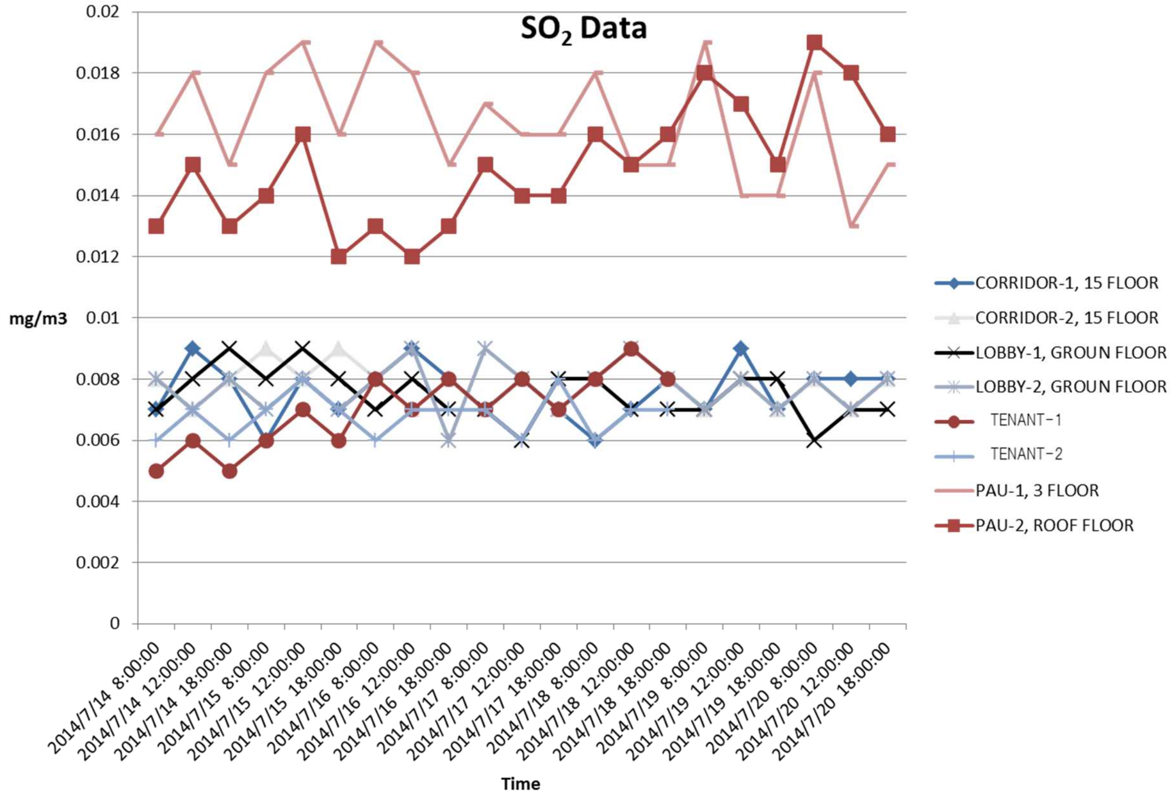


Figure 16 SO_2 Concentration Measurements in the Rainy Season

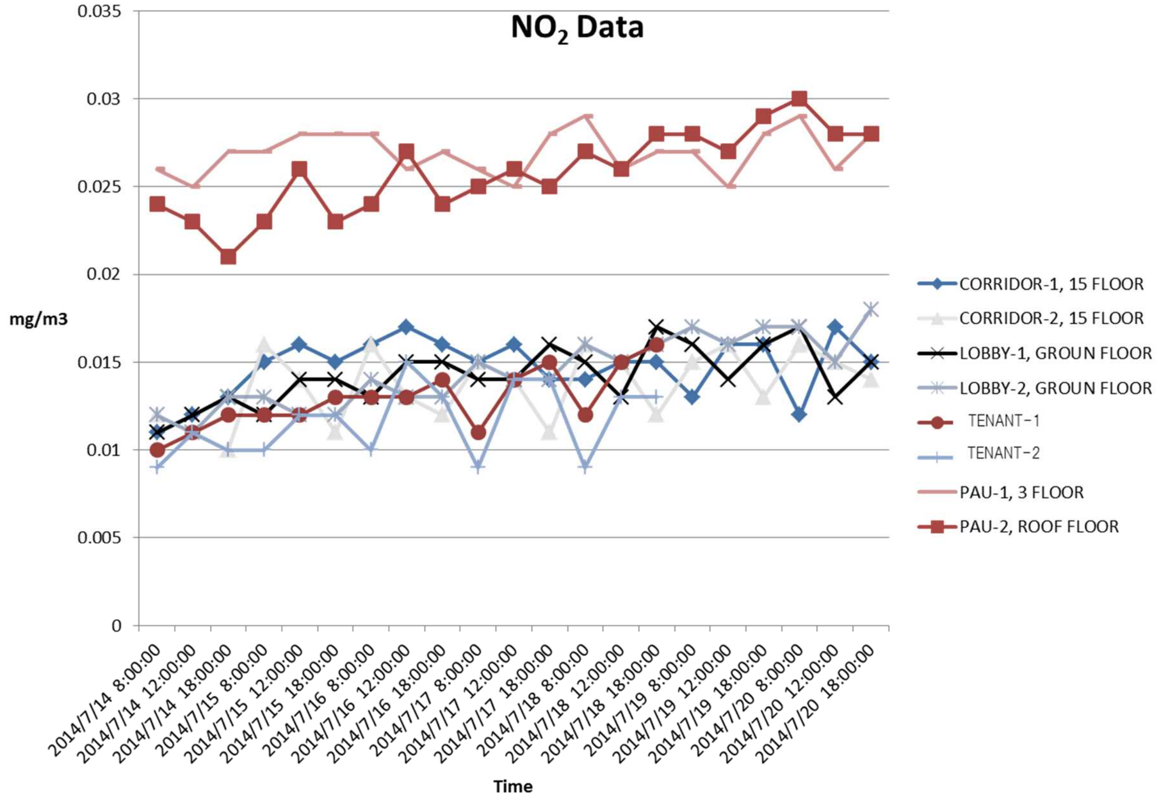


Figure 17 NO_2 Concentration Measurements in the Rainy Season

②Survey on Preparation of JCM Methodology

(ⅰ) Eligibility requirements

Eligibility requirements in the methodology have been set as shown in Table 7.

The requirements have been compiled so as to calculate and balance emissions assuming that the project entails equipment upgrade in an existing building. In the case where existing equipment cannot continue to be used, standard equipment will be adopted. Standard equipment here refers to products that have a high market share at the start of the project.

Table 7 Eligibility Requirements

Eligibility Requirement	Reason for Setting Each Requirement
The project is implemented in an existing building.	For equipment renewal in an existing building, since the goal is to introduce energy saving technology, this requirement is needed.
At least one of the existing air-conditioning equipment, lighting equipment and ventilation equipment is replaced.	Emission reductions are calculated for air conditioning equipment, lighting equipment, and ventilation equipment, however, other equipment renewal cannot be calculated in this methodology.
The existing equipment before replacement is capable of continuous use without exceeding the remaining lifetime. If continuous use of the existing equipment is impossible, it is assumed that new equipment will be introduced and the reference equipment will be the standard equipment at the time.	In calculating reference emissions, it is assumed that equipment data before renewal can be used, however, this assumes that the equipment before renewal can continue to be used. If it can no longer be used, it is necessary to target the new equipment that can be introduced at that point in order to preserve conservativeness.
Equipment before replacement uses grid electricity.	It is assumed that the equipment after renewal will use grid electricity. In order to prevent the methodology becoming too complicated, it is assumed that the equipment before renewal also uses grid power.

The following table shows a comparison of the eligibility requirements with the project contents. Since the project contents comply with all the requirements, the proposed methodology is applicable to the project.

Table 8 Eligibility Requirements

Eligibility Requirement	Project Explanation
The project is implemented in an existing building.	The project will be implemented in Sun Wah Tower, which was completed in Ho Chi Minh City in 1997. Therefore, it complies with the requirement.
At least one of the existing air-conditioning equipment, lighting equipment and ventilation equipment is replaced.	The project entails renewal of air conditioning equipment, lighting equipment, and ventilation equipment. For air conditioning equipment, equipment that contains technology for desiccant air treatment, raising the temperature of cold water, and floor-separate control of cold water flow will be introduced. For lighting equipment, high-efficiency LED lights and human sensors will be introduced. And for ventilation equipment, ventilation fans

	that enable inverter control based on CO sensors will be introduced. Therefore, it complies with the requirement.
The existing equipment before replacement is capable of continuous use without exceeding the remaining lifetime. If continuous use of the existing equipment is impossible, it is assumed that new equipment will be introduced and the reference equipment will be the standard equipment at the time.	Since the air conditioning equipment, lighting equipment, and ventilation equipment in the target building can be used, the reference equipment will be the equipment before renewal. Therefore, it complies with the requirement.
Equipment before replacement uses grid electricity.	The power used by the target building in the project is purchased from the power company. Therefore, it complies with the requirement.

(ii) Calculation of reference emissions and project emissions

The BaU scenario is the case where existing air conditioning equipment, lighting equipment, and ventilation equipment continues to be used.

When calculating reference emissions, the energy efficiency and rated electricity consumption are used. Catalog values are used for these. Actual values of energy efficiency and rated electricity consumption may grow worse than catalog values due to changes over time and operating conditions, however, by using catalog values in calculations, emissions become smaller than BaU values and can be conservatively evaluated.

Reference emissions are calculated using the following expression:

$$RE_p = RE_{AC,p} + RE_{L,p} + RE_{V,p} \tag{1}$$

Where,

RE_p	Reference emissions [tCO_2/p]
$RE_{AC,p}$	Air conditioning equipment (heat source) reference emissions [tCO_2/p]
$RE_{L,p}$	Lighting equipment reference emissions [tCO_2/p]
$RE_{V,p}$	Ventilation equipment reference emissions [tCO_2/p]

i Air conditioning equipment

$$RE_{AC,p} = RQ_{AC,p} \times \frac{1}{R\varepsilon_{AC}} \times \frac{1}{3.6} \times EF_{grid} \tag{2}$$

Where,

$RE_{AC,p}$	Air conditioning equipment reference emissions [tCO_2/p]
$RQ_{AC,p}$	Amount of heat produced by reference air conditioning equipment [GJ/p]
$R\varepsilon_{AC}$	Energy efficiency of reference air conditioning equipment [-]
EF_{grid}	Grid power emission factor [tCO_2/MWh]

$$RQ_{AC,p} = PQ_{AC,p} = PEC_{AC,p} \times P\varepsilon_{AC} \times 3.6 \tag{3}$$

Where,

$RQ_{AC,p}$	Amount of heat produced by reference air conditioning equipment [GJ/p]
$PQ_{AC,p}$	Amount of heat produced by project air conditioning equipment [GJ/p]
$PEC_{AC,p}$	Electricity consumption in project air conditioning equipment [MWh/p]
$P\varepsilon_{AC}$	Energy efficiency of project air conditioning equipment [-]

ii Lighting equipment

$$RE_{L,p} = \sum_i RRE_{L,i} \times ROH_{L,i,p} \times EF_{grid} \tag{4}$$

Where,

$RE_{L,p}$	Lighting equipment reference emissions [tCO_2/p]
$RRE_{L,i}$	Rated electricity consumption of reference lighting equipment in area i [MW]
$ROH_{L,i,p}$	Operating time of reference lighting equipment in area i [hour/p]
EF_{grid}	Grid power emission factor [tCO_2/MWh]
I	Area inside building (i = office, common)

iii Ventilation equipment

$$RE_{V,p} = RRE_V \times ROH_{V,p} \times EF_{grid} \tag{5}$$

Where,

$RE_{V,p}$	Ventilation equipment reference emissions [tCO_2/p]
RW_V	Electricity consumption of reference ventilation equipment [MW]
$ROH_{V,p}$	Operating time of reference ventilation equipment [hour/p]
EF_{grid}	Grid power emission factor [tCO_2/MWh]

Project emissions are calculated using the following expression:

$$PE_p = PE_{AC,p} + PE_{L,p} + PE_{V,p} \tag{6}$$

Where,

PE_p	Project emissions [tCO_2/p]
$PE_{AC,p}$	Air conditioning equipment project emissions [tCO_2/p]
$PE_{L,p}$	Lighting equipment project emissions [tCO_2/p]
$PE_{V,p}$	Ventilation equipment project emissions [tCO_2/p]

i Air conditioning equipment

$$PE_{AC,p} = PEC_{AC,p} \times EF_{grid} \tag{7}$$

Where,

$PE_{AC,p}$	Air conditioning equipment project emissions [tCO_2/p]
$PEC_{AC,p}$	Electricity consumption in project air conditioning equipment [MWh/p]
EF_{grid}	Grid power emission factor [tCO_2/MWh]

ii Lighting equipment

$$PE_{L,p} = PEC_{L,p} \times EF_{grid} \quad (8)$$

Where,

$PE_{L,p}$	Lighting equipment project emissions [tCO_2/p]
$PEC_{L,p}$	Electricity consumption in project lighting equipment [MWh/y]
EF_{grid}	Grid power emission factor[tCO_2/MWh]

iii Ventilation equipment

$$PE_{V,p} = PEC_{V,p} \times EF_{grid} \quad (9)$$

Where,

$PE_{V,p}$	Ventilation equipment project emissions [tCO_2/p]
$PEC_{V,p}$	Electricity consumption in project ventilation equipment [MWh/p]
EF_{grid}	Grid power emission factor [tCO_2/MWh]

(iii) Settings before project implementation

The following table shows a list of the values that need to be set before implementation of the project.

Table 9 Settings before Project Implementation

Item	Explanation	Basis for Setting
EF_{grid}	Grid power emission factor [tCO_2/MWh]	Value published by the Government of Vietnam
$R\varepsilon_{AC}$	Reference air conditioning equipment energy efficiency [%]	Information from manufacturer (catalog values, etc.)
$P\varepsilon_{AC}$	Project air conditioning equipment energy efficiency [%]	COP is converted from the catalog value to the actual value using monthly mean values of climate in Ho Chi Minh City. If the disparity in the calculated monthly COP values is small, adopt the minimum value throughout the year to be on the conservative side.
$RRE_{L,office}$	Rated electricity consumption of reference lighting equipment in office area [MW]	Information from manufacturer (catalog values, etc.)
$RRE_{L,common}$	Rated electricity consumption of reference lighting equipment in common area [MW]	Information from manufacturer (catalog values, etc.)
$ROH_{L,office,p}$	Operating time of reference lighting equipment in office area [hour/p]	Information from the building owner and tenants
$ROH_{L,common,p}$	Operating time of reference lighting equipment in common area [hour/p]	Information from the building owner and tenants
RRE_V	Rated electricity consumption of reference ventilation equipment [MW]	Information from manufacturer (catalog values, etc.)
$ROH_{V,p}$	Operating time of reference ventilation equipment [hour/p]	Information from the building owner

(iv) Monitoring items and frequency

The following table shows the monitoring items, and the method and frequency for monitoring them.

All items are continuously measured.

Table 10 Monitoring Items

Item	Explanation	Monitoring Method and Frequency
$PEC_{AC,p}$	Electricity consumption in project air conditioning equipment [MWh/p]	Measurement by watt-hour meter. Introduced inspected instruments and calibrate once per year.
$PEC_{L,p}$	Electricity consumption in project lighting equipment [MWh/p]	Measurement by watt-hour meter. Introduced inspected instruments and calibrate once per year.
$PEC_{V,p}$	Electricity consumption in project ventilation equipment [MWh/p]	Measurement by watt-hour meter. Introduced inspected instruments and calibrate once per year.

(v) Emission reductions (or JCM credit amount)

Emission reductions are calculated using the following expression:

$$ER_p = RE_p - PE_p \tag{10}$$

ER_p Emission reductions [tCO_2/p]
RE_p Reference emissions [tCO_2/p]
PE_p Project emissions [tCO_2/p]

Emission reductions in the project are estimated as follows according to the expression in the proposed methodology:

<Reference emissions>

i Air conditioning equipment

$$RQ_{AC,p} = PQ_{AC,p} = PEC_{AC,p} \times P\varepsilon_{AC} \times 3.6 \tag{3}$$

= 2,469.863×4.56×3.6
= 40,545

$$RE_{AC,p} = RQ_{AC,p} \times \frac{1}{R\varepsilon_{AC}} \times \frac{1}{3.6} \times EF_{grid} \tag{2}$$

= 40,545×1/3.01×1/3.6×0.6244
= 2,336

$PEC_{AC,p}$	Electricity consumption in project air conditioning equipment [MWh/p]	:2,469.863
$P\varepsilon_{AC}$	Project air conditioning equipment energy efficiency[-]	:4.56
$R\varepsilon_{AC}$	Reference air conditioning equipment energy efficiency[-]	:3.01
EF_{grid}	Grid power emission factor[tCO_2/MWh]	:0.6244

ii Lighting equipment

$$RE_{L,p} = \sum_i RRE_{L,i} \times ROH_{L,i,p} \times EF_{grid} \tag{4}$$

$$= \left(RRE_{L,office} \times ROH_{L,office,p} + RRE_{L,common} \times ROH_{L,common,p}\right) \times EF_{grid}$$

= (0.36560×3,510＋0.01074×7,200)×0.6244

= 849

$RRE_{L,office}$	Rated electricity consumption of reference lighting equipment in office area [MW]	:0.36560
$RRE_{L,common}$	Rated electricity consumption of reference lighting equipment in common area [MW]	:0.01074
$ROH_{L,office,p}$	Operating time of reference lighting equipment in office area [hour/p]	:3,510
$ROH_{L,common,p}$	Operating time of reference lighting equipment in common area [hour/p]	:7,200
EF_{grid}	Grid power emission factor [tCO_2/MWh]	:0.6244

iii Ventilation equipment

$$RE_{V,p} = RRE_V \times ROH_{V,p} \times EF_{grid} \tag{5}$$

= 0.0210×8,760×0.6244

= 115

RW_V	Electricity consumption of reference ventilation equipment [MW]	:0.0210
$ROH_{V,p}$	Operating time of reference ventilation equipment [hour/p]	:8,760
EF_{grid}	Grid power emission factor [tCO_2/MWh]	:0.6244

iv Total of each equipment

$$RE_p = RE_{AC,p} + RE_{L,p} + RE_{V,p} \tag{1}$$

= 2,336＋849＋115

= 3,300

<Project emissions>

i Air conditioning equipment

$$PE_{AC,p} = PEC_{AC,p} \times EF_{grid} \tag{7}$$

= 2,469.863×0.6244

= 1,542

$PEC_{AC,p}$	Electricity consumption in project air conditioning	:2,469.863

	equipment [MWh/p]	
EF_{grid}	Grid power emission factor [tCO_2/MWh]	:0.6244

ii Lighting equipment

$$PE_{L,p} = PEC_{L,p} \times EF_{grid} \qquad (8)$$

= 400.476×0.6244

= 250

$PEC_{L,p}$	Electricity consumption in project lighting equipment [MWh/y]	:400.476
EF_{grid}	Grid power emission factor [tCO_2/MWh]	:0.6244

iii Ventilation equipment

$$PE_{V,p} = PEC_{V,p} \times EF_{grid} \qquad (9)$$

= 131.089×0.6244

= 82

$PEC_{V,p}$	Electricity consumption in project ventilation equipment [MWh/p	:131.089
EF_{grid}	Grid power emission factor[tCO_2/MWh]	:0.6244

iv Total of each equipment

$$PE_p = PE_{AC,p} + PE_{L,p} + PE_{V,p} \qquad (6)$$

= 1,542＋250＋82

= 1,874

<Emission reductions>

$$ER_p = RE_p - PE_p \qquad (10)$$

= 3,300－1,874

= 1,426

③Investigation related to Preparation of the JCM Project Design Document (PDD)

(i) Environmental impact assessment

Because the project targets the renewal (upgrading) of equipment in a specific existing building, there is no need for environmental impact assessment.

(ii) Discussions with local stakeholders

The building owners (the stakeholders) and Shimizu Corporation have a good relationship concerning the target building, and the owners greatly anticipate that high-degree energy saving, upgrading better than expected can be achieved through the project.

Moreover, concerning the financial plan necessary for the upgrading, coordination and review including schedule are being conducted with the building owners with a view to realizing the project in fiscal 2015.

Since the project targets the renewal (upgrading) of equipment in a specific existing building, the building tenants are identified as the stakeholders. The building owners and Shimizu Corporation will conduct explanations and interviews with the building tenants and hear their comments concerning the equipment upgrading schedule.

(iii) Monitoring plan

The target building owners will appoint the person in charge of monitoring and build the monitoring structure. The person in charge of monitoring will guarantee the quality of the monitoring report. In preparing the monitoring report, a manager will be appointed as the person responsible for gathering data and controlling the monitoring instruments (including calibration and inspection) in the monitoring locations. The monitoring items will basically be the electricity consumption of each type of equipment as shown in the following figure. Electricity consumption will be measured by watt-hour meters and archived as electronic data.

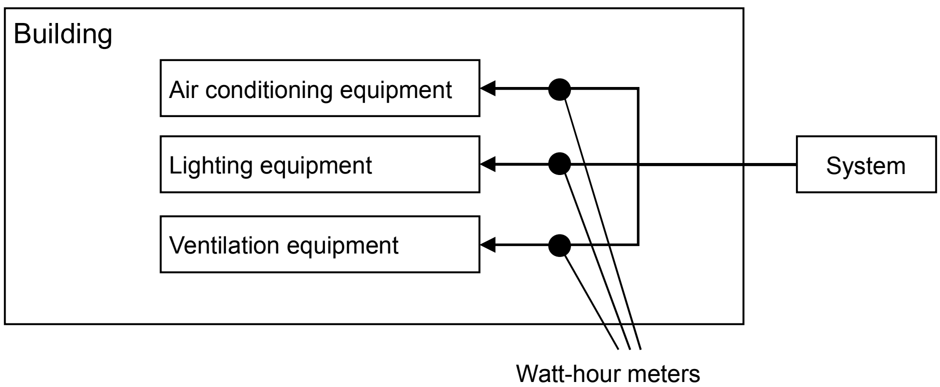


Figure 18 Monitoring Positions

(iv) Calibration of measuring instruments

Measuring instruments in the project will basically be only watt-hour meters. Where necessary, flowmeters, thermometers and so on will also be used, and such instruments will be inspected before introduction and calibrated once per year thereafter.

④Investigation Geared to project Realization

(ⅰ) Project plan (including financial plan and review of profitability)

Concerning the financial plan, it is intended to offset some of the costs through having the project recognized as a subsidized undertaking under the bilateral offset credit system. It is planned for the international consortium that is expected to comprise of Sun Wah Properties (the enterprise that owns Sun Wah Tower) and Shimizu Corporation to commence the concrete review of the total costs and financial plan. Concerning the part of costs that cannot be covered by equipment subsidies from the Government of Japan, it is aimed to have Sun Wah Properties take budget steps.

Figure 19 shows the project implementation structure. Shimizu Corporation and Sun Wah Properties aim to realize the project as an international consortium.

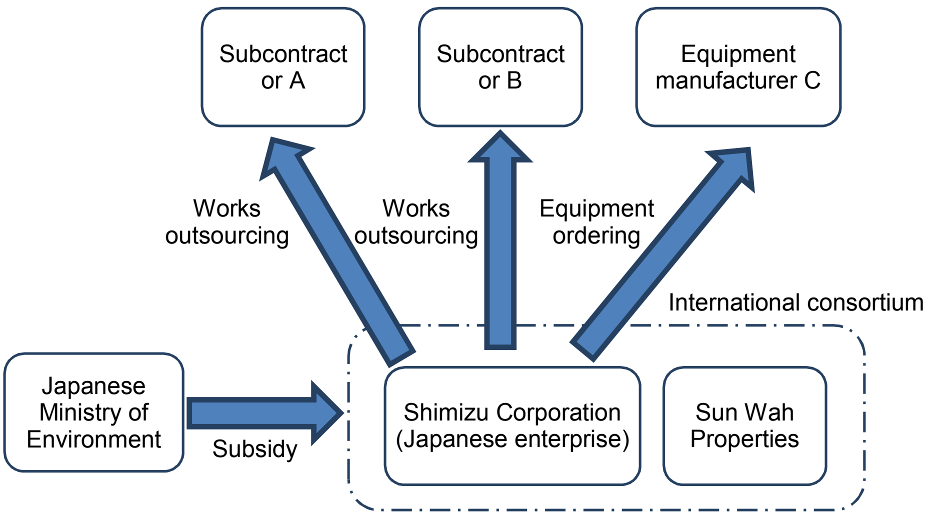


Figure 19 Works Implementation Structure

Concerning the works plan, because the renovation works will only be conducted on Saturdays and Sundays one floor at a time in order to allow tenants to continue operations, it is estimated that the entire works will take around 18 months. In the case where fiscal 2015 subsidies are applied for, taking into account the time required for preparations and procedures, it is guessed that the works will begin around September 2015 and finish at the end of fiscal 2016.

Operation of the building following completion of the upgrading works will be conducted by the owner Sun Wah Properties as before.

(ii) MRV structure

As is shown in the following figure, the necessary monitoring data will be submitted by the building owners for confirmation by the Ho Chi Minh Office of Shimizu Corporation, and then the Tokyo head office will compile the monitoring report for verification.

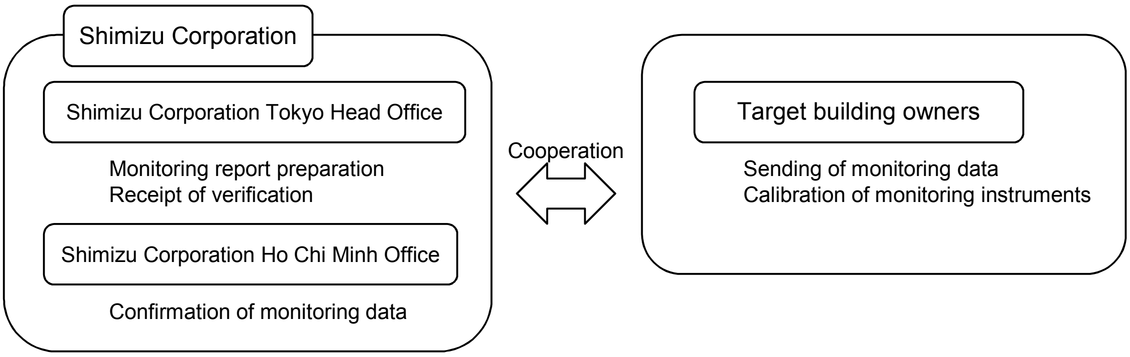


Figure 20 MRV Implementation Structure

(iii) Acquisition of project authorization

Since the project entails routine building renovation, no special authorization will be required in advance. The design drawings will be prepared and submitted to the Ho Chi Minh People's Committee building department.

(iv) Japan's contribution

Among the advanced nations, Japan has a particularly hot and humid climate, and its technology related to dehumidification air conditioning in particular is superior to that of developing countries and also Western nations.

Considering that many cities in Southeast Asia including Ho Chi Minh have high-temperature, high-humidity climate, the demand for cooling is expected to grow dramatically from now on. By using solar water heaters and so forth, it will be relatively easy to secure heat sources and the potential for energy saving via dehumidification air conditioning will be extremely large.

Concerning dehumidification air conditioning, Japanese manufacturers are engaged in developing products, and it will be significant to deploy these as Japanese technology under the JCM scheme.

Moreover, when implementing energy saving in a building, rather than applying one effective technology, it is more effective to optimally coordinate and combine a number of small technologies. Such work is time consuming and cannot be disseminated in one fell swoop, however, if the optimal combination of technologies can be treated as a specialty of Japanese enterprises, and appropriate standards can be established based on public-private cooperation, it is possible that Japanese technologies can be similarly deployed over the long-term future.

(v) Securing of environmental integrity

Examination was carried out on environmental impacts in building energy saving systems and area energy saving systems.

The project entails introducing higher efficiency systems than compared to using existing energy systems, and it is thought that this will entail hardly any negative impacts on the environment.

It has been confirmed that the energy saving technologies and systems proposed for introduction do not contain or use any environmental pollutants.

(vi) Contribution to sustainable development in Vietnam

In Ho Chi Minh City, many buildings that were constructed in the 1990s are now due for equipment upgrading. Introducing energy saving technologies to such buildings will help promote energy saving, reduce GHG emissions, extend the useful life of buildings, and contribute to environmental preservation.

(4) Future Issues and Schedule

①Issues:

- ✓ Project financial plan and implementation scheme: Set up of the international consortium that will be the project implementing body and that will apply for the equipment subsidy, financial plan for the parts that cannot be covered by the equipment subsidy, and compilation of the project implementation scheme
- ✓ Works plan: Compilation of the works plan in accordance with the financial plan and implementation scheme
- ✓ MRV structure: Preparation of the Monitoring Plan Sheet and Monitoring Structure Sheet

②Specific contents that need to be implemented from now on:

- ✓ Set up of the international consortium that will be the project implementing body and that will apply for the equipment subsidy, financial plan for the parts that cannot be covered by the equipment subsidy, and compilation of the project implementation scheme: Concrete discussions will be advanced with the international consortium composed of Sun Wah Properties (the building owner) and Shimizu Corporation concerning the project implementation scheme.
- ✓ Compilation of the building upgrading plan and the works plan according to the financial plan and implementation scheme: The works plan will be compiled according to the requested contents of building upgrade by the building owners, the budget measures schedule, and in consideration of the fact that works will be implemented while tenants are still using the building.
- ✓ Preparation of the Monitoring Plan Sheet and Monitoring Structure Sheet: The MRV structure will be constructed with care taken not to deviate from JCM rules.

③Future schedule:

Table 11　Future Implementation Schedule

Year/Month	Item
2015 May	Application to the Ministry of Environment's JCM equipment subsidy scheme
2015 September	Start of building upgrading using the equipment subsidy
2017 March	End of building upgrading
2017 April~	Start of operation of the upgraded building

Annex>

●Draft JCM Methodology (English),　Draft PDD (English)

3. 2 Promotion to Convert to Eco-Friendly and Park-and-Ride Buses

(1) Outline of the Project

①Study background

Currently, in Ho Chi Minh mass transit public transportation modes such as subways, BRT, etc. have not yet been constructed, and buses are the only current form of public transportation. Since in Ho Chi Minh the development of 1 or 2 MRT lines is proceeding but the start of operation is not planned to be until around 2020, until that time buses are an important mode of public transportation. Against this backdrop, from 2003 to 2012 Ho Chi Minh implemented plans to make their bus network more comprehensive, and this achieved a certain degree of success. During this period, the focus of activities was more on improving bus services than on increasing the number of buses owned in particular. In 2002, the bus transportation capacity was 36.2 million people per year, and by 2012 this had increased to 413 million people per year. Furthermore, in 2002, the average number of passengers for the 2,100 buses owned at that time was 20.2 people per bus, but in 2013 the average number of passengers for the 2,954 buses owned had increased to 54 people per bus. At the same time, in the current situation this means that it only around 10% of the city transportation demand is being supported.

Because of this, it is desirable to expand the system to handle 15% of transportation demand in 2015, and a bus transportation master plan is currently under consideration. It is important to note that in this plan, not only will the number of buses be increased, but improving bus services is also set as an important goal.

As stated above, in response to the rapid increase in the number of motorcycles and cars, Ho Chi Minh is actively working to shift transportation demand to buses, and these efforts are proceeding with activities focused on not only increasing the number of buses, but also on shifting transportation modes through improving bus services. This project is for supporting the transportation policies of Ho Chi Minh, and through the introduction of new transportation policy models developed by Japan, aims to contribute to reducing the CO2 from the city's transportation sector.

②Project overview

(ⅰ) Project content

This project in Ho Chi Minh, Vietnam aims to reduce GHG due to commuting traffic by encouraging citizens to switch from motorcycles and cars as their main mode of commuting to buses through the introduction of i) a Park-and-Bus-Ride (hereafter referred to as "P&BR") system utilizing commercial facilities and ii) a public transportation Eco Point system. The specifics of the project are as follows:

i) P&BR utilizing commercial facilities

This system has been introduced by the Aeon Group in Japan, in which customers who purchase shopping tickets (generally around ¥3,000 to ¥5,000 in Japan) at the store are allowed to utilize the store's parking lot as a P&BR parking lot. In the implementation of this project, it is necessary to secure parking spaces that can serve as P&BR spaces and areas for getting on and off buses. In addition, for the purposes of store security management, it is necessary to be able to specify the motorcycle or car used by the purchaser of shopping tickets. For this purpose, P&BR users will be required to submit a "P&BR usage application form" to enable their personal information such as vehicle license plate number, home address, etc. to be known.

ii) Public Transportation Eco Points

A system in which users of public transportation are awarded a fixed number of Eco Points in order to encourage customers to switch to public transportation. This has also already been introduced by the Aeon Group in Japan as "Green Score". For the realization of this project, it is necessary to accurately capture the public transportation usage history (date of use, number of times, etc.) and award points based on that history.

This project will be initially implemented at the Ho Chi Minh Aeon Store #1 (which opened in January 2014), but since it can be expanded to wherever there is a large commercial facility in the suburbs, the aim is to expand it to other stores (for example, to the Aeon Store #2 scheduled to open in October of the same year, etc.), and even to other cities and countries.

Since operators of bus services connecting P&BR stores and the city center are essential to this project, the Ho Chi Minh Department of Transportation (hereafter referred to as "DOT") becomes a counterpart. In addition, other partners include the owner of the commercial facility providing the store parking spaces for P&BR, the Japanese companies contributing funds for operating the transportation Eco Point system, etc.

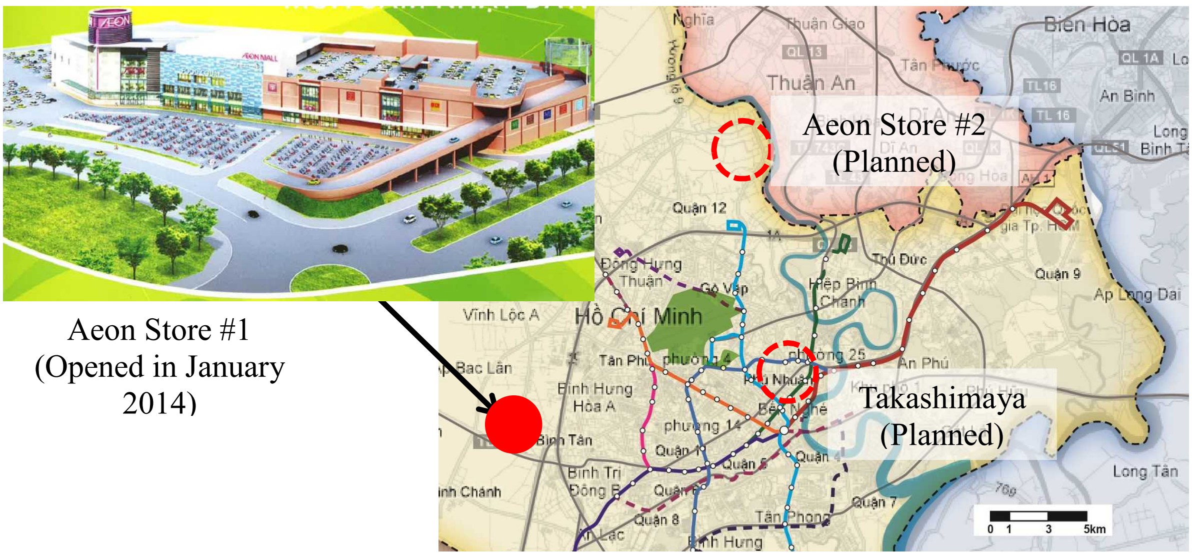


Figure 1: Planned openings of Japanese commercial facilities in Ho Chi Minh

(ii) Host country conditions:

(a) General situation of transportation in Ho Chi Minh

The road network in Ho Chi Minh has already reached the limits of its capacity due to the rapid

popularization of personal transportation modes such as motorcycles, cars, etc. It is reported from recent data that the citizens own 5 million motorcycles and 500,000 cars. Due to this, it is feared that the problems of air pollution and global warming will become more serious in the future.
On the other hand, in Ho Chi Minh mass transit public transportation modes such as subways, BRT, etc. have not yet been constructed, and buses are the only current form of public transportation. Since there are currently 1 or 2 MRT lines currently being planned to start operation around 2020, switching the mode of transportation from personal transportation modes to buses as a public transportation mode is seen as an extremely important transportation policy from the viewpoint of countermeasures for traffic congestion and global warming.

(b) Bus activation measures

Against this backdrop, from 2003 to 2012 Ho Chi Minh implemented plans to make their bus network more comprehensive, and this achieved a certain degree of success. During this period, the focus of activities was more on improving bus services than on increasing the number of buses. In 2002, the bus transportation capacity was 36.2 million people per year, and by 2012 this had increased to 413 million people per year. In 2002, the average number of passengers for the 2,100 buses owned at that time was 20.2 people per bus, but in 2013 the average number of passengers for the 2,954 buses owned had increased to 54 people per bus.
At the same time, in the current situation this means that it only around 10% of the city transportation demand is being supported. Because of this, it is desirable to expand the system to handle 15% of transportation demand in 2015, and a bus transportation master plan is currently under consideration. In this plan, not only will the number of buses be increased, but in addition there are important policy goals for improving bus services, and these are points that should receive attention.

(c) Relevance to this project

As stated above, in response to the rapid increase in the number of motorcycles and cars in Ho Chi Minh, there are vigorous efforts to shift transportation demand to buses, with a particular focus on shifting transportation modes through improving bus services. The P&BR and public transportation Eco Point systems in this project are also consistent with the city's transportation policy.

1－3 Study partners

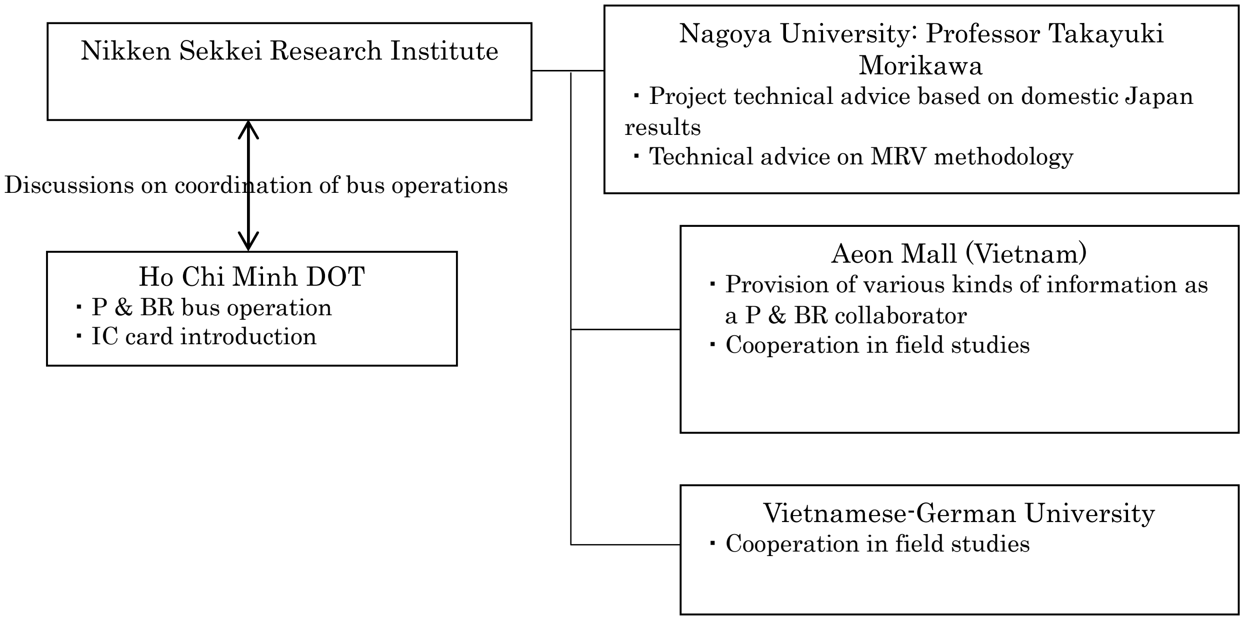


Figure 1-4: Organization for implementation of this study

(2) Study contents and results

① Eligibility criteria

In order to establish this MRV method, the following issues were raised.

Issue ①: Establishment of a transportation environment in which a P&BR system can be realized.

To begin with, in order to realize a P&BR system, a transportation environment in which parking lots and bus routes conducive to P&BR can be introduced with certainty is essential.

Issue ②: Ability to accurately determine GHG reduction amounts

In order to accurately forecast the amount of shift from motorcycles and cars to buses due to P&BR., it is necessary to devise a structure for accurately determining respective travel behaviors before and after implementation.

In addition, the forms of commuting traffic include not only just driving oneself by motorcycle or car, but also carpooling, transportation to/from the bus stop, etc., and to accurately forecast the amount of reduction, it is necessary to be able to classify each of these and determine them separately.

Issue ③: Construction of a system to efficiently process large volumes of data from different management categories

Calculation of GHG reduction amounts requires information from store operators on the usage of parking lots under their management and information such as bus usage history, etc. managed by transportation operators. In addition, it is desirable that this project not be limited to only Aeon Store #1 but be a business model which can be smoothly participated in by other stores which advance into Ho Chi Minh in the future. Because of this, it is necessary to reduce the workload related to MRV for store operators.

Based on the above, the eligibility criteria were set from the following viewpoints.

・Eligibility criteria ① and ② to deal with issue ①.

・Eligibility criteria ③ and ④ to deal with issue ②.

・Eligibility criteria ⑤ to deal with issue ③.

Table 1: Eligibility criteria

<table>
<tr><td>Eligibility criteria①</td><td>Existence of private commercial facility in suburbs for P&BR use.</td></tr>
<tr><td colspan="2">In order to realize P&BR in a large-scale commercial facility in the suburbs, the commercial facility must be located in the suburbs and in addition, it must be possible to secure sufficient parking spaces for P&BR (there must be a surplus of parking spaces).</td></tr>
<tr><td>Eligibility criteria②</td><td>Existence of bus routes conducive to P&BR which can be accessed from the parking lot.</td></tr>
<tr><td colspan="2">In order to realize P&BR, after parking the commercial facility's parking lot, there must be bus routes from the parking lot to destinations such as the city center, etc. In addition, the distance between the parking lot and the bus stop for getting on and off the bus must be short, and there must be no obstacles to walking between the two.</td></tr>
<tr><td>Eligibility criteria③</td><td>Completion of introduction of IC card as a bus fare payment method.</td></tr>
<tr><td colspan="2">By implementing IC cards as a bus fare payment method, the following records required for calculating GHG reduction amounts can be collected:
・Capturing of bus usage frequency and distance (section between getting on and off) due to P&BR
・Capturing of method of access to Aeon parking lot (driving own motorcycle/car, carpooling, walking) is possible.
Furthermore, the requirements for the IC card are as follows:
・Card type: Type A or Type C
・Information stored on card: Section between getting on and off (Date and time of riding will also be stored); Record of passing through parking lot gate; ID information correlating with P&BR usage application form.</td></tr>
<tr><td>Eligibility criteria④</td><td>Mandatory submission of P&BR usage application form by users.</td></tr>
<tr><td colspan="2">For calculating GHG emission reduction amounts, it is necessary to identify the transportation method before switching to P&BR (previous method), the user's home address and destination, and the transportation method used to get to the parking lot when using P&BR. For that purpose, users will be required to submit a P&BR usage application form filled out with such information. Submission of this application is common even for P&BR examples in Japan, and is also essential information and procedures for the commercial facility operator from the aspect of parking lot management.</td></tr>
<tr><td>Eligibility criteria⑤</td><td>Development of a system for automatically calculating GHG reduction amounts.</td></tr>
<tr><td colspan="2">For calculating GHG reduction amounts, the information on the P&BR usage application form (home address, destination, previous transportation method) and IC card information (bus usage history information, records on passing through the parking lot gate) are necessary, but such data are large volumes of data day by day and moment by moment, and in addition they are managed by different organizations (parking-lot-related information is managed by the store operators, and bus-related information is managed by DOT). Because of this, a system that can span management classifications and automatically aggregate such data is necessary. By using such a system, GHG emission amounts can be accurately calculated in real time without any workload on operators, etc.</td></tr>
</table>

② Value settings before implementation of project

(ⅰ) Default values

The GHG emission sources which are considered subjects of this project are as follows:

Table 2: Subject GHG and emission sources

Classification	Emission source		GHG type
	Subject transportation	Subject section	
Reference value	Transportation mode (mainly motorcycle or car is assumed) previously used for commuting transportation	Entire section traveled by previous transportation method.	CO_2
Project value	Transportation mode for access from home to large-scale commercial facility (mainly motorcycle or car is assumed)	Access transportation section after implementation	CO_2
	From large-scale commercial facility to bus stop near destination	"	CO_2

Based on the above, the default values which are necessary would be as follows:

Table 2-3: List of default values

RE/PE	Information/Data	Default value	Basis for setting	Use/non-use of conservative calculation and reason for use/non-use
RE	Per-unit CO_2 emissions for each commuting transportation mode used prior to the existence of this project.	Setting from 2.3 for each transportation mode	Original estimation for this study while referring to recent results values in Vietnam	Since values are averaged public values, there is no need for conservative settings
PE	Per-unit CO_2 emissions for transportation mode for access from home to large-scale commercial facility (P&BR)	Same as above	Same as above	Same as above
PE	Per-unit CO_2 emissions for bus from large-scale commercial facility (P&BR) to destination	Setting from 2.3 for each transportation mode	Data for CNG bus was set using study data from study performed by Ho Chi Minh in 2013.	Same as above
RE	Fuel consumption improvement coefficient	1.2%/year	Forecast value from The Institute of Energy Economics, Japan was used.	Also specified in the CDM methodology。
RE/PE	α value for determining road distance value from spatial distance value: Road distance value = Spatial distance value ×α	1.25	Estimated in this study.	Conventionally it would be thought that road network density would increase, but since

				the network density of suburban road extensions is low, a conservative estimation is desirable.

* RE: Reference emission amount　　PE: Project emission amount

(ii) Calculation of emission reduction amounts (Calculation of reference emission amounts and project emission amounts)

(a) About reference emission amounts

The reference scenario is based on a BaU scenario in which there is no P&BR and no transportation Eco Point system, and the current transportation mode usage is continued, and furthermore, conservative calculation methods are used.

・The effects of fuel consumption improvements and reviews of road structure for the existing transportation modes are taken into consideration, and conservatism is secured by applying a 1.2% per year fuel consumption improvement coefficient as stated earlier.

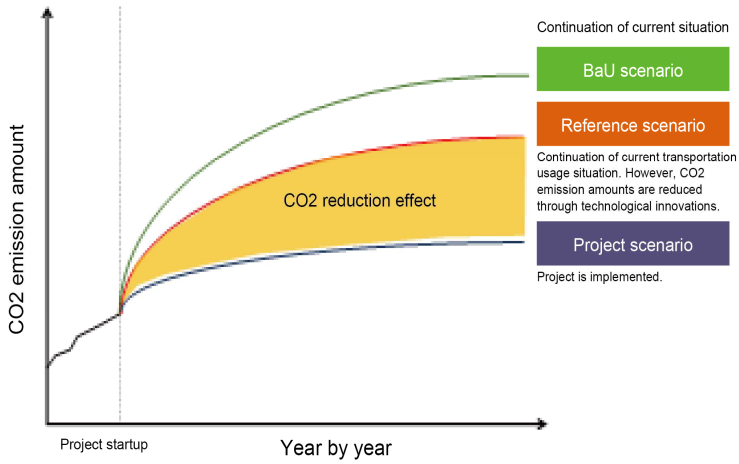


Figure 3: Concept of reference scenario

Furthermore, the registered contents of the P&BR usage application form are obtained, and emissions are calculated from the road distance and the per-unit CO2 emissions for each transportation mode.

Taking the above into consideration, the calculation method for reference emission amounts can be stated as the following equation:

●Reference emission amounts(t-CO2)=BaU emission amounts(t-CO2)×*RCo*

RCo : Fuel consumption improvement coefficient(%)

In other words,

$$CE_r = \sum_{D}\{\sum_{i}(CE_{bai} \times RCo^{y-t})\}$$

CE_{bai} : BaU emission amounts of individual i (t-CO2)　i : Individual

D : Number of days of P&BR usage

Furthermore,

$$CE_{bai} = IDE_{mi} \times L_d$$

L_d : Travel distance (km) between home and work location

IDE_{mi} : Per-unit CO2 emissions (tCO2/person・km) for corresponding transportation mode

Here, the distance between home and work location is measured as the spatial distance calculated (x km) using a map information system based on the home address and work address registered in the aforementioned P&BR usage application form. From this, the calculation of road distance (X km) = x km ×1.25 is performed.

(b) About project emission amounts

Project emission amounts are calculated separately for 2 sections: Access section and bus ride section

$$CE_p = \sum_{D}\{\sum_{i}(CE_{ai} + CE_{bi})\}$$

CE_p : Project emission amounts CE_{ai} : Access emission amounts of Individual i

CE_{bi} : Bus ride emission amounts of Individual i i: Individual

D: Number of days of P&BR usage

・Calculation method for access emission amounts

Access emission amounts are calculated by determining the road distance from the home address information registered in the P&BR usage application form, and multiplying that by the per-unit emissions corresponding to the access transportation method used (as registered in the P&BR usage application form).

$$CE_{ai} = IDE_{mi} \times L_d$$

CE_{ai} : Access section emissions amount for Individual i

L_d : Travel distance (km) between home and commercial facility location

IDE_{mi} : Per-unit CO_2 emissions (tCO_2/person・km) for corresponding transportation mode

The travel distance is calculated as stated above as 1.25 times the spatial distance (x km).

・Calculation method for bus ride emission amounts

The bus ride section distance can be obtained if the IC card system for paying bus fares is introduced.

$$CE_{bi} = IDE_b \times L_b$$

CE_{bi} : Bus ride section emissions amount for Individual i

L_b : Distance (km) of section between getting on and getting off bus

IDE_b : Per-unit CO_2 emissions (tCO_2/person・km) for type of bus used

(c) Fuel consumption improvement coefficient for internal-combustion-engine vehicles

For this project, it was decided to include the fuel consumption improvement effects of technological innovations on internal-combustion engines in the reference emission amounts. For example, in CDM (ACM0016 or AM0031), fuel consumption improvement is set at 1% per year.

On the other hand, for this project we aimed to set the fuel consumption improvement coefficient using a clear basis for making such setting, and the value from a research report by The Institute of Energy Economics, Japan was used. According to that report, for non-OECD member countries, since emission regulations are not strict, fuel consumption improvements are self-driven, and fuel consumption improvement effects from 2005 to 2050 is estimated to be 35%. Of this, the improvement ratio for 2010 to 2020 is expected to be 12%, so for this project it was set at 1.2% per year.

Of this, the improvement ratio from 2010 to 2020 is expected to be 12%.

Table 2-4: Energy efficiency improvement ratios for transportation modes as presented in CDM_ACM0016

Vehicle Category	Technology Improvement Factor (IR)
Buses	0.99
Passenger cars	0.99
Taxis	0.99
Motorcycles (incl. tricycles)	0.99

(d) Road distance - spatial distance estimation coefficient α

This coefficient is used to calculate "road distance" from "spatial distance". It is necessary to estimate the "road distance" from the home address and the destination address/bus stop provided on the P&BR usage application form.

The spatial distance (straight-line distance) between the two registered addresses can be easily calculated from a map information system, but a mechanism for estimating the road distance from the spatial distance is required. For this purpose, in this study Ho Chi Minh road network data was constructed, and a model for estimating road distance from spatial distance was investigated.

L_d (Road distance) $= L_{sp}$ (Spatial distance) $\times \alpha$

For setting α, as described in the attached documents, using the data for the road network within Ho Chi Minh, the spatial distance and road distance were measured between specific points (25 locations) within the city, and an α value which covered 95% of the accumulated data points was adopted. As a result, α was set at 1.25. Since in general in Japan the α value is always between 1.2 and 1.3, the set value was judged as appropriate.

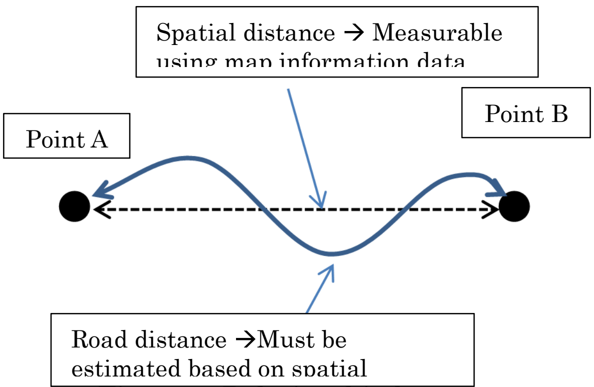


Figure 2: Relationship between spatial distance and road distance

(3) Setting of per-unit emissions

In this study, a detailed study regarding estimation of the CO_2 emission amounts for each transportation mode, which is essential when estimating reference emission amounts and project emission amounts, was conducted.

① Results of previous studies

A study of the per-unit CO_2 emissions from each transportation mode in Vietnam was conducted in 2012, and the settings in Table 2 were made based on the study results. (Source: JCM/BOCM feasibility study on offset credit system between two countries "Promotion of Modal Shift from Roadway Transportation to Mass Rapid Transit (MRT) (Mitsubishi Research Institute, Inc.)").

In order to maintain consistency with other JCM models, it was considered desirable to use those default values uniformly, and the default values shown in Table 4 are used in this project as well.

In addition, the per-unit CO_2 emission amounts for CNG buses are set using the actual values for CNG buses obtained during the Bus Performance Evaluation Study conducted by the Ho Chi Minh Department of Transportation (DOT) in 2013. The per-unit CO_2 emissions were set taking into consideration that the CO_2 reduction effect of CNG buses is approximately 8.0% (refer to Table 3).

Table 4: Per-unit CO_2 emissions for each transportation mode

* Per-unit emissions for CNG buses were calculated independently in this study.

Transportation mode	Per-unit CO2 emission amount [tCO2/person per km]	Type of fuel	Fuel efficiency	Average number of passengers
Walking	0	-	-	-
Bicycle	0	-	-	-
Electric bicycle	0.4×10^{-5}	Electricity	-	1.48
Motorcycle	6.9×10^{-5}	Gasoline	31.14	1.18
Car	14.0×10^{-5}	Gasoline	11.94	1.63
Taxi	8.4×10^{-5}	Gasoline	12.96	2.39
Bus	2.3×10^{-5}	Diesel fuel	3.15	44.65
	1.8×10^{-5}※	CNG	-	44.65

Table 5: Comparison of CO2 emission amounts for diesel vs. CNG for Ho Chi Minh NO28 bus model

Emission	NO28 model	
	Diesel	CNG
CO_2 [Kg]	290.136	267.017
CO_2 [Ton] reduction effect	23,118	

On the other hand, since the per-unit CO2 emissions from motorcycles, cars, and buses exert a major influence on these JCM reduction effect estimations, they should be set very carefully. Among these amounts, since the amount for buses is the amount measured by the Ho Chi Minh DOT in 2013, these were taken as the true value. For the remaining per-unit emissions for motorcycles and cars, they were carefully verified in this study.

② Methodology

In this study, the per-unit CO2 emissions for each transportation mode used in this project were set using the International Vehicle Emissions (hereafter referred to as "IVE") model.

As stated above, although per-unit CO2 emissions were set in previous studies, since per-unit emissions are important elements in reduction amount estimations, for this study they were set using on-site investigations and the latest forecasting technologies.

(ⅰ) Outline of IVE-model

The International Vehicle Emissions (IVE) model has been developed jointly by the University of California at Riverside, College of Engineering – Center for Environmental Research and Technology (CE-CERT), Global Sustainable Systems Research (GSSR), and the International Sustainable Systems Research Center (ISSRC). Its prime purpose is application in developing countries. This model uses vehicle technology distributions, power-based driving factors, vehicle density distributions, and meteorological factors specific for local condition (ISSRC, 2008). With high resolution, friendly user interface and flexibility in multi scale choices, multi technologies as well as base adjustment ability, compared with other models, the IVE model (version 2.0.2) was selected to calculate the emission factors from car and motorcycle fleets in HCMC.

The IVE model contains a total of 1372 predefined technologies, and an additional 45 non-defined technologies. The technologies are grouped using the following parameters:

- ✓ Vehicle Size (7 options including trucks)
- ✓ Fuel Type (5 options)
- ✓ Vehicle Use (3 options)
- ✓ Fuel Delivery System (3 options)
- ✓ Evaporative Control System (varies)
- ✓ Exhaust Control System/Standards (varies)

In addition, emissions when vehicle is traveling and when starting vehicle can be estimated separately. In this study, since the emission load when traveling is larger and also because monitoring engine starting is difficult and not taking this into consideration results in a conservative estimate, only the emission amounts when traveling were used as the subject of estimations.

(ii) Overview of investigation of current situation

In order to obtain the condition data which are required to be input to the IVE model, in this study ① Questionnaire surveys, ② Video observation investigation of traffic volumes, and ③ GPS logger investigations were conducted in Ho Chi Minh. An overview of this data is shown below.

Table 3-4: Summary of Data Collection

Data types	Method	Recordings	Valid data
- Technology types of cars and motorcycles - Start time and soak time distributions	Questionnaire survey	- Car/motorcycle brand - Engine volume - Odometer reading - Model year - Age - Emission standard - Number of starts per day - Time of stop, starts	2066 questionnaire sheets
On-road car and motorcycle fleet	Video camera	Counting by hour	1170 minutes video data recording
Driving patterns	2 GPS loggers combined with the car and motorcycle operated on-road	Instantaneous location, time, longitude, latitude, altitude and speed of the car/motorcycle operated on- road	Total 43313 second-by- second of on- road GPS recording 2 minutes GPS data: 5 days*2 drivers (1 car. 1MC)
Starts locations	2 GPS loggers	Time and location when engine turned on & turn off	5 days of start patterns survey

① Questionnaire survey

A survey of 3,500 people was conducted, and 2,066 responses were obtained. Questionnaire distribution methods were as follows:

(i) Giving questionnaire sheets at an organization such as company, university and so on.
(ii) Giving questionnaire sheets at citizen’s home

(iii) Asking citizens on street, coffee shop, gasoline station, etc. to answer the questionnaire sheets.

② VIDEO investigation

The video investigation was conducted to determine the traffic volume by vehicle type and cameras were located at the locations shown below along typical roads in Ho Chi Minh.

Figure 3-1 Selected streets for video survey

Figure 3-2: Video survey at Dien Bien Phu Street

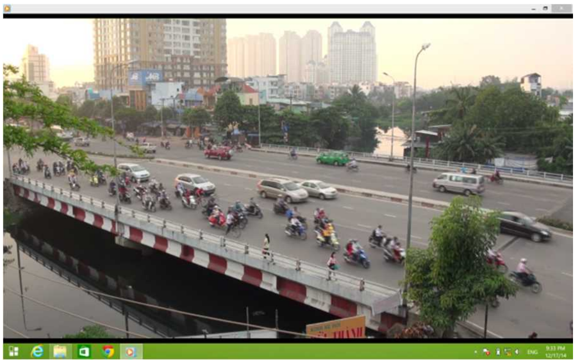


Figure 3-3: View of camera at Dien Bien Phu (screenshot)

③ GPS for driving characteristics

Two GlobalSat GPS loggers DG-100 were installed in a car and a motorcycle respectively to measure driving characteristics on representative streets. The car and motorcycle with GPS devices ran on three routes on December 15 from 6:30 to 19:30.

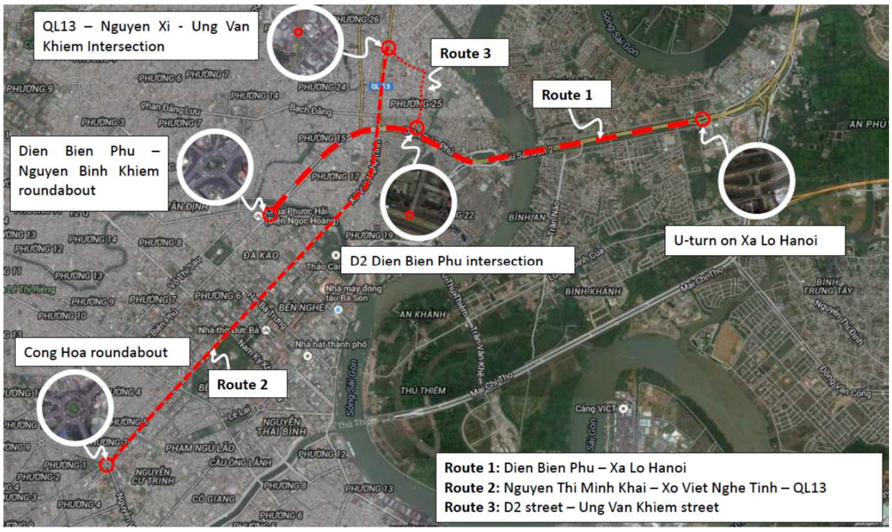


Figure3-4: Determined routes for driving characteristics measurement

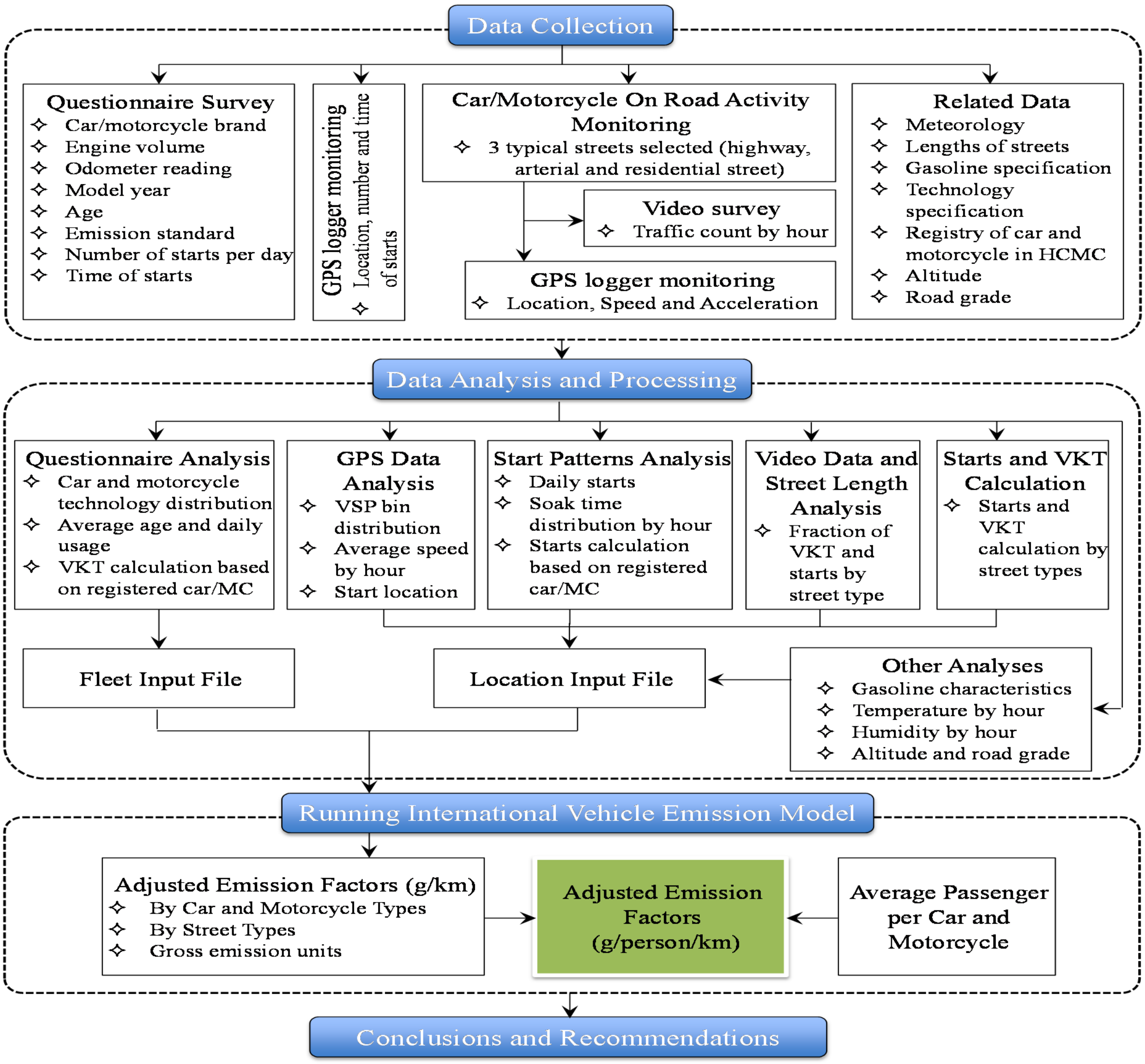


Figure 3-5: Framework of methodology

③ Overview of current situation investigation data

(i) Vehicle characteristics from questionnaire

Of 2,066 responses, vehicle was a car in 167 cases and a motorcycle in 1,707 cases, so motorcycles accounted for more than 90% of vehicles.

Further, the age of the car or motorcycle are shown in Figure 3.6. For both cars and motorcycles, the average vehicle age was 5 years or less, but there were also vehicles which had been used for 15 years or more. The average vehicle age was 4.84 years for cars and 4.15 years for motorcycles. These values are input to the IVE model and used for calculating the per-unit CO2 emission values.

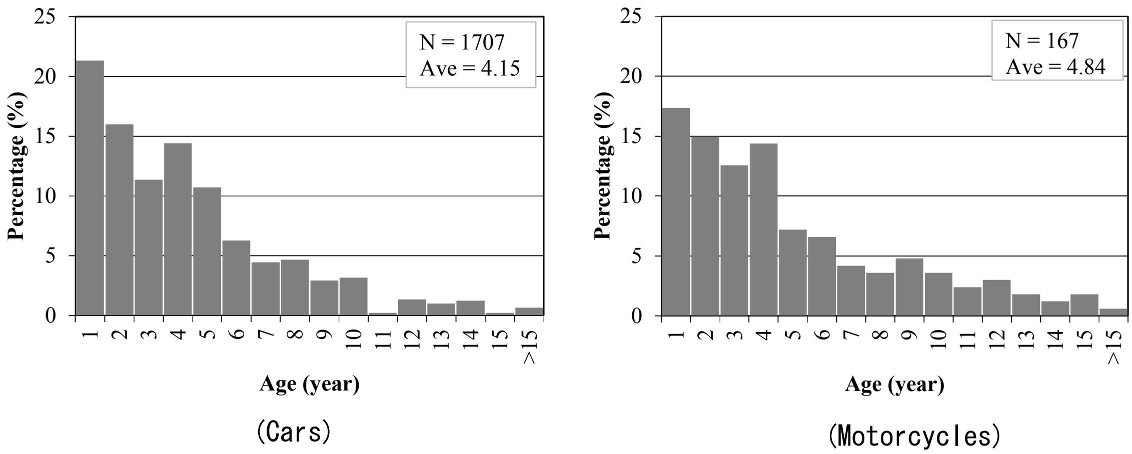


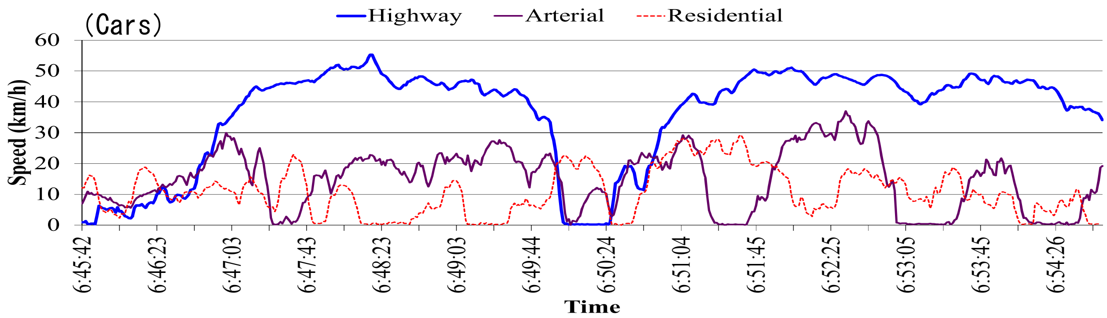
Fig. 3-6 Distribution graph for car and motorcycle use year Ho Chi Minh City

(ii) Traveling characteristics from GPS loggers

The traveling speeds during typical travel times obtained from GPS loggers are shown in Figure 3-7. For cars, highway speeds are much faster than the speeds on arterial and residential roads. On the other hand, for motorcycles, there are not always clear differences in speed. Also, it is assumed that the periods when the speed is zero is when stopped at a signal on general roads but when stopped in traffic jams on highways.

①

②



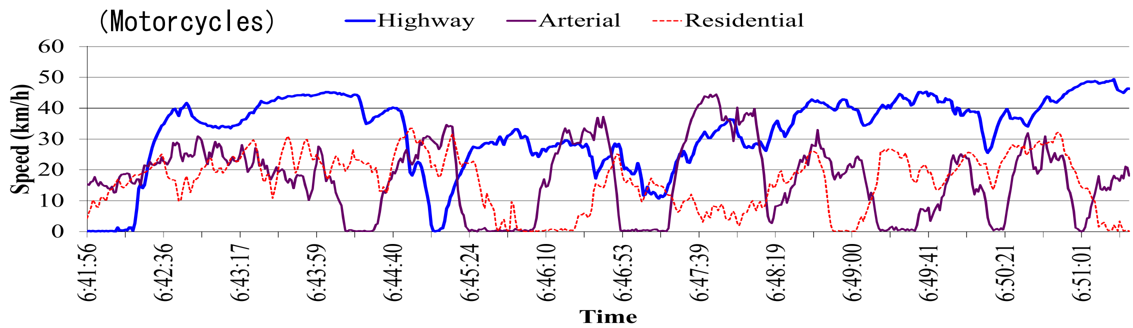


Figure 3-7: Traveling speed characteristics by vehicle type for specific time periods obtained from GPS loggers

(iii) Traffic volume by vehicle type from video observation

The observation results from the highway, arterial road, and residential road monitored using video tapes are shown below. Each type of data is listed in 30-minute increments.

Table 3-5: Traffic volume observation results from video observation

(Highway)

Street types	Time	Volume (veh/h)	MC	Car	Taxi	Bus	Truck
Highway	6~7	13,620	88.11%	8.78%	1.17%	1.91%	0.03%
	7~8	16,284	89.93%	7.59%	1.40%	0.98%	0.10%
	8~9	13,272	83.88%	10.16%	1.75%	1.21%	3.01%
	9~10	10,144	83.79%	8.32%	2.25%	1.34%	4.30%
	10~11	8,756	82.05%	9.09%	2.38%	1.60%	4.89%
	11~12	9,004	82.72%	8.88%	2.00%	1.91%	4.49%
	12~13	7,620	83.57%	8.50%	2.78%	1.63%	3.52%
	13~14	8,184	84.07%	7.82%	2.30%	1.47%	4.35%
	14~15	9,188	84.15%	7.79%	2.61%	1.61%	3.83%
	15~16	9,548	83.41%	10.31%	2.43%	1.89%	1.97%
	16~17	12,724	87.52%	7.73%	1.95%	2.77%	0.03%
	17~18	17,652	90.60%	6.28%	1.11%	1.88%	0.14%
	18~19	11,936	87.40%	7.77%	2.58%	2.11%	0.13%
Average		*11,379*	*85.48%*	*8.39%*	*2.05%*	*1.71%*	*2.37%*

(General roads: Arterial roads)

Street types	Time	Volume (veh/h)	MC	Car	Taxi	Bus	Truck
Arterial	6~7	6,112	94.11%	2.95%	1.05%	1.83%	0.07%
	7~8	6,224	94.79%	2.76%	0.96%	1.41%	0.06%
	8~9	4,748	91.41%	4.47%	2.19%	1.26%	0.67%
	9~10	6,460	92.76%	2.35%	1.73%	1.55%	1.61%
	10~11	5,924	92.98%	2.16%	1.35%	1.22%	2.30%
	11~12	6,608	93.04%	2.06%	2.00%	1.45%	1.45%
	12~13	6,760	93.61%	2.07%	1.66%	0.89%	1.78%
	13~14	5,120	90.23%	5.00%	1.80%	1.02%	1.95%
	14~15	6,104	91.74%	3.08%	2.29%	1.25%	1.64%
	15~16	7,264	93.50%	2.53%	2.09%	1.27%	0.61%
	16~17	8,956	96.61%	1.38%	1.25%	0.71%	0.04%
	17~18	10,260	96.84%	1.75%	0.90%	0.51%	0.00%
	18~19	8,544	95.69%	2.01%	1.69%	0.61%	0.00%
Average		*6,853*	*93.64%*	*2.66%*	*1.61%*	*1.15%*	*0.94%*

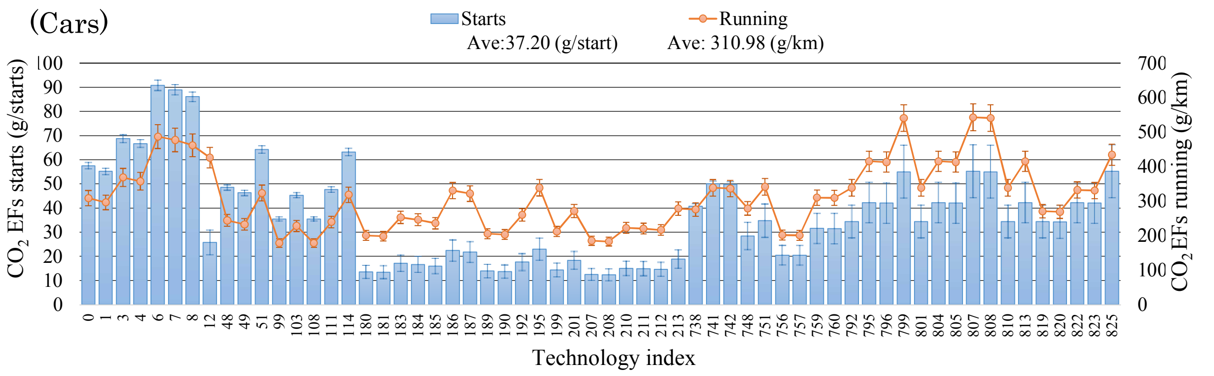
(General roads: Residential roads)

Street types	Time	Volume (veh/h)	MC	Car	Taxi	Bus	Truck
Residential	6~7	5,560	94.96%	3.31%	0.65%	1.08%	0.00%
	7~8	6,732	96.49%	2.14%	0.65%	0.71%	0.00%
	8~9	4,732	93.58%	2.87%	1.01%	0.93%	1.61%
	9~10	3,652	95.07%	1.53%	1.42%	0.99%	0.99%
	10~11	3,024	93.52%	3.04%	1.19%	1.19%	1.06%
	11~12	4,112	96.50%	1.46%	0.78%	0.78%	0.49%
	12~13	3,372	94.66%	1.90%	0.95%	0.95%	1.54%
	13~14	3,024	93.25%	2.65%	2.25%	0.53%	1.32%
	14~15	3,024	94.18%	2.65%	1.19%	0.53%	1.46%
	15~16	3,304	93.70%	2.54%	2.18%	0.85%	0.73%
	16~17	4,016	93.23%	2.79%	2.99%	1.00%	0.00%
	17~18	5,008	96.81%	1.36%	1.52%	0.32%	0.00%
	18~19	3,476	95.51%	2.30%	1.61%	0.58%	0.00%
Average		*4,080*	*94.73%*	*2.35%*	*1.41%*	*0.80%*	*0.71%*

⑤ Estimation of per-unit CO2 emission amounts

(i) Emission amounts by road type/vehicle type

The CO2 emission amounts estimated from the IVE model utilizing the above analysis data are shown in the figure below. In the IVE model, the CO2 emission amounts at startup and during travel can be estimated for each vehicle type. Therefore, the figure below shows the emission amounts at startup and during travel for each vehicle type.



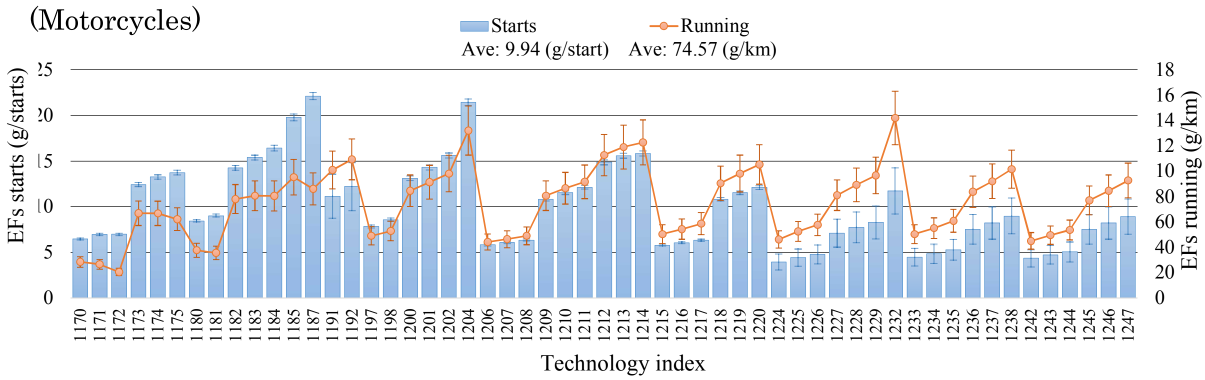
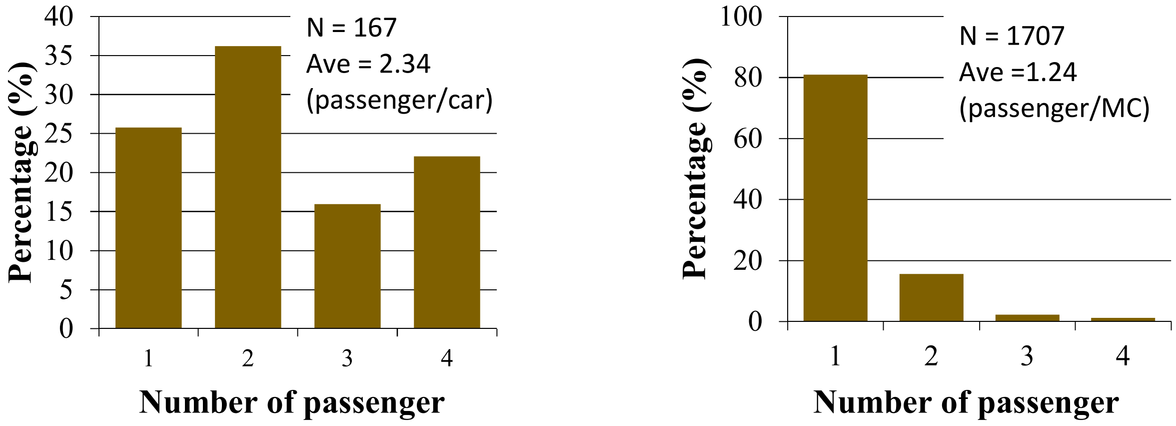


Figure 3-8: CO2 emission amounts by vehicle type (at startup and when traveling)

(ii) Per-unit estimation

Figure 3-9 shows the number of passengers per car or motorcycle. For cars, there were 1 or 2 passengers in about 60% of cases, and the average was 2.34 passengers per car. On the other hand, for motorcycles, there was a single passenger in 80% of cases, and the average number of passengers was 1.24.

When these average values for number of passengers were used to calculate per-unit emissions, the results were as shown in Table 3-6.



(a) Cars (b) Motorcycles

Figure 3-9: Average number of passengers per vehicle for cars and motorcycles

Table 3-6: Per-unit CO2 emissions per person for cars and motorcycles

Mode types	Adjusted CO_2 EFs		Average number of passenger	Adjusted CO_2 EFs	
	Running (g/km)	Start (g/start)		Running (g/person/km)	Start (g/person/start)
Car	310.98	37.20	2.34	*132.90*	*15.90*
Motorcycle	74.57	9.94	1.24	*60.13*	*8.02*

(iii) Estimation results for per-unit emissions

In this study, when the IVE model advanced system for estimating emission amounts due to traffic was utilized to estimate the per-unit CO2 emission amounts in Ho Chi Minh for cars and motorcycles based on the investigation of actual traffic conditions in Ho Chi Minh, the emissions were estimated to be 132g-person/km for cars and 60.13g-person/km for motorcycles.

These results are exceedingly close to the values shown in Table 3-2 (previous study results) of 14.0×10^{-5} ton-person/km (140g-person/km) for cars and 6.9×10^{-5} ton-person/km (69g-person/km) for motorcycles.

From the above points, it was judged that the results shown in Table 3-2 can be considered to be reliable values, and that there is no problem with using the per-unit emission amounts in Table 3-2 for this project.

(4) Estimation of project emission amounts

In the actual project, it will be possible to accurately obtain GHG emission amounts and reduction amounts based on the methods described in 2-2 "Estimation of reference emission amounts and project emission amounts" above, but at this stage GHG reduction effect will be predicted using the prediction simulation method below.

Step 1 Determining citizen usage intentions using questionnaire surveys

A questionnaire survey (1,000 samples) of the intentions of Ho Chi Minh citizens to use P & BR and Transportation Eco Points was conducted, and using these results a transportation mode selection prediction model was constructed using the multinomial logit model. (For details of the questionnaire survey, refer to Reference Materials below.)

Step 2 Prediction of CO2 reduction effect using person-trip surveys

Using 2002 Ho Chi Minh person trip (PT) data and the above transportation mode model, a) Commuting transportation amount for each current transportation mode, and b) Commuting transportation amount for each transportation mode when P&BR and Transportation Eco Points are in operation were predicted respectively. The amount of mode shift to P & BR can be predicted from the difference between these two values.

Furthermore, GHG emission amounts are predicted using the per-unit CO2 emission amounts estimated in 3-6.

On the other hand, since it can be expected that the number of people utilizing P & BR will vary according to the price of the prepaid shopping tickets and the return ratio for Transportation Eco Points, the project model with the highest effectiveness was investigated.

As a result, the case in which the price of the prepaid shopping tickets was 300,000 VND and the Transportation Eco Point return ratio was 10,000 VND for each 20 bus rides indicated the highest shift ratio.

However, these prediction results are based on 2002 PT data, and taking into consideration that the suburban population has increased in recent years by 2.7 times, these prediction results were modified as shown in Table 4.3.

Table 4-1: Conditions for each scenario

Scenario	Price of prepaid shopping ticket	Points awarded for number of times riding bus
Scenario ①	100,000 VND	10,000VND/20 times
Scenario ②	200,000 VND	10,000VND/20 times
Scenario ③	300,000 VND	10,000VND/20 times
Scenario ④	100,000 VND	20,000VND/30 times
Scenario ⑤	200,000 VND	20,000VND/30 times
Scenario ⑥	300,000 VND	20,000VND/30 times
Scenario ⑦	100,000 VND	30,000VND/40 times
Scenario ⑧	200,000 VND	30,000VND/40 times
Scenario ⑨	300,000 VND	30,000VND/40 times

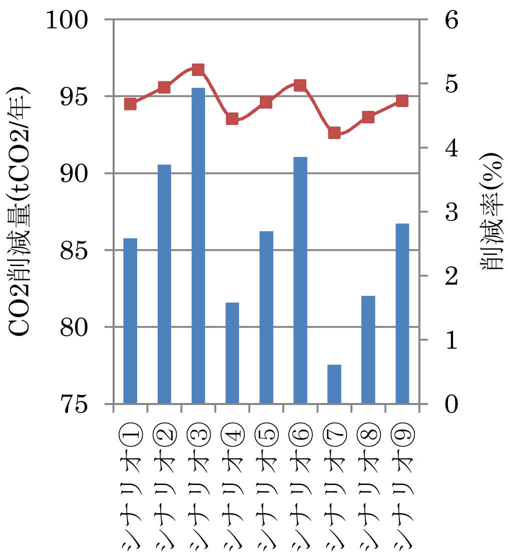


Figure 4-1: CO2 reduction amount/shift ratio results

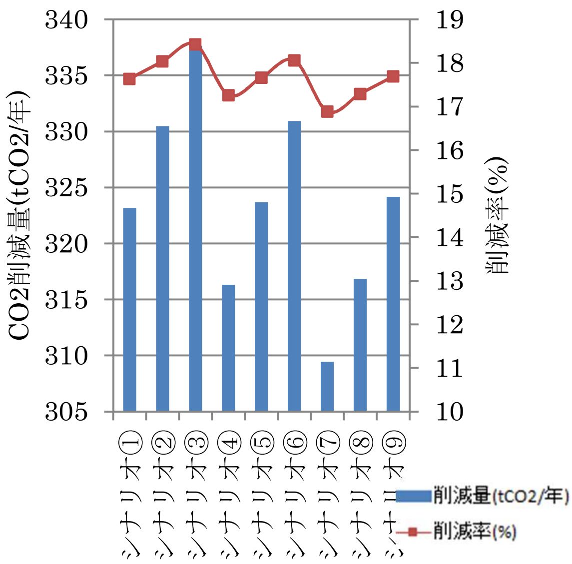


Figure 4-2: CO2 reduction amount/shift ratio results

Table4-3 GHG emission amounts and reduction effect (Scenario③)

Reference emission amounts	Project emission amounts		GHG reduction amount	Reduction ratio
4,960.73t-CO2/yr.	Minimum	4,702.77t-CO2/yr.	257.96t-CO2/yr.	5.2%/yr.
	Maximum	4,049.10t-CO2/yr.	911.63t-CO2/yr.	18.43%/yr.
	Average	4,375.94t-CO2/yr.	584.79t-CO2/yr.	11.82%/yr.

Note: Minimum: Proportion of persons answering "Will definitely use"
Maximum: Proportion of persons answering "Will use"

Reference materials: Overview of the questionnaire survey conducted in Ho Chi Minh and the logit model that was used

1. Overview of questionnaire survey

The questionnaire survey was conducted using approximately 1,000 Ho Chi Minh citizens as subjects.

In addition, in order to ensure the reliability and validity of the questionnaire used this time, we received technical guidance regarding its design from Professor Takayuki Morikawa of Nagoya University. Since it was necessary to distribute the survey in a way that matched the hierarchy of the citizen population in order to ensure the validity of the questionnaire survey, the survey was conducted with a combination of web survey and individual visitation surveys. (Reason: Since it was not possible to secure sufficient web monitors aged 40 and over if the survey was only via the web, it was decided to compensate for this lack through conducting individual visits.)

Table 1: Overview of questionnaire implementation

Item	Details
Questionnaire subjects	Ho Chi Minh citizens
Number of subjects	1,000 people
Subject distribution	Equivalent to the hierarchy of the city population (Table 4-13)
Implementation method	Web questionnaire + individual visitation surveys
Survey content	Refer to Table 4--15
Implementation period	December 2013

Table 2: Age and gender composition of questionnaire subjects

Age group	Male	Female
18-29	216	203
30-39	122	118
40-49	97	100
50-59	69	77

Table 3: Questionnaire question items

Classification	Question items
Personal attributes information	Gender, age, employment, area of residence, annual income, family composition, whether or not subject has driver's license
Daily commutation behavior	Starting region/destination region, commutation transportation mode, commutation time/fares required (by access/trunk line), bearer of commutation expenses, transportation mode on rainy days, number of co-passengers and starting region/destination of co-

	passengers
Evaluation of buses	Possibility of bus utilization and bus utilization experience, bus fare payment method, evaluation of buses, desired improvements
Usage intention relative to policies	Conducted with illustrations explaining the details of each project ① Transportation Eco Points (Various return rate cases were shown and usage intention responses collected.) ②P & BR (Various prepaid shopping ticket prices were shown and the usage intention response for each case was collected.) ③Combination of Transportation Eco Points an P & BR (Various cases were shown and usage intention was checked.) ④For each of the above cases, the bus usage frequency was asked.
Environmental awareness	Recognition of the importance of each of the following points: Global warming problem, traffic jam problem, improvement of public transportation, destruction of forests, automobile exhaust problem, cooperation intention for contributions to the environment

The intentions to shift transportation behaviors for each of the policies of the proposed project from the questionnaire survey are shown below.

◆ Transportation Eco Point system

Here, analysis of the sensitivity of the respondent's usage shift intention to the Transportation Eco Point return rate (in other words, whether or not increasing the return rate could be expected to increase the intention to shift to buses) was performed. However, since if multiple cases are shown to the same survey subject, there is a risk that they will think about their response by comparing cases, for this questionnaire survey, the method of showing each respondent only one case was used. In other words, a respondent who was shown "If you ride the bus 20 times you'll get 10,000 VND" would only respond to that case regarding returns, and likewise a respondent who was shown "If you ride the bus 20 times you'll get 10,000 VND" would only respond to that question regarding returns.

The results show a tendency for the proportion who would shift to buses to increase as the return ratio was increased.

In addition, the results show that the effect of a discount on bus fares was higher than that of a shopping ticket discount.

◆Effect of P & BR

P & BR sensitivity analysis was performed in the same way. Here, the usage intention for when P & BR alone is performed (upper graph) and the usage intention when P & BR is used under the same conditions with Transportation Eco Points added are shown.

The results showed the following interesting trends:

・For P & BR, if the access terminal is somewhat far away, the effect decreases.

・If P & BR is performed not alone but in combination with a prepaid-type shopping ticket that can be used at a shopping center, there is a major increase in usage intention.

In addition, it was shown in these results that there is a possibility that 60% or more of the people would shift to bus usage under this P & BR system

◆ Effect of combination of P & BR and Transportation Eco Points

Sensitivity analysis of the effects of combining P & BR and Transportation Eco Points was performed in the same way.

These results show that as in the above analysis for Transportation Eco Points, higher return rates increased the possibility of shifting to P & BR.

However, in order to precisely see the relationship between parking lot access conditions, shopping ticket price, and the point system, model analysis must be performed, and the results are analyzed in detail in the following section.

2. Overview of transportation mode selection model

A transportation mode selection model was constructed using commutation as the subject in order to grasp the selection of movement modes within Ho Chi Minh after the introduction of Park and Bus Ride. The typical modes of transportation were taken as 5 types: Walking, bicycle, motorcycle, car, and bus, and a multinomial logit model (MNL model) was employed.

The MNL model utility function is shown in Equation (1.1) below.

$$\begin{aligned} U_{in} &= \beta_1 x_{1in} + \beta_2 x_{2in} + \cdots + \beta_K x_{Kin} + \varepsilon_{in} \\ &= V_{in} + \varepsilon_{in} \end{aligned} \quad \text{(Equation 1.1)}$$

where, U_{in} shows the utility to individual n when selection i is selected, x_{kin} is the k-th explanatory variable for selection i for individual n, β is the undefined parameter for each explanatory variable, V_{in} is the deterministic term for the utility when selection i is selected by individual n, and ε_{in} is the probabilistic term for the utility when selection i is selected by individual n. The probabilistic term is independent, and if it is assumed that it follows the Gumbel distribution with the same variance, the probability that individual *n* will select selection *i* can be shown by Equation (1.2) below.

$$P_n(i) = \frac{\exp(V_{in})}{\sum_{j=1}^{J} \exp(V_{jn})} 、 i = 1、 \ldots 、 J \quad \text{(Equation 1.2)}$$

where $P_n(i)$ is the probability that individual *n* will select selection *i*, *j* is the selection number, *J* is the selection set number, and V_{in} is the deterministic term for the utility when individual *n* selects selection *i*. The utility probabilistic term from this Equation (1.2) is inserted into Equation (1.1), and parameters are estimated for the related explanatory variables.

The parameter estimation results from the multinomial logit model using the transportation mode selection results from questionnaire respondents is shown in Table 4.

When the constant term for motorcycles, which had the highest share, is set to 0 and the constant terms for the other modes are set to any setting, the values' are all shown as negative, and it can thus be seen that to change from motorcycles to other modes.

Age 40 or higher dummy was set for motorcycles, but since it became negative, it can be said that older generations tend to use motorcycles relatively little.

Although a high household income dummy was set for cars, since it was positive it can be said that high income households tend to use cars.

Table 4: Parameter estimation results

Dependent explanatory variable	Transportation mode		
Explanatory variable	Estimated value		t value
Walking constant term	-1.03	***	-14.5
Bicycle constant term	-0.49	***	-6.41
Car constant term	-2.59	***	-17.7
Bus constant term	-4.38	***	-31.7
Time (h)	-5.1	***	-9.74
Walking time (h)	-9.09	***	-26.8
Cost (/1000VND)	-0.24	***	-3.97
Male dummy (Motorcycle)	0.05		0.83
Age below 20 dummy (Walking)	0.13		0.81
Age 40 or higher dummy (Motorcycle)	-0.21	***	-3.53
Low household income dummy (Walking)	0.15		0.70
High household income (car)	1.53	***	5.95
Initial likelihood	-49,300		
Final likelihood	-5,280		
Fixed determination coefficient	0.89		
Number of samples	30,632		
** ：5% significance; *** ：1% significance			

(5) Study regarding the creation of JCM (Project plan)

① Monitoring plan

Actual monitoring will be organized as shown in the table below. In this project, since it is important to obtain evidence of P&BR usage, it is necessary to reliably obtain the various kinds of transportation activity data at the time of submitting the P&BR usage application form and during P&BR operation.

On the other hand, for the work of calculating CO2 emission amounts (total CO2 integrated from the data collected for each individual P&BR user), it is desirable to keep in mind the future expansion of this project (expansion to other stores or city regions, and further application both inside and outside the country). For this purpose, it is extremely important to give consideration reducing the workload of the commercial facilities operator for this MRV.

Taking the above into consideration, in this FS, it was judged as desirable to move the data operations into the cloud as shown in Figure 5 so that the various types of information managed by the commercial facilities operator or the bus operator (DOT) can be collected automatically, and moreover, the GHG reduction amounts can also be calculated automatically.

Table 5-1: Monitoring plan

Monitoring item	Monitoring method	Implementation timing	Frequency	Agency
Residence address; Destination address	P&BR use application form	At time of application by person desiring to use system	Once per year	Store operators
Reference transportation method	P&BR use application form		Once per year	Store operators
Carpooling information	P&BR use application form		Once per year	Store operators
Record of passing through parking lot gate	Parking lot management system	When commuting by P&BR (Entering/leaving parking lot)	Each time	Store operators
Bus usage frequency; Distance between getting on and off	IC card payment system	When commuting by P&BR (When riding bus)	Each time	DOT
Bus travel route and bus type	Field study	At time of DOT inspection	After each change	DOT
Bus per-unit CO2 emissions	Vehicle maintenance check		Once per year	DOT

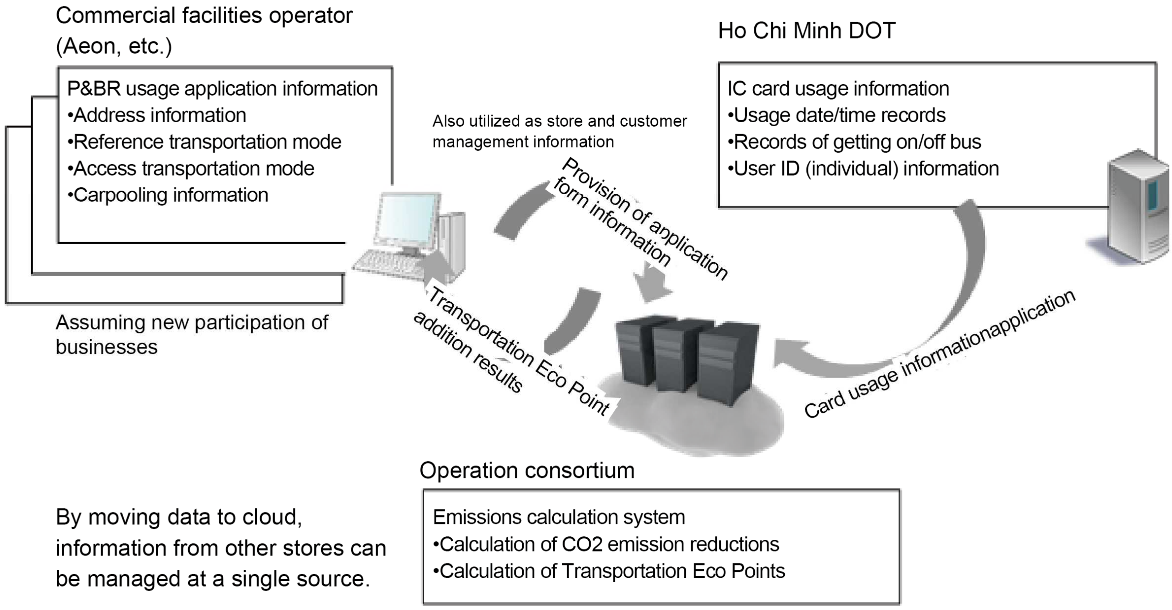


Figure 5-1: Monitor system concept

② Environmental impact evaluation

This project is a soft measure in the transportation field, and there is no special infrastructure construction required. In addition, since the content of the project is also an economical inducement method with the aim of inducing people to switch from individual transportation modes to public transportation modes, no phenomenon will occur that would generate loads in terms of the transportation aspect or environmental aspect.

Taking the above into consideration, it is judged that there is no particular need for environmental impact evaluation for this project.

③ Comments from stakeholders

The local stakeholders who are consultation targets for this project are shown in the table below. Organization of the opinions of these related persons will be performed within the MRV organization which is described later.

The results of discussions held this year with related parties for this study are shown in Table 6. The Ho Chi Minh DOT, which is a particularly important stakeholder, indicated their willingness to cooperate in this project, and also indicated their willingness to operate new bus routes from Aeon Store #1, which are necessary for P&BR.

In addition, the Aeon Group who will be the principal party of this project are planning to start preparatory investigations for realizing this project, taking into consideration the operating conditions of the store after its opening in January.

Table 5-2: Comments from stakeholders

Stakeholder	Comment	Countermeasure
Ho Chi Minh DOT	・We recognize that shifting demand from motorcycles to buses is an important transportation policy. Since the DOT considered introducing new bus routes at the time of the opening of the Aeon store, we definitely want to realize the project. If a place for getting on and off buses can be secured within the Aeon site, the DOT side will investigate operating plans such as bus lines, frequency, etc. ・Since we don't know whether or not bus demand will actually increase due to P&BR alone, we would like you to also consider measures to stimulate demand. ・Japanese CNG buses are expensive, which makes their introduction difficult. ・Within the DOT, the development of a park-and-ride system corresponding with the opening of MRT Line 1 in areas along the line is being considered. The proposed project is consistent with this flow. ・Introduction of IC cards is planned. It is thought that the specifications can be provided at as early a stage as possible. It is anticipated that the card will probably be a Type-A mifare card. In addition, we would like to use a highly versatile card reader that can read any card type.	・There is already a space for getting on and off the bus constructed at Aeon Store #1. Further concrete coordination such as whether there is sufficient capacity for the bus route operation plans provided by the DOT will enable this to become a reality. ・The economic inducements when combined with the Transportation Eco Points are intended to encourage demand. In addition, according to the demand forecast prepared as part of this study, it was indicated that a demand increase of around 18% is possible. ・No specific countermeasures ・For this project, what is important is not the card type, but the information content. Looking toward validation testing, we would like to proceed with discussions from a system perspective. ・No specific countermeasures A study of pre-measures prior to the introduction of IC cards is necessary. (JCM scheme for when there is no IC card.)

Local corporation of Aeon Group	・We would definitely like to proceed toward realizing this project. However, since we still do not know how many customers will be coming to Store #1 after its opening and whether or not it will be possible to secure sufficient spaces for P&BR, the top priority is verifying the situation after the store opens.	・Plans for a demonstration project next year will be studied taking into consideration the situation after the store opens.

(6) Study toward project realization

① Project plan

As also shown in the results of discussions with stakeholders in Table 5-2, the result for this year was confirmation of the implementation intentions of Ho Chi Minh DOT and Aeon as the business entity implementing the project, raising the feasibility of the project.

However, regarding the introduction of IC cards for buses, the fact that no concrete technical specifications have been presented and further, the fact that the timing of IC card introduction is expected to be around 2019 are causes for concern.

Therefore, this project will aim for realization in the two stages shown below.

●There is a risk that introduction of IC cards will be around 2019 (DOT response). Therefore, in the meantime the P & BR project will be realized in advance.

● Since introduction of IC cards will not be done until then, low-fuel-consumption buses will be introduced on said P & BR lines, and MRV related to that reduction amount will be implemented.

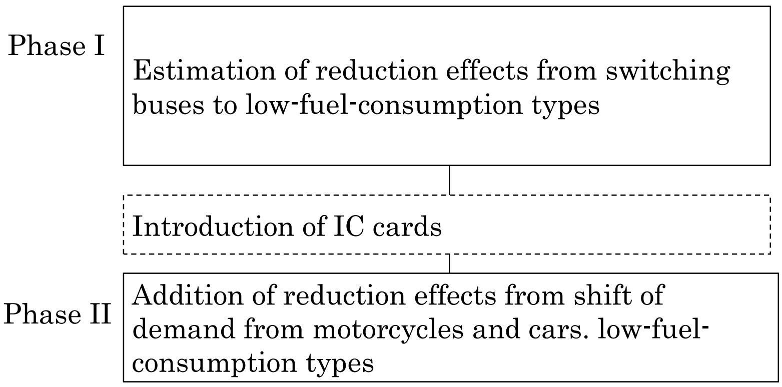


Figure 6-1: Idea for project stages

Table 6-1: Financial plan

System name	Function	Project cost
(1)Development of a system for estimating GHG reduction amounts	Links with the DOT IC card payment information to determine bus usage information and perform CO2 reduction amount estimations. (Fully subsidized)	20 million yen
(2)Development of Transportation Eco Point management system	Development costs for server to manage Transportation Eco Points and award them based on the GHG reduction amounts from above, etc. (1/2 subsidized)	20 million yen
(3)System renovation for connection with HCMC bus payment system	To protect the security of the DOT IC card payment management system and above GHG reduction amount estimation system (1/2 subsidized)	30 million yen
(4)Purchase cost of IC cards for testing	Purchase cost of IC card recommended by Japan (FeLica). Assumed quantity is around 30, 000 cards (1/2 subsidized)	30 million yen
Total		100 million yen

② MRV System

With Aeon Store #1 as a pilot project, the aim is to expand this project scheme to other stores and finally throughout the entire region. Therefore, although for the time being the principal parties of the project will be the Aeon Group, Sumitomo Mitsui Banking Corporation, and Nikken Sekkei Research Institute as the principal parties who proposed this study, in the future a consortium will be formed and a system established for promoting the participation of the numerous Japanese companies who are advancing into Ho Chi Minh and the surrounding areas.

For this purpose, it is planned to establish an MRV system similar to that shown in Figure 6.

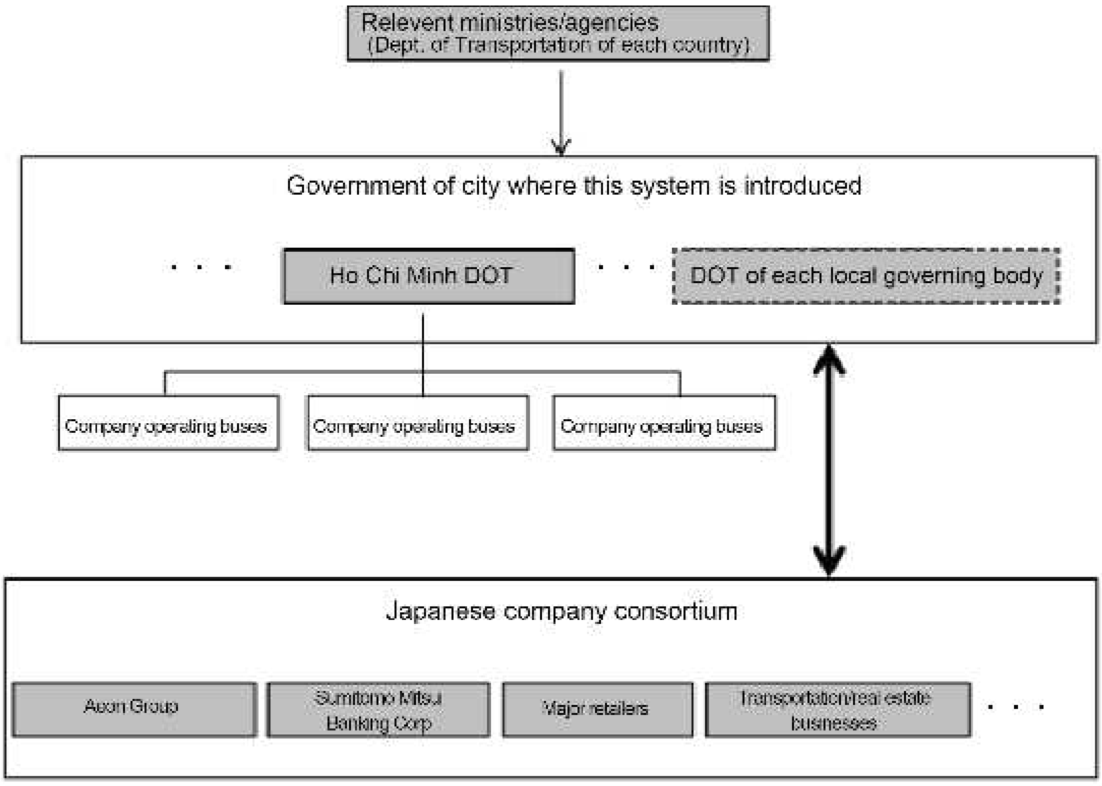


Figure 6-2: MRV system

③ Obtaining project approval

Since providing the history information stored on the IC card is required, it is necessary to obtain the approval of the DOT for the acquisition and utilization of such information. Other than this, no additional approvals are required.

④ Japanese contributions

(i) Concrete examples of Japanese technology and products

(a) Park-and-bus-ride system utilizing the parking lot of a large-scale commercial facility

Although there are numerous park-and-ride systems in Europe and the United States, the system of this project in which the parking lot of a commercial facility is utilized and parking can be used free of charge only for those citizens who have purchased prepaid shopping tickets is a uniquely Japanese system, and is a win-win-win system in which the merits can be enjoyed by the 3 parties of the commercial facility operator, citizens, and government.

In addition, it can provide opportunities for the citizens of Ho Chi Minh to widely purchase Japanese products, so that for Japanese companies it is expected to not only enable them to contribute to the environment but to also create broad connections for cultivating the market.

(b) Transportation Eco Point system

The Transportation Eco Point system is also a uniquely Japanese system, and there are several government-led examples even in Japan. Aeon in particular has established their Green Score System as a private initiative. The expansion of this project will also be according to the above Japan Method, so that not only does the project reduce GHG due to transportation, but it also becomes a PR mechanism for Japanese companies.

(ii) Superiority compared to other Japanese technology and products

Even in Japan, the examples centered on Aeon Group have taken the lead, and an original solution for this consortium is being considered.

(iii) Concrete examples of similar technology and products in other industrialized countries (as references or rivals)

As previously stated, this proposal uses the Japan Method, and there are no examples of overseas expansion.

⑤ Ensuring environmental integrity

Effects of this project other than GHG reduction also include reductions in the various societal costs caused by traffic, such as air pollution, noise, traffic accidents, etc. since motorcycle and car traffic would be reduced. On the other hand, since bus traffic would be increased, it is necessary to increase the environmental performance (reduce exhaust gases such as GHG, SPM, etc.) of buses themselves in order to create an environment for obtaining the maximum effects of this project.

In addition, according to past research by Professor Morikawa, the introduction of a Traffic Eco Point system not only fosters ecological awareness related to the transportation sector but also has been pointed out as leading to increasing citizen awareness regarding the overall environmental sector. This proposed project will contribute to increasing the environmental awareness of citizens of the host country, and is expected to derivatively spread GHG reduction effects, etc.

⑥ Contributions to sustainable development in host country

When the lessons from the past 40 years of transportation policies in Japan are taken into consideration, the detrimental effects that accompany the progress of motorization cannot be handled through only the development of road infrastructure or public transportation infrastructure alone. It is well-known that the development of road infrastructure further induces the demand for car transportation, and even if the public transportation network is further developed, citizens still prefer the higher mobility of cars, resulting in business pressures on public transportation and the abandonment of some routes. According to this professor, in order to avoid repeating these lessons in the host country, it is necessary to introduce the advanced knowledge and efforts of Japan's transportation policies as early as possible. This proposed project is not overly dependent on hard development but is a transportation demand management measure (soft measure), and since it involves activities to change citizen awareness and is a win-win method that utilizes private businesses, sustainability can be expected. The introduction of Japan's advanced knowledge and efforts in this way can also be considered as enabling Japan to support the sustainable development of the host country.

⑦ Future plans and issues

The schedule for realizing this project is as in Table 10 shown previously.

For the realization of this project, Ho Chi Minh DOT and Aeon Group have already indicated their willingness to cooperate and it is thought that there are no particular future obstacles. However, how much parking capacity can be provided by the Aeon store for P&BR is an important issue, and it is planned to meticulously analyze the conditions of store visitors from the aspects of variations by day of the week, time of day, etc. in the future. On the other hand, since the possibility of implementing this project at Aeon Store #2 (which is scheduled to open within 2014) as well is also being considered, the environment for realization will be broadly set and discovery and investigation of numerous stores as potential subjects will be performed.

On the other hand, since as stated before there is a risk that the timing of introduction of IC cards will be around 2019, it is conceivable that in the meantime the P & BR project will be realized in advance alone, and preparations for when IC cards are introduced will be made. Therefore, from next year and onwards, high-fuel-efficiency low-carbon buses will be introduced in advance in Ho Chi Minh, with the aim of achieving CO2 reductions at an early stage due to P & BR at first.

In order to do this, Japan bus manufacturers, etc. will be included in the project consortium, and the possibility of realizing JCM in advance will be studied.

(7) Park and Bus Ride field trial utilizing Aeon Mall

In this project, in order to determine citizen acceptance of the Park and Bus Ride concept, Park and Bus Ride field trial was conducted utilizing Aeon Mall #1 (Tan Phu Celadon Mall).

The results of citizen evaluation of this project obtained from this field trial are described below.

① Overview of field trial

Commuting buses with Aeon Mall #1 (Tan Phu Celadon Mall) as the starting point and Ben Thanh market as the final destination were operated with the collaboration and support of Aeon Mall Vietnam and DOT. (Refer to Table 7-1 for the detailed plan.)

For the bus fare, although normally 50,000 VND (the same fare as actual buses) should have been collected, for the field trial the fare was deliberately set as free for the following reason. The reason was that since there is still no Park and Bus Ride system in Ho Chi Minh, it was thought that first it was necessary to get citizens to experience the bus ride and confirm its effectiveness and acceptability. Therefore, in order to eliminate obstacles to field trial participants, the fare was set as free. However, questionnaire surveys of monitors on the days they rode the bus were conducted on the bus, and in that survey the question of whether they would use the bus if the fare was 50,000 VDN was included in order to check their usage intentions.

Refer to the Appendix for the questionnaire survey.

In this field trial, the participation of 416 people was obtained. (An average of 22 people/day and approximately 11 people per bus)

Table 7-1: Overview of bus operation plan

Aeon ⇔ Ben Thanh Market P & BR bus operation field trial plan	
Operation period	January 28 to February 15, 2015 (19 days)
Operation times	Aeon → Ben Thanh Market: 2 buses; 6:30 departure and 7:30 departure Ben Thanh Market → Aeon: 2 buses: 17:00 departure and 18:00 departure
Monitor recruitment	Monitors were recruited in stores in Aeon Mall #1
Bus fare	Free

Bus used in P & BR

Monitor recruitment scene in Aeon

Boarding/disembarkation scene in Aeon Mall

Scene of riders on bus

Scene of survey of monitor

Figure 7-1: Scenes from field trials

② Questionnaire survey results

Based on the questionnaire results, the following opinions regarding this project (P & BR) were confirmed:

・Virtually all of the monitors considered the P & BR to be a convenient mode of transportation (Question7.1)

・Regarding the good points of P & BR, many monitors cited the benefits of not having to drive oneself, the ability to read a book, etc. while commuting, comfortable commuting on rainy days, and relief from exhaust gases while commuting. In particular, the benefits regarding rainy days and exhaust gases were cited by more than half of the monitors (Question7.2)

・Regarding the bad points of P & BR, many monitors cited the slowness due to buses getting caught in traffic jams. However, even for such opinions, the percentage choosing "Agree strongly" was low, and since on the other hand there were many responses of "Agree strongly" regarding the good points above, the results can be interpreted as showing that the good points outweigh the bad points. (Question7.3)

・Regarding usage intentions if the fare of 50,000 VND was charged, 90% of the monitors responded that they would use it, so usage can be secured even if the fare is charged. (Question8)

・Even regarding use frequency if 50,000 VND was charged, 20% answered every day, 20% answered 3 or 4 times per week, and 32% answered more than once a week, so regular usage can be expected. (Question8)

From the above, it was shown that even regarding the result of the field trial monitor surveys, citizen usage of P & BR can be expected.

For the questionnaire survey in Section 4, a high P & BR usage intention was shown, and since the opinions in this survey are from people who actually tried using P & BR, the credibility of this survey can be expected to be higher than that of the previous questionnaire. Furthermore, since 416 people used the system during the 19 days of the field trial, it can be expected that the system will be able to gain users during actual operation.

Table7-2 : Compiled results of questionnaire survey

Question	Answer 1	Answer 2	Answer 3	Answer 4	Answer 5	Answer 6	Answer 7
Question 1: Why did you decide to participate in this experiment?	58%	10%	8%	18%	4%	6%	
Question 2: Why did you travel by bus today?	16%	8%	66%	6%	2%		
Question 3: How did you get to Aeon today?	6%	2%	84%	2%	4%	0%	0%
Question 4: Please tell us about what you normally do when you go to the destination for today's traveling purpose							
• Question 4.1: What type of transportation do you normally use?	6%	0%	86%	2%	4%	0%	0%
• Question 4.2: Roughly how much time does it normally take?							
• Question 4.3: What type of transportation do you use on rainy days?	2%	2%	84%	6%	0%	0%	0%
• Question 4.4: Why do you normally not use the bus?	2%	4%	0%	4%	2%	2%	2%
Question 5: Do you normally go to Aeon?	6%	10%	30%	12%	14%	18%	32%
Question 6: Did you know about any existing Park and Ride system in HCMC like the one you used this time?	40%	60%					
Question 7: Please tell us about your impression of using the Park & Ride system today.							
• Question 7.1: Do you think Park & Ride is convenient?	40%	58%	0%	0%	0%		
• Question 7.2: Please tell us your impression of possible good points of the Park & Ride.							
→ *Question 7.2.1: Since I wouldn't have to drive, it's carefree.*	54%	32%	14%	0%	0%		
→ *Question 7.2.2: I can read a book, take a nap, or do something else while riding on the bus.*	40%	36%	18%	0%	6%		
→ *Question 7.2.3: On rainy days, I can go without getting wet.*	64%	14%	8%	12%	2%		
→ *Question 7.2.4: I wouldn't need to worry about exhaustive gases and dusts*	82%	14%	4%	0%	0%		
→ *Question 7.2.5: I can go shopping at Aeon on my way home.*	34%	32%	30%	2%	2%		
→ *Question 7.2.6: I wouldn't have to worry about traffic accidents.*	22%	60%	10%	4%	4%		
→ *Question 7.2.7: I could send off someone in my family in the morning and/or pick him/her up in the afternoon.*	32%	32%	36%	0%	0%		
→ *Question 7.2.8: Other*							
• Question 7.3: Please tell us your impression of possible bad points of the Park & Ride							
→ *Question 7.3.1: It's slow because buses get caught in traffic jams*	30%	26%	30%	10%	4%		

→ *Question 7.3.2: Transferring in the Aeon parking lot is inconvenient*	2%	24%	38%	14%	22%		
→ *Question 7.3.3: The environment in the bus is poor.*	2%	24%	38%	14%	22%		
→ *Question 7.3.4: The scheduled operating times are not good.*	6%	32%	30%	10%	22%		
→ *Question 7.3.5: It takes so long time to get to AEON in order to use the system.*	4%	24%	24%	24%	24%		
→ *Question 7.3.6: It takes so long time to go from the final bus stop to the final destination.*	10%	28%	30%	16%	16%		
→ *Question 7.3.7: In term of door-to-door travel time, using the system takes more time than driving a car/motorcycle.*	12%	38%	26%	8%	16%		
→ *Question 7.3.8: Others*							
Question 8: Please tell us about your future intentions of use.							
• Question 8.1: Would you use it if the fare was the same as a normal bus fare (5,000VND)?	50%	32%	18%	0%	0%		
• Question 8.2: For people who responded ① or ② above, how often do you think you would use it?	20%	20%	32%	2%	10%	0%	
• Question 8.3: If the following conditions are added to the bus fare (5,000VND):	16%	36%	38%	6%	4%		
Question 9: Please let us ask some general questions about your way of thinking							
• Question 9.1: What do you think about global warming?	42%	48%	10%				
• Question 9.2: What do you think about traffic jam problems on roads?	46%	46%	8%				
• Question 9.3: Do you think environmental and energy problems due to increased use of cars/ motorcycles are serious?	40%	46%	14%				
• Question 9.4: Do you think people should use cars and motorcycles less to alleviate environmental and energy problems?	48%	44%	4%	4%			
• Question 9.5: Are you limiting your use of your car or motorcycle and using the bus?	34%	44%	22%				

Appendix: Questionnaire sheet for field trial monitors

Questionnaire survey to P&BR users

Question 1: Why did you decide to participate in this experiment? (Multiple answers are acceptable.)
① Bus is free. ② I thought I might want to commute by bus. ③ To go to Aeon on way home.
④ I'm interested in Park & Bus Ride system ⑤ No particular reason
⑥ Other ( )

Question 2: Why did you travel by bus today?
① Commuting to work ② Work purpose other than commuting ③ Recreation/shopping
④ No particular purpose ⑤ Other （ ）

Question 3: How did you get to Aeon today?
① Motorcycle ② Car ③ Bus ④ Bicycle ⑤ Passenger on family member's/friend's motorcycle
⑥ Passenger in family member's/friend's car ⑦ Other（ ）

Question 3: Please tell us about what you normally do when you come to today's destination for today's traveling purpose.
(1) What type of transportation do you normally use?
①Motorcycle ②Car ③Bus ④Bicycle ⑤Passenger on family member's/friend's motorcycle ⑥Passenger in family member's/friend's car
⑦ Other（ ）

(2) Roughly how much time does it normally take?
It takes about（ ）minutes.

(3) What type of transportation do you use on rainy days?
①Motorcycle ②Car ③Bus ④Bicycle ⑤Passenger on family member's/friend's motorcycle
⑥Passenger in family member's/friend's car ⑦ Other（ ）

(4) For people who answered other than "③Bus" for their normal type of transportation in (1) above.
Why do you normally not use the bus? (Multiple answers are acceptable.)
① I use a motorcycle/car for work, so I can't commute by bus.
② Buses takes a lot of time in traffic jams. ③ Bus fare is high.
④ When waiting for a bus, it takes a long time to arrive. ⑤ Buses don't have AC so it's hot.
⑥ It's crowded and uncomfortable in the bus. ⑦ Bus drivers have bad attitudes.
⑧ I'm scared because it's not safe on a bus.
⑨ Riding a bus isn't comfortable. (Specifically: ）
⑩ Other（ ）

Question 4: Do you normally come to Aeon?
① I come almost every day. ② I come 2 or 3 times per week.③ I come once a week.
④ I come 2 or 3 times per month. ⑤ I come once or less a month. ⑥ I almost never come.
⑦ I've never come here before.

Question 5: Did you know about the Park & Ride system you used this time?
① Yes, I knew about it. ② No, I didn't know about it.

Question 6: Please tell us about your impression of using the Park & Ride system today.

(1) Do you think Park & Ride is convenient? (5-level scale)
Very much – Somewhat – Neutral – Not really – Not at all

(2) Please tell us your impression of the possible good points of Park & Ride.
① Since I wouldn't have to drive, it's carefree. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

② I can read a book, take a nap, or do something else. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

③ On rainy days, I can go without getting rained on. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

④ I wouldn't need to worry about exhaust gases. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

⑤ I can go to Aeon on the way home. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

⑥ I wouldn't have to worry about traffic accidents. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

⑦ Other（ ）

(3) Please tell us your impression of the possible bad points of Park & Ride. (Multiple answers are acceptable.)
① It's slow because buses get caught in traffic jams. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

② Transferring in the Aeon parking lot is inconvenient. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

③ The environment in the bus is poor. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

④ The scheduled operating times are not good. (5-level scale)
Agree strongly – Agree somewhat – Neutral – Disagree somewhat – Disagree strongly

⑤ Other（ ）

Question 7: Please tell us about your future intentions of use.
(1) Would you use it if the fare was the same as a normal bus fare (5,000VND)?
① I would definitely use it. ② I would probably use it. ③ I'm not sure.
④ I probably wouldn't use it. ⑤ I definitely wouldn't use it.

(2) For people who responded ① or ② above, how often do you think you would use it?
① Almost every day. ② 3 or 4 times per week. ③ 1 or 2 times per week.
④ On special days such as rainy days. (Specifically: ）
⑤ Less frequently. ⑥ Other（ ）

(3) If the following conditions are added to the bus fare (5,000VND):
In order to use the Aeon parking lot, you would need to purchase 100,000VND in Aeon shopping coupons in advance. However, since you could use the coupons later for shopping at Aeon, there is absolutely no loss to you. Do you think you would use the Park & Ride in the future?
① I would definitely use it. ② I would probably use it. ③ I'm not sure.
④ I probably wouldn't use it. ⑤ I definitely wouldn't use it.

Question 8: Please let us ask some general questions about your way of thinking. All questions are on a 5-level scale.

(1) What do you think about global warming?

① Very concerned ② Concerned ③ Neutral ④Not concerned much ⑤ Not concerned at all

(2) What do you think about traffic jam problems on roads?

① Very concerned ② Concerned ③ Neutral ④Not concerned much ⑤ Not concerned at all

(3) Do you think environmental and energy problems due to cars and motorcycles are serious?

① Very serious ② Somewhat serious ③ Neutral ④Not very serious ⑤ Not serious at all

(4) Do you think people should use cars and motorcycles less to alleviate environmental and energy problems?

① Strongly agree. ② Somewhat agree. ③Neutral ④Somewhat disagree ⑤Strongly disagree

(5) Are you limiting your use of your car or motorcycle and using the bus?

① Trying hard to do so. ② Trying to do so. ③Neutral ④Not trying much to do so.
⑤ Not trying to do so at all.

4. Promotion of the city-to-city cooperation and the public-private cooperation

Under the coordination between Ho Chi Minh City and Osaka City, through the support in planning the Climate Change Action Plan of Ho Chi Minh City, as we come to know the necessary elements needed in the realization of a low-carbon Ho Chi Minh City and in sustainable development efforts, we have promoted the framework of a detailed JCM project together with the promotion of information, know-how, technology and system transfer developed, managed and owned by Osaka City. As an objective to develop JCM Project, we encourage information sharing with the business operators from the private sector that are interested in the implementation of the JCM Project in Ho Chi Minh City ([5.1 Orientation Session at Ho Chi Minh on JCM and the Its Operations (July 2014)]. At the [Team Osaka Symposium] ([7.2 Presentations and Attendance of Domestic Meetings Held Before the Launch of Workshops at Targeted Locations]) under this operations, we also facilitated business operators from the public sector and coordinate the support from the public sector in regard to the implementation of this project.

5. Launching of Symposiums

5.1 Orientation Session at Ho Chi Minh on JCM and the Project (July 2014)

This orientation session was launched in July 2014 for Japanese companies that are set up in Vietnam and local Vietnamese companies with the aim to discover new initiatives for JCM operations and to introduce the system (that includes support systems related to fund-raising) and the operations.

During the session, there were about 14 participants from the public sector and a debriefing and a dialogue was held in regard to the operations support system by MOE that utilizes JCM (bilateral credit system), the support by Osaka City for the realization of a low-carbon city and the Japanese government framework.

[Date and Time] 9th July (Thursday) 2014 1:30 p.m. – 5:00 p.m.

[Venue] JETRO Ho Chi Minh Office Meeting Room

[Attendees] Osaka City, Shimizu Corporation, Nikken Sekkei Research Institute, Ogawa Electrical, National Institute for Environmental Studies, Chuo Fukken Consultants, GEC

[Participants] 14

[Outline]
・ A dialogue was held among Osaka City, GEC and business operators in Vietnam in regard to issues that involve operations in Ho Chi Minh City along with presentations on case studies on JCM project candidate initiatives by GEC bilateral credit system (JCM), Shimizu Corporation, Nikken Sekkei Research Institute and Ogawa Electrical.
・ Opinions on awareness creation on environmental issues, the necessity of administrative infrastructure and development of laws and regulations and environmental education from a young age were presented.

[Agenda]

・ In regard to the introduction of a “Parking Lot Guide System” that uses a vehicle’s GPS to check the availability of empty parking lots, its feasibility was considered. However, the number of parking lots is low and the fee charged is uniform, hence such a guide system is not necessary.
・ The Department of Transport manages the parking lots. In private owned lands, the owner decides on the parking fee but the people here do not manage it from a profit-making perspective.
・ We have head that it was a Japanese enterprise that started the concept of a multi-story parking lot.
・ In regard to the road pricing of motorbikes, we are reviewing the administrative issues. However motorbike users are many and because we would expect retaliation from the people, the measures cannot be implemented. It is considered a taboo to create limitations on

motorbikes.

- Insufficient infrastructure (electricity, water and sewage systems) is crippling the operations greatly.
- It is necessary to conduct primary treatment by placing a septic tank under buildings as there is insufficient discharge treatment facilities in HCMC.
- It is necessary for the government to understand the link between infrastructure development and tax collection increase.
- By implementing measures intensively in a narrow space, it would serve to provide successful cases in HCMC.
- For example, we can consider carrying out frameworks for rain water discharge and sewage water treatment separately and restricting it to smaller regions.
- We would like to expand the use of energy-saving technology to more buildings but because subsidies are scarce, it may be difficult to do so.
- There is a necessity in implementing projects that utilizes HCMC’s features. For example, HCMC is humid for 11 months in a year. Hence, it is important to include a highly efficient dehumidifying feature in the air-conditioning facilities.
- In regard to the environment, it is important to start educating the people from young. Vietnamese are willing to invest in their children’s future.
- For example, in Japan, excursions are organized to teach children about social infrastructure like sewage treatment plants. In Vietnam, there are parents that willingly tell their children to throw garbage onto the roads.
- In Vietnam, visualization on the value behind the introduction of energy-saving technology is important.
- For example, when a fluorescent lamp or any lighting equipment is broken, we would repair it on our own. However, there is no awareness in increasing the value of a building by changing a broken light to LED.
- In Thailand, there are enterprises that make it an effort to purchase recycled products and are highly passionate about environmental education. Hence, if households would start separating their garbage, this would make collection an easier task and consumers will be able to purchase higher quality recycled products.

5.2 JCM Joint Symposium With Osaka’s and Ho Chi Minh City (January 2015)

(1) Outline

In regard to the climate change measures in Ho Chi Minh City, in relation to the promotion of transferring information, know-how, technology and system owned by Osaka city and the private sector, and for the purpose of presenting a brief on the implementation situation of JCM Project and the progress in planning the Climate Change Action Plan, the [Ho Chi Minh City and Osaka City International Symposium for Developing Low Carbon City] was held in Ho Chi Minh City on

16th January 2015 (Friday).

In this symposium, from the Japan side, Mr. Tanaka (Vice mayor of Osaka City Government), Mr. Takano (Director for Environmental Policy, Environment Bureau of Osaka City) and 30 relevant parties participated. From the Vietnam side, There were about 70 participants including Mr. Ha who is Vice Minister of Ministry of Natural Resources and Environment Vietnam, Vice Chairman Cang of Ho Chi Minh City People's Committee, Mr. Kiet who is Director of Ho Chi Minh City Department of Natural Resources and Environment, and related departments and agencies in Ho Chi Minh City (Department of Industry and Trade, Department of Planninh and Architecture, Department of Transport, Department of Science and Technology etc.) and news media representatives, making the total number of participants to about 100.

In the beginning of the symposium, Mr. Cang (Vice Chairman of of Ho Chi Minh City People's Committee), Osaka City's Vice mayor, Mr. Tanaka and Mr. Ha Vice Minister of Ministry of Natural Resources and Environment Vietnam presented an opening remarks. An introduction by Mr. Kiet (Director of Ho Chi Minh City Department of Natural Resources and Environment) on the current (2013 – 2015) progress in the Ho Chi Minh City Climate Change Action Plan and the project developments followed. Mr.Chau who is Vice Manager of Ho Chi Minh City's Climate change Bureau presented on the outline of Ho Chi Minh City Climate Change Action Plan for the next term (2016 – 2020) and its future plans including the support given by Osaka City this year. After the mentioned presentations, Mr. Takano (Director for Environmental Policy, Environment Bureau of Osaka City) spoke on the measures and policies, plans and projects in detail that aimed to develop a low-carbon Ho Chi Minh City based on the experiences in Osaka City. With these presentations, the progress of specific efforts toward realizing a low-carbon Ho Chi Minh City was shared. Moreover, Ho Chi Minh City also benefited from the administrative perspective with the knowledge and information by Osaka City, by posing questions to the panel especially in regard to pressing issues like countermeasures against water exposure, floods and the construction of an underground railway that is associated with the construction of an underground city.

Later, each participating business operator was given the opportunity to present the JCM Model Project, successful case studies, initiatives behind the JCM Project Feasibility Study, and to also provide updates on the framework's consistent developments in the detailed implementation of the projects and the continuous cooperation by both cities in the future in line with the plans for 2015 for Ho Chi Minh City Climate Change Action Plan 2016 – 2020.

(2) Program

[Date and Time] 16th January 2015 (Friday) 8:30 a.m. – 3:00 p.m.

[Venue] Grand Indochine Ballroom, New World Saigon Hotel, Ho Chi Minh City, Socialist Republic of Vietnam

[Attendees]

Japan Side: Osaka City, Shimizu Corporation, Nikken Sekkei Research Institute, Institute for Global Environmental Strategies, Chuo Fukken Consultants, Hitachi Zosen

Corporation, K.K. Satisfactory International, Nittsu Research Institute and Consulting, KPMG AZSA LLC., Kobelco Eco-Solutions Vietnam, New Energy and Industrial Technology Development Organization, Urban Infrastructure Technology Center Foundation, Panasonic, Mitsubishi UFJ Morgan Stanley, Shiny Vietnam Joint Stock Company, GEC, Total of 30 participants

Vietnam side: Ministry of Natural Resources and Environment (MONRE), Ho Chi Minh City People's Committee, Ho Chi Minh City Department of Natural Resources Environment, Ministry of Industry and Trade, Department of Architecture and Construction Planning, Ministry of Transport, Health Service Bureau, Department of Construction Management, Department of Scientific Policies, Total of 70 participants

[Program]

[Morning Session]	
8:30 – 9:00	Opening remarks - Mr. Tat Thanh Cang, Vice Chairman of Ho Chi Minh City People's Committee - Mr. Seigo Tanaka, Vice Mayor of Osaka City - Mr. Tran Hong Ha, Vice Minister of MONRE
9:00 – 9:15	The Implementation of Ho Chi Minh City Climate Change Action Plan in the period 2013-2015 - Mr. Dao Anh Kiet, Director of Ho Chi Minh City, Department of Natural Resources and Environment
9:15 - 9:35	HCMC Climate Change Action Plan 2016-2020 towards Forming a Low-Carbon City - Mr. Ha Minh Chau, Vice Manger of Ho Chi Minh City's Climate Change Bureau
9:35 – 9:50	Osaka City's Support of HCMC Low Carbon City Development - Mr. Shuichi Takano, Director for Environmental Policy of Osaka City
9:50 – 10:00	Policy Dialogues and Discussions
10:00 - 10:40	Photo Session and Coffee Break
10:40 – 11:40	Progress of Projects - JCM Model Project "Market waste methane digestion and biogas usage" (by Hitachi Zosen (Hitz)) - JCM Project Planning Study on "Energy-from-waste" (by Hitz) - JCM Model Project "Eco-drive with digital tachographs" (by Nippon Express Research Institute) - JCM Demonstration Projects "Energy efficiency improvement at hospital and hotel" (by New Energy and Industrial Technology Development Organization (NEDO))
[Afternoon Session]	
13:30 – 14:15	Progress of Projects: - JCM FS on "Energy efficiency improvement at buildings" (by Shimizu Corporation) - JCM FS on "Park & Bus ride" (by Nikken Sekkei Research Institute) - JCM FS on "biogas generation system" (by Hitz)
14:15 – 15:00	Progress Report on the development of HCMC CCAP 2016-2020: Examination of GHG Inventory

	- Ms. Le Nguyen Que Huong, Ho Chi Minh City Climate Change Bureau
15:00	Closing address - Mr. Kazuhiro Oishi, Managing Director of Global Environment Centre Foundation

(3) Agenda

○ MONRE

・ In Japan the countermeasures against floods are comprehensive. In Ho Chi Minh City, such countermeasures are just as important and hence we would like to learn more from Osaka City in regard to them.

・ In regard to the construction of an underground city, we believe that there would be differences in the nature of the soil between Ho Chi Minh City and Osaka City and would like to be advised upon that.

○ Osaka City

・ The flood patterns that occur in Osaka City mainly involve the overspill of water from the rivers. Countermeasures against river flooding in Osaka City have had a long history. Recently, the countermeasures against floods involve processing the water as drainage water. However, in the event that a concentrated downpour occurs in a short period of time, the drainage system cannot cope and this will cause floods to happen in the city. As an adaptive measure, we would need to improve our drainage system but at the same time, we call for the people to understand and accept its limitations too.

・ There are also water damages from the sea and high tides due to typhoons. Besides strengthening the revetment, we also promote an evacuation measure in the event the water damage exceeds the set limit.

・ In regard to water damage caused by earthquakes, there is the pressing issue on countermeasures against tidal waves, ground liquefaction at some areas and making coastal levees earthquake-resistant.

・ Efforts on strengthening countermeasures against water damages caused by earthquakes like tidal waves in a must for underground cities, and this is a unique issue for big cities in their countermeasures against floods. A concrete example would be the efforts in improving the waterproof facilities that prevent floods and evacuation measures.

○ Ho Chi Minh City People's Committee

・ There are various constructions projects to manage and certain requirements to meet. Regional administrative bodies often face a variety of management issues. How is it possible to adopt and use IT technology in managing an underground city? In addition, we hope to get some ideas on how management can be carried out in an administrative perspective. For example, we would like to be advised upon the formulation of a management plan, commercial goals for an underground city, administrative operations on non-commercial goals, technique for the management of construction above and below ground, expansion of an underground city and management plans on maintenance.

○ Osaka City

・ In relation to Osaka City's underground city, we aim to ease of traffic stress by securing the safety of pedestrians and providing pedestrian crossings and we start off by building underground infrastructures that allow pedestrians to move easily underground. However, there is the issue of safety and hygiene when it comes to underground roads. Hence, to develop a comfortable underground city, provide safety, reassure consumers, we invest in building stores underground and through this too we are able to maintain the underground city from the profit gained in building the stores.

・ The issue is on the countermeasure against disasters in an underground city. Based on past experiences in Osaka City, the standards on disaster prevention in an underground city have been greatly enhanced. Specifically, the management and operations that use IT technology for disaster prevention centers, creative ways in minimizing damages through fire prevention facilities like fireproof shutters.

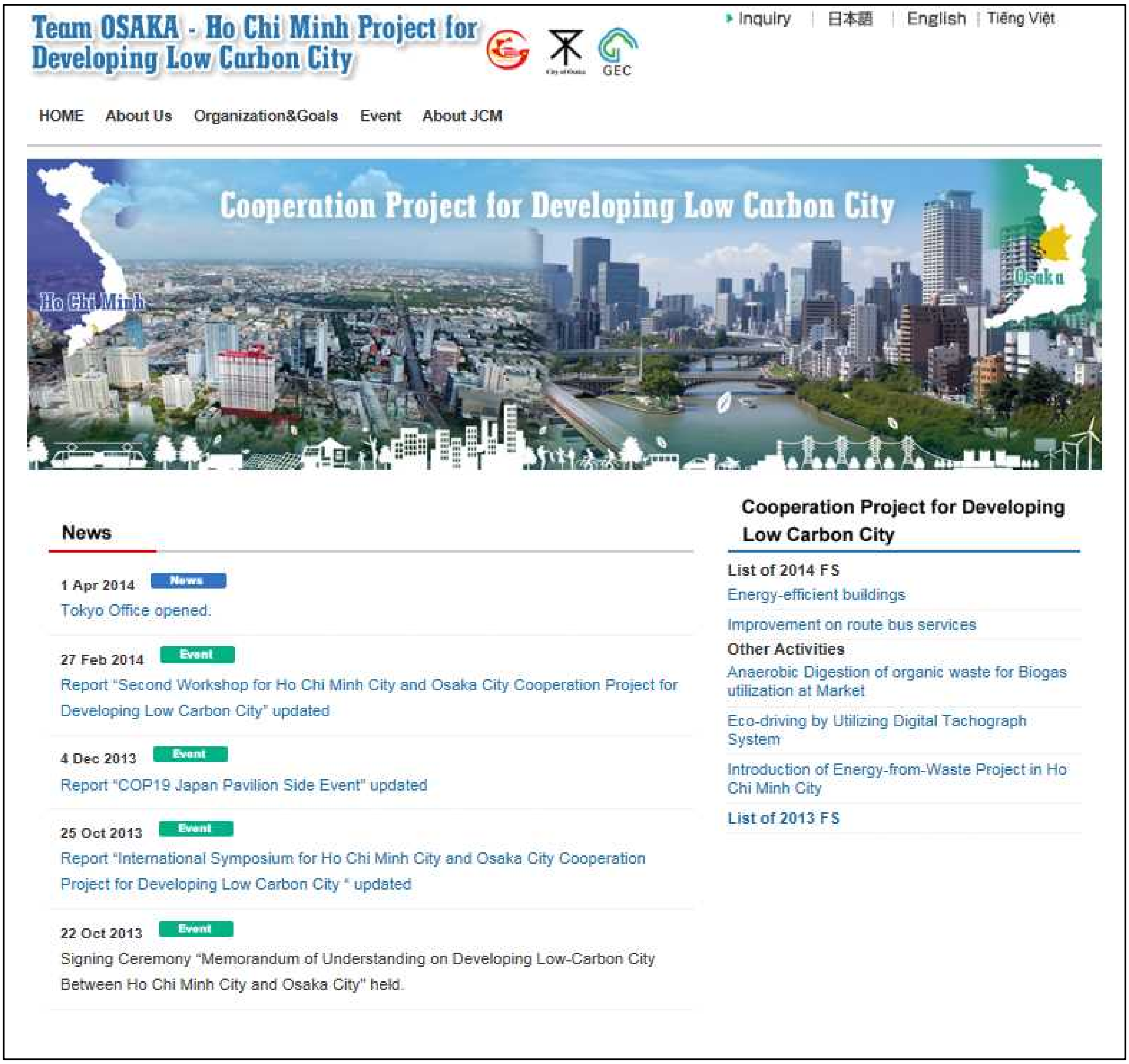
・ In addition, there is the pressing issue on sustainable management of an underground city. In Japan, we adopt the stock management method that reduces the lifecycle cost and plan the effective use and extension of a construction's lifespan based on a diagnose on its features and a forecast on its degradation.

6. Public Relations Activities

6.1 Website

Sharing of information in regard to the contents of this study is done through the following website.

([URL] http://gec.jp/citycoop/osaka-hcm-lcc/index.html)



Top page of the Homepage

6.2 Orientation Session for the Industry (November 2014)

The Orientation Session for the Industry that introduces the objectives and the contents of the activities of [Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City] and with the aim of inviting new participants from the private sector in the efforts of creating low-carbon cities, was held on 6th November 2014 (Thursday).

On that day, 45 participants from various private enterprises attended the session. There were dialogues and presentations on support systems for MOE, NEDO and JICA's projects that utilize JCM (a bilateral credit system) and the framework of the Japanese government including the support from Osaka City in view of the efforts in creating a low-carbon city.

[Date and Time] 6th November 2014 (Thursday) 2:30 p.m. – 5:00 p.m.

[Venue] Kansai Economic Federation Meeting Room

[Attendees] Osaka City, New Energy and Industrial Technology Development Organization (NEDO), Japan International Cooperation Agency (JICA) Kansai International Center, Kansai Economic Federation, Global Environment Centre Foundation GEC

[Participants] 45

[Outline]・ There were presentations on support policies (that include economic assistance from the Japanese government) in regard to the implementation and the content of the projects that aim to build a sustainable collaboration in promoting project developments and the expansion of private enterprises while discovering new projects for the next term that utilize the JCM scheme and are adaptive to the local needs. These presentations are meant to help more enterprises and organizations understand our operations better.

[Agenda]

・ We would like to understand the weight behind the responsibilities of Ho Chi Minh City Climate Change Bureau. We have been entrusted by MOE with the study on creating and discovering initiatives for JCM projects in Vietnam, and through discussions with business operators in regard to the implementation of JCM in Ho Chi Minh City, we were told that beside a JCM approval, an approval from Ho Chi Minh City is also required. However, the process of obtaining such an approval is not transparent and since there is no source of information on that, we would like to be advised upon this issue.

-> HCMC Climate Change Steering Board does not exist within the Ho Chi Minh City's organization. It comprises of the governing bodies from each department and is a body that summarizes each department in a cross-sectional manner. The Climate Change Bureau that acts as a secretariat is established within the Department of Natural Resources and Environment. In this project, the Climate Change Bureau (HCCB) takes up the responsibility of summarizing and running detailed projects and planning climate change action plans. In the event that a detailed project is carried out, the bureau will directly contact departments and agencies that are related to the field and obtain the final approval from the HCMC People's Committee.

-> Even if headquarter or branch is not located in the Kansai region, we are able to provide the necessary management from our representatives in Kansai. We would definitely like to contact the person in-charge once if it is possible.

- Questions should be posed to those who have had the experience of commercialization in Vietnam. We would also like to hear about some problematic issues that have occurred.
- In comparison to the cooperation between Kobe City and Vietnam, under the cooperation between Kien Gang province and the cities, large-scale JCM initiative studies are carried out but since the cooperation is not established formally with the public sector, there are some difficulties in promoting the projects. Specifically, there were plans to build a garbage incinerator as at the current stage, local business operators are collecting the garbage and conducting open burnings. However, not much could be achieved, even if the project were to be introduced to a public agency. We also expect the issue where not much can be utilized effectively locally even if Kobe City were to provide the know-how on garbage incineration. For Ho Chi Minh City, how is Osaka going to follow up on Hitachi Zosen Corporation's plans for a garbage incinerator?

  -> Hitachi Zosen Corporation is developing a power generator that uses the garbage from the city and organic garbage from the markets, but we are faced with the following issues on the sorting and collection of the garbage. Hitachi Zosen Corporation and related parties are currently reviewing on how Osaka City can provide the know-how in relation to the sorting and collection of garbage.
- Are the projects only limited to Ho Chi Minh City? Or do they include neighboring provinces and regions?

  -> This project is an administrative framework between Osaka City and Ho Chi Minh City and to conduct administrative talks with other cities, provinces and regions would be difficult.
- In the event that we are reviewing specific projects, would it be possible to be introduced to other counterparts?

  -> From an administrative perspective, it would be difficult to introduce SPC like local organizations. However, as we have contacts in Ho Chi Minh's department and agencies, we might be able to make use of that and consult with them.

  -> As a secretariat, when Japanese business operators are reviewing the project, it is possible to provide consultation support and information collection on business operators.
- In regard to reviewing a development of financing programme for JCM Projects by MOE, we would like to learn more about the review on JCM methodology and hurdles in the construction of the MRV system.

  -> To implement a financing programme, an international consortium is necessary. At the least, it is necessary to build the system that implements the project in the event that the representative of the business operator is required to return the subsidies for when damages or disposals occur due to the condition where an infrastructure, which happens to be eligible for subsidies do not meet the subsidies requirements. In addition, in the current subsidized projects, we are required to report on the reduction in emission to MOE by the end of 2020. For that, it is necessary to build a monitoring system. The JCM methodology defines the monitoring items needed to provide a quantitative assessment on the reduction amount. We would have to build the monitoring system in implementing the project. To apply for subsidies with MOE at the current moment, there is no necessity in getting the JCM methodology approved but when the JCM methodology is being screened, the calculation method for the reduction in emission has to meet the screening requirements. The eligibility for subsidies ultimately lies in the introduction of the infrastructure. We will provide the necessary support for entrusted projects and in the development efforts on applicable JCM methodology for subsidized projects within MOE.

7. Cooperation in Related Operations

7.1 Reports and Presentations on Domestic Progress Debriefing Sessions

(1) Interim Report Meeting (September 2014)

On 10th September 2014, at MOE, we attended an interim report meeting to provide the necessary updates.

The agenda for the interim report meeting is as follows.

- In regard to the introduction of energy-saving measures (by Shimizu Corporation) and to the questions on the selection of the target buildings, one of the target buildings is a commercial building in which, Shimizu Corporation played a part in its construction and this year marks its infrastructure renewal time too. From the information obtained, there are 200 candidate buildings and if the introduction is carried out for half of that amount, we can consider this as a large-scale development. In respond to the opinion that the subsidies would be insufficient for a 100-building project, the target buildings are symbolic landmarks in Ho Chi Minh City and if we can show concrete proof on the positive effect of energy-saving (like a reduction in energy cost), we can expect the support from the private sector in expanding this project.
- In respond to the suggestion of carrying out a survey in understanding the public's opinions on the Park and Bus Ride System (P&BR) (Nikken Sekkei Research Institute), a survey has been carried out last year and the results show that 40% of the survey participants are ready to change to the new system. To further confirm the results, we plan to carry out trail runs.
- In addition, in respond to the financing programme for JCM projects by MOE on P&BR, on whether we will consider applying for it, we will deliberate with the same companies in the event that there is a 2nd open recruitment.
- In addition, in respond to a server system that is eligible as the financing programme for JCM projects for P&BR, we are unable to provide a clear explanation as to what makes an eligible subsidized infrastructure but we hope to be given the opportunity to further discuss this matter with suggestions from MOE and guidance from Nikken Sekkei Research Institute.

(2) Final Report Meeting (January 2015)

On 10th January 2015, we attended a final debriefing session with MOE to deliver our reports.

The agenda of the final debriefing session is as follows.

① Operations

- In regard to the planning of Ho Chi Minh City Climate Change Action Plan, the plan's test runs have been carried out concurrently and we shall proceed in reviewing and building a list for the project and detailed measures and policies to be included in the plan.
- Ho Chi Minh City aims to obtain the approval for the action plan from the Communist Party of Vietnam in December of this year of January, next year. We also aim to come up with Ho Chi Minh City development plans by September of this year.
- In conjunction with the planning of the action plan, MOE has requested for the

implementation of operations that make use of JCM in regard to the measures and policies and project that have been specially listed up along with the support given to PDCA after the action plan has been drawn up. MOE also has requested that we should aim to implement 2 – 3 issues in the FS study in 2015.

・ For Osaka City, to make use of the experience in Ho Chi Minh City, MOE has requested that developments in other cities to also be reviewed. Osaka City responded by stating that first they while concentrating in making the projects in Ho Chi Minh City a success and in the future, would like to review the future developments in other cities.

② FS Study [Introduction of Building Energy Saving Technologies (Shimizu Corporation)]

・ In regard to this study, MOE has the following requests.

・ This project is recognized as a pilot project in Ho Chi Minh City, and in the new future, even if it fails to obtain subsidies, we are dedicated in creating a framework for its horizontal expansion within Ho Chi Minh City. Especially, we will work towards approaching the administrators in regard to the possibility of introducing a government based economic assistance system or a Vietnam ESCO project.

・ In the current project plans, the occurrence of CO2 credit starts from 2017 and since time is needed until the credit takes into effect, in order to get it off to an early start, we will have to effectively proceed in the discussions with building owners and related organizations. Especially, in Vietnam, when a project consumes too much money and time, it is common for the project to abandoned halfway. Hence, it is important to proceed quickly.

-> We have obtained the consent from the owners in Vietnam about the project promotion and we are currently waiting for the consent from the headquarter in Hong Kong. We will continue negotiations in order to keep the project moving. (Shimizu Corporation)

・ In regard to this study, MOE had the following questions.

・ What are the reasons behind selecting the mentioned buildings?

-> These are standard buildings from a selection of buildings built by Shimizu Corporation in the past. 20 years have passed since its completion and now marks the time to renew their infrastructure. Even without the JCM project, it is necessary to renew the infrastructure. (Shimizu Corporation)

・ What is the current situation on fund accumulation on the Vietnam side?

-> In regard to fund plans, we are deliberating with the owners and we are currently waiting for the consent from the headquarter in Hong Kong. (Shimizu Corporation)

・ In this FS Study, from the implemented study, were you able to collect data that can be used in the future too?

-> Different requirements would exist for each building but air circulation requirements or indoor air quality for a building and other data that can be used in the future has been collected. Especially, we have confirmed the effectiveness of an absorption installation that is installed indoors to improve air circulation through the data that shows the relation between the increase in concentration of CO_2 in air circulation with the increase in concentration of CO_2 indoors. (Shimizu Corporation)

③ FS Study [Promoting Shift to Bus Transportation Through the Use of Mall-Linked Park-and-Ride and Eco-Point Systems]

・ This project would require the introduction of IC cards but such introduction is expected to be held in Ho Chi Minh City in 2019. Hence, to implement the project next year would be difficult.

・ Currently, since there are no bus routes from the target commercial facilities to the city center, proposals to Ho Chi Minh City's Department of Transport (DOT) on the establishments of new bus routes, have been made. However, at the same time, DOT has requested for the infrastructure of parking bays for buses while taking note of the lack of bus route issue.

・ Based on the developments at AEON's 2nd store, Takashimaya's outlet and Tokyu Real Estate Agency, with the BRT and Park and Bus Ride System, maintenance of the project is possible and we believe this proves that the project will also be highly effective and meaningful in Ho Chi Minh City.

・ The introduction of the IC card will only be implemented in 2019 and until then, we shall concentrate on other projects and proceed with the introduction of low-pollution buses.

・ In regard to this study, MOE had the following questions.

・ Is it not possible to use the parking lots at AEON as bus parking bays?

-> AEON's parking lots are comparatively congested on a daily basis and to use it as a bus parking bay would be difficult.（NSRI）

・ What do you think about bus fare charges?

-> We expect to apply the same charges for all bus routes.(NSRI)

・ What do you think about the user's data management?

-> There is a need to share data between public and private sectors. Since there will be an issue for both parties to mutually access each other's servers, there will be plans to set up a third party server and to manage the data from there. (NSRI)

7.2 Presentations and Attendance of Domestic Meetings Held Before the Launch of Workshops at Targeted Locations

In regard to the content of operations, enforcement policies and schedules, in order to share information and exchange opinions, a meeting was held between MOE, National Institute for Environmental Science (NIES), Team Osaka and the related parties.

[Date] 8th May 2014 (Thursday)

[Attendees] MOE, Osaka City, National Institute for Environmental Science, Kyoto University, Shimizu Corporation, Nikken Sekkei Research Institute, Institute for Global Environmental Strategies, Chuo Fukken Consultants, Kobelco Eco-Solutions Co. Ltd., K.K. Satisfactory International, Hitachi Zosen Corporation, Ogawa Electrical, Japanese Conference on Overseas Development of Eco-Cities (J-Code), Daikin, Mizuho Information and Research Institute, Global Environment Centre Foundation

[Agenda]

- There was an explanation in regard to the overall outline on [FY2014 Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City] by MOE and new funds from this year for the dissemination of low-carbon technologies and trust funds from Asian Development Bank. In addition, there was an introduction in regard to the informational website and network that supports the Leapfrog development projects in Asia.
- GEC presented the main points of this meeting that included the overall outline of this research operations and the schedule. There was also an explanation in regard to the information transmission that collaborates with the use and platforms of the subsidies and funds that were introduced by MOE. GEC also stated that they would proceed in updating information on the GEC homepage that was set up last year.
- Shimizu Corporation presented in regard to [Introduction of Building Energy Saving Technologies] under the JCM Feasibility Study (FS). The building under consideration for this study is the Sanwa Building (the building right below the viewing deck).
- Nikken Sekkei Research Institute presented in regard to this year's JCM FS Project on the [Promoting Shift to Bus Transportation Through the Use of Mall-Linked Park-and-Ride and Eco-Point Systems].
- The members of Team Osaka Consortium that comprise of Hitachi Zosen Corporation and K.K. Satisfactory International gave an introduction on candidates for the JCM Project.
- NIES, who cooperates for the support in planning Ho Chi Minh City Climate Change Action Plan under this study, presented in regard to the use of Asia Pacific Integrated Model (AIM).
- The observers from Team Osaka (J-Code, Kobelco Eco-Solutions Co. Ltd., Ogawa Electrical and Daikin) presented information related to each of their objectives in participation and the condition of the operation candidates.

7.3 Presentations at Meetings Designated by MOE

(1) JCM Workshop (October 2014)

On 29th October 2014, we attended the JCM Workshop in Yokohama City that was hosted by MOE (and co-hosted by IGES) and presented our operations from the Osaka side along with a display poster.

Display Poster

(2) COP20 Side Event (December 2014)

The 20th Session of the Conference of the Parties (COP20) to the United Nations Framework Convention on Climate Change (UNFCC) that was launched in Peru, Lima (1st – 12th December 2014) has a side event that was held on the 2nd day (2nd (Tuesday) December) at the Japan Pavilion with the cooperation from MOE, Ministry of Natural Resources Environment (MONRE, Vietnam).

The results of the opening are as follows.

- Title: City-wide Mitigation Project Development in HCMC, Vietnam and Vientiane, Lao PDR Utilizing the Joint Crediting Mechanism (JCM)
- Date & Time: December 2, 2014 (13:00-14:30)
- Organizer(s): Global Environment Centre Foundation (GEC)

■ Outline

This side event presented the JCM recent development and the city-wide mitigation project development under the JCM (Joint Crediting Mechanism), by showing programmes of city-to-city cooperation (cooperation between Ho Chi Minh City (HCMC) (Vietnam) and Osaka City (Japan), and cooperation between Vientiane Capital (Lao PDR) and Kyoto City (Japan)). For these programme, host country representatives presented their perspectives and expectations.

■ Agenda and speakers

- Opening Address (by Mr. Nobuhiro Kino, Director, International Cooperation Office, Ministry of the Environment, Japan (MOEJ))
- Presentation: Overview and Progress of the JCM (by Mr. Kino, MOEJ)
- Presentation: Showcases of MOEJ's Project to Support the Large-Scale Formation of JCM Programs to Realize Low-Carbon Societies in Viet Nam and Lao PDR (by Mr. Tomoya Motoda, Deputy Director, International Cooperation Division, Global Environment Centre Foundation (GEC))
- Presentation: Vietnamese Perspective on JCM and its Upscaling (by Mr. Le Ngoc Tuan, Department of Meteorology, Hydrology and Climate Change, Ministry of Natural Resources and Environment (MONRE), Viet Nam)
- Presentation: JCM Project Introduction on Solid Waste Management in Ho Chi Minh City (by Mr. Taiyo Miyagi, Manager, Global Business Promotion Department, Business Planning Headquarters, Hitachi Zosen Corporation (Hitz))
- Presentation: Lao Perspective on JCM and its Implementation (by Mr. Syamphone Sengchandala, Department of Disaster Management and Climate Change, Ministry of Natural Resources and Environment (MONRE), Lao PDR)
- Q&A (Moderated by Mr. Tomoya Motoda, GEC)

■ Summary

- Mr. Kino, MOEJ, introduced the overview of the JCM and the MOEJ's activities for the development, implementation and upscaling of JCM projects, and expressed their expectation to further promotion and spread of JCM projects.
- Mr. Motoda, GEC, presented the cases of city-to-city cooperation programmes for the large-scale JCM project development: (i) Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City, and (ii) JCM Feasibility Studies of GHG Mitigation Projects contributing to Low Carbon Historic City based on City-to-City Cooperation between Vientiane and Kyoto. Then he introduced the concrete JCM projects which were to be implemented and whose feasibilities were studied under these programmes. He stressed that the implementation of low-carbon projects in cities were effective due to more GHG emissions from a variety of emission sources based on many economic/industrial activities, and that the city-wide diffusion of JCM projects (in a packaged way) was important through the municipal government (city-to-city) cooperation.
- Mr. Tuan, Vietnamese MONER, presented their perspectives on JCM, including pros and cons of JCM in Viet Nam. He expressed the expectation on low-carbon project implementation and technology transfer promotion through the JCM, and on financial and technological supports provided from Japan, and noted that it should be important to promote the capacity development in Viet Nam, ant to further promote the development and upscaling of the JCM projects.
- Mr. Miyagi, Hitz, showcased their waste management JCM projects to be implemented in Ho Chi Minh City, Viet Nam: (i) JCM Model Project "Anaerobic digestion of organic waste for biogas utilization at market in Ho Chi Minh City"; and (ii) JCM Project Planning Study "Introduction of our Energy-from-Waste technology", and introduced their activities and their own technologies of waste management plants.
- Mr. Sengchandala, Lao MONRE, presented the status of the JCM in Laos, and recognized the contribution of the JCM to the transfer of low-carbon technologies and the establishment of low-carbon society in Laos. He also expressed the expectation to the JCM project development through the city-to-city cooperation between Vientiane and Kyoto, to improve the actual situation with no concrete JCM projects developed up to now.
- In Q&A session, questions about the promotion and PR of the JCM, and the upscaling of the JCM projects were raised. Mr. Kino replied that the partnership between Japan and signed countries should be strengthened and PRed. He added the importance of further development of the JCM projects through the project feasibility studies and the city-to-city cooperation

programmes. Regarding upscaling, Mr. Tuan suggested a possible solution of "tradable" credit scheme after 2020. Mr. Motoda mentioned that successful cases through the city-to-city cooperation programmes would contribute to the upscaling and the PR of the JCM.

■ Photograph

(Reporter: Tomoya Motoda, GEC)

To access the Side Event Reports and presentation files, please refer to the following link:
http://www.mmechanisms.org/e/cop20_japanpavilion/

Ⅲ. Presentation Materials

— Table of contents —

1. 1st Working Group Meeting

"Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City" 2014

Global Environment Centre Foundation

1st Working Group Meeting
for the Development of HCMC
Climate Change Action Plan 2016-2020

9 July 2014

Global Environment Centre Foundation (GEC)

GEC

1

Progress draft schedule

Global Environment Centre Foundation

	4	5	6	7	8	9	10	11	12	1	2	3
CCAP development						1st draft			final draft	Publication of final draft		
Meeting/CB in HCMC		● 13-15		☆ now	●			●	●			
High-level Symposium									●			
Training course in Japan			● 2-6									

- FS for 2 JCM projects: to make several field surveys in HCMC
- Seminar for project seeds identification in HCMC
on 10 July at JETRO HCMC

2

Discussion result of Meeting in May

Global Environment Centre Foundation

Date：13-15 May 2014

Participants：

（HCMC） CCB, DONRE, DOST, Department of Construction, Department of Agriculture and Rural Development, HCMC People Committee, Department of Investment and Planning, Flooding prevention center, Department of Industry and Trade, Department of Planning and Architect, Department of Transportation, etc.

（OSAKA） GEC, NIES, Kyoto Univ., IGES

3

Discussion result of Meeting in May

Global Environment Centre Foundation

- Shared understandings between Japanese and HCMC sides, on how to proceed of the development of "HCMC CCAP 2016-2020", AIM application, and GHG Inventory
- Proposed the structure/contents of "HCMC CCAP 2016-2020" by HCMC
  ⇒ Suggesting to the structure/contents of CCAP based on Japanese experiences and expertise by Osaka City.
- Proposed 8 sectors and 6 development zones as the focus points of HCMC
  ⇒ Identifying concrete policies/activities/projects
- Introduction of FS for JCM Projects to be implemented in 2014

4

Outline of Training course in Japan

Global Environment Centre Foundation

Date : 2-6 June 2014

Participants：Dr. Phung (DOST), and Ms. Huong (CCB)

Date	Contents	Lecturer
6/2 6/3	Learning AIM and related models and their application from the basis to practice	Dr. Fujino, etc. (NIES)
6/4	Meeting about modeling of AIM	Prof. Matsuoka, Ms. Tu (Kyoto University)
6/5	Learning GHG inventory at city-level	Ms. Akagi (IGES)
	International symposium on climate change and waste (Osaka City)	UNEP/IETC, etc.
6/6	Learning how to develop practical and feasible climate change action plan, based on Osaka City's experiences	Mr. Izumi, Mr. Kitaura, etc. (Osaka City)

5

Objectives of WG Meeting #1

Global Environment Centre Foundation

- To share the progress situation on the development of "HCMC CC-AP 2016-2020"
- To promote mutual understandings on the components/contents of "HCMC CC-AP 2016-2020"
- To discuss how and when to proceed the development of "HCMC CC-AP 2016-2020"

6

Objectives of WG Meeting #1

- To identify task/role allocation both by Japanese side and by HCMC side
  - Consistency with existing CC-AP 2015 and other relevant legal bases (eg. development plans)
  - Checking the progresses of actions/programs/projects, identified in existing CC-AP 2015
  - HCMC GHG inventory development
  - Future projection of GHG emission in HCMC, including the application of the Asia-Pacific Integrated Model (AIM) developed by NIES
  - Listing of actions/programs by sector and area basis, with prioritization
  - Concrete policies/activities/projects to be identified in "HCMC CC-AP 2016-2020"
  - Drafting text of "HCMC CC-AP 2016-2020"
- To identify the schedule toward the completion of the draft Action Plan

Expected achievements of WG#1

- Deciding the structure (contents, and chapters) of "HCMC CC-AP 2016-2020"
- Setting the 1st draft menu list of actions/programs/projects for tackling climate change
- Completing the draft text of chapters of background, fundamental concepts, legal bases, target term, etc.

Agenda <1st round (9 July)>

time	contents
09:00	1. Opening
09:10	2. Overview of the Working Group Meeting (by GEC) - Expected result of 2014 - Proposed task progress schedule of 2014
09:30	3. Progress Situations on HCMC CC-AP 2016-2020 (by HCCB)*: (1) Background of the development of HCMC CC-AP 2016-2020 (2) Relevant existing legal bases (including plans/programs) for the development of HCMC CC-AP 2016-2020 (3) Review of existing actions, and identification of obstacles * Based on the "Proposal: Climate Change Action Plan of HCMC in the 2016-2020 Period, with a Vision towards 2030 (1st draft)" received on 14th May at HCMC-DONRE Meeting Room.

Agenda <1st round (9 July)>

time	contents
10:30	4. Progress Situation on the support to develop HCMC CC-AP 2016-2020: (1) Support to establish HCMC GHG inventory (by IGES) (2) Application of AIM (by NIES) (3) Proposals of contents of CC-AP 2016-2020 (by CFK) - Chapters - Expected targets (short-, mid-, and long-term) - Overall framework of policies, programs, and actions - Priorities of sectors and/or districts - Promotion of actions: Model case (area) - Institutional arrangement of administration for the implementation (including PDCA cycle scheme)

Agenda <1st round (9 July)>

time	contents
11:00	5. Discussion on concrete priority measures in the 8 sectors and/or implemented in the priority districts - Priority measures menu in the 8 sector i) Energy ii) Transportation iii) Industrial production iv) Water management v) Solid waste management vi) Agriculture vii) Healthcare viii) Land use planning (1) Planned programs/projects to be implemented by Departments of HCMC (by HCMC) (2) Proposed concrete programs/projects (by Osaka City Government)

Agenda <1st round (9 July)>

time	contents
13:30	5. Discussion on concrete priority measures in the 8 sectors and/or implemented in the priority districts [cont'd]
17:00	Adjourn of 1st Round

Global Environment Centre Foundation

Agenda <2nd round (11 July)>

time	contents
08:30	5. Discussion on concrete priority measures in the 8 sectors and/or implemented in the priority districts [cont'd] ・ To provide additional information and/or feedbacks for the substantial progress based on the 1st round discussions ・ To set the 1st draft menu list of actions/programs/projects for tackling climate
10:30	6. Wrap-up of 1st Working Group Meeting ・ Confirmation of the structure of HCMC CC-AP 2016-2020 (including the confirmation of the draft texts of chapters of background, etc.) ・ Confirmation of task schedule for the completeness of draft HCMC CC-AP 2016-2020
12:00	7. Closure

13

Global Environment Centre Foundation

To make substantial step forward

- Structure (contents, and chapters) of "HCMC CC-AP 2016-2020":
  - "Proposal: CCAP of HCMC in the 2016-2020 period with a vision towards 2030 (1st draft)", proposed by DONRE/CCB in May
  - Paper "Suggestions for Structure & Contents for HCMC CCAP 2016-2020", proposed by Osaka
- 1st draft menu list of actions/programs/projects for tackling climate change
  - List of Projects, proposed and submitted by Osaka
    ➔ based on the existing HCMC plans, HCMC CCAP 2015, and results of talk between Osaka City and HCMC taken place in 2013
- Draft text of chapters of background, fundamental concepts, legal bases, target term, etc.
  - Texts of HCMC-specific issues and contents should be drafted (or at least provided) by HCMC:
    - General information of HCMC
    - Background to develop CCAP 2016-2020
    - fundamental concepts of CCAP 2016-2020
    - Legal bases (including precedent plans/programmes) to develop CCAP 2016-2020
    - Preferred target term (short term = 2020, mid term = 2030?, and long term = 2050???)
    - Characteristics of 6 regions/zones
- Proposed work schedule:
  - 21 August: Workshop for confirmation of work progress
  - November: Working Group Meeting, to finalize draft CCAP
  - December: High-level Symposium, and Policy Dialogue
    → to publish the draft CCAP 2016-2020
  - January (if necessary): Working Group Meeting, to final check of the draft CCAP, to be submitted to People's Committee for approval

14

Global Environment Centre Foundation

Thank you for your attention!

http://osaka-hcm-lcc.net/en/index.html

15

Institute for Global Environmental Strategies

MRV Project in HCMC: Progress and Activities in FY2014

Shiko Hayashi and Junko Akagi, IGES Kitakyushu Urban Centre
Meeting for Information sharing for the Development of HCMC Climate Change Action Plan 2020
9th July 2014, Ho Chi Minh City

Why is GHG Inventory important?

- Management for low-carbon city development
  → A fundamental tool for local governments assess the amount of current GHG emissions, identify key emission sources, set a target for GHG emissions reduction, and develop effective mitigation actions in MRV manner

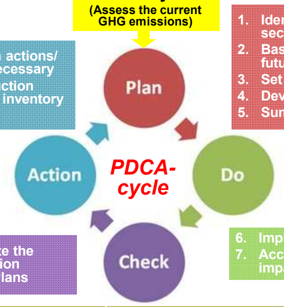
GHG Inventory in base year
(Assess the current GHG emissions)

1. Identify key emission sectors/sources
2. Baseline setting/ Forecast future emissions scenario
3. Set a GHG reduction target
4. Develop mitigation actions
5. Summarize in Action Plan

6. Implement mitigation actions
7. Account GHG reduction impacts

8. Review & evaluate the effects of mitigation actions/ Action Plans

8. Revise mitigation actions/ Action Plan as necessary
9. Report GHG reduction (reflect into GHG inventory in next year)



Top-down v.s. Bottom-up approaches of GHG Inventory

	Top-down approach	Bottom-up approach
Advantages	• Statistic (macro) data can be utilized if exists. • Comprehensive accounting of GHG emissions	• The effectiveness of each mitigation actions (policy) can be explained.
Disadvantages	• The effectiveness of each mitigation actions cannot be directly explained (GHG emissions reduction is not directly linked with specific polity/actions)	• Difficult to collect all bottom-up data without double-counting or leakage
Example of data	Electricity supplied to a building (e.g. monthly electricity bill)	Accumulate all electricity consumption data of each equipment (e.g. PCs, lights, air conditioners, etc.)

Ref. Local Government Action Plan in Japan

Act on Promotion of Global Warming Countermeasures

Government operation
Article 20-3 Paragraph 1

Responsibility to reduce GHG emissions associated with local government operations

(e.g.)
- Energy conservation measures for government buildings and facilities

i. Assess the total amount of GHG emissions
ii. Setting quantitative target for total amount GHG emissions
iii. Develop concrete measures included in an Action Plan

City-wide activities
Article 20-3 Paragraph 3

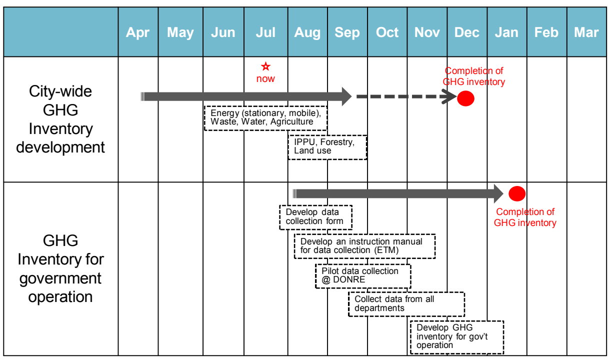
Responsibility to promote comprehensive and planned policies in the city

(e.g.)
- Promote introduction of renewable energy
- Promote energy conservation by business operators and residents
- Construct and improve public transportation, park land and other regional environment
- Create a recycling-based society by reducing waste generation

i. Estimate the current amount of GHG emissions
ii. Set a target
iii. Develop measures and policies

Source: Based on "Emission inventories in practice Japanese Experiences", August 2011, Ministry of the Environment, Japan

Schedule of GHG Inventory development in HCMC (tentative)



HCMC's GHG inventory (city-wide)

○ : Data is collected/collecting
△ : Data is identified
✖ : Data is not identified

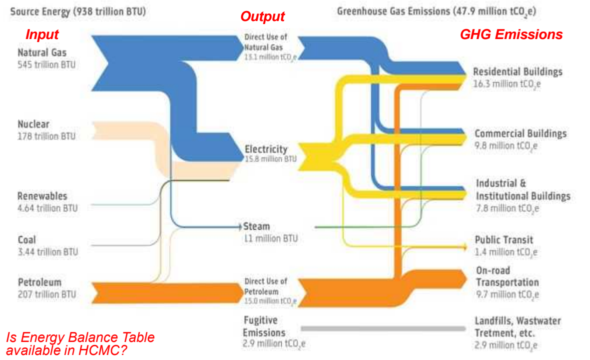
Sector		Activity	Gas	Year	AD	EF	Data
Energy	Stationary units	Energy Generation	CO_2, CH_4, N_2O	2013	Energy balance table,	IPCC default	✖
		Industrial	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Commercial/ Institutional	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Residential	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Agriculture/ Forestry/ Fishing	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Fugitive emissions	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
	Mobile units	Road transportation	CO_2, CH_4, N_2O	2013	Fuel consumption or Km travelled	IPCC default	✖
		Off-road transportation	—	—	—	—	—
		Railways	—	—	—	—	—
		Water-borne navigation	—	—	—	—	—
		Aviation	—	—	—	—	—
Water		Tap water production	CO_2	2013	Amount of water supply	Country specific	○
		Waste water treatment/discharge	CH_4, N_2O	2013	Industry production, Population	IPCC default	△
Waste		Solid waste disposal	CH_4	2013	Composition, generation per capita	FOD method	○
		Biological treatment	CH_4, N_2O	2013	Waste amount processed	IPCC default	△
		Incineration & open burning	CO_2	2013	Waste amount incinerated	IPCC default	△
IPPU		—	—	—	—	—	—
AFOLU	Agriculture	Enteric fermentation	CH_4	2013	Population of livestock (head)	IPCC default	△
		Manure Management	CH_4, N_2O	2013	Population of livestock (head)	IPCC default	△
		Rice cultivations	CH_4	2013	Harvested (irrigated) area of rice	IPCC default	△
		Emission from managed soils	N_2O	2013	Amount of N (nitrogen) to soils, etc.	IPCC default	△
	Forestry, Land Use	—	—	—	—	—	—
Other Indirect Emissions		—	—	—	—	—	—

GHG emissions from energy sector

- Energy sector
  - Fuel combustion (Stationary combustion)
    - Energy Industries
      - Electricity and Heat production
      - Petroleum Refining
      - Manufacture of Solid Fuels and Other Energy Industries
    - Manufacturing Industries and Construction — Iron and Steel; Non-ferrous metals; Chemicals; Pulp, Paper and Print; Food Processing, Beverage and Tobacco; Non-metallic minerals; Transport equipment; Machinery; Mining and Quarrying; Wood and Wood products; Construction; Textiles and Leather; Non-specified industries
    - Other Sectors — Commercial/Institutional; Residential; Agriculture/Forestry/Fishing/Fish farms
    - Non-specified — Emissions from fuel combustion in stationary/mobile sources that are not specified elsewhere.
  - Transportation (Mobile combustion)
    - Road Transportation — Automobiles, light trucks, heavy-duty vehicles(tractor trailers and buses), motorcycles etc.
    - Off-road Transportation
    - Railways
    - Water-borne Navigation
    - Civil Aviation
  - Fugitive emissions

GHG emissions from energy sector 1

New York City Energy Consumption and Greenhouse Gas Emissions (in 2002)



Is Energy Balance Table available in HCMC?

Source: NYC Mayor's Office in Inventory of New York City Greenhouse Gas Emissions: December 2013

GHG emissions from energy sector 2

Fuel types covered by each sub-sector in National GHG Inventory 2005.

- **Energy industries (CO_2, CH_4, N_2O)**
  - Anthracite, Bituminous, Diesel Oil, Fuel Oil, Non-associated gas, Associated gas, Biomass, LPG
- **Manufacturing Industries and Construction (CO_2, CH_4, N_2O)**
  - Anthracite, Fat Coal, Lignite, Coke, Kerosene, Diesel Oil, Fuel Oil, Biomass, LPG
- **Commercial/ Institutional (CO_2, CH_4, N_2O)**
  - Anthracite, Kerosene, Diesel Oil, Fuel Oil, LPG
- **Residential (CO_2, CH_4, N_2O)**
  - Anthracite, Kerosene, Diesel Oil, Fuel Oil, LPG, Biomass, Biogas
- **Agriculture/Forestry/Fishing (CO_2, CH_4, N_2O)**
  - Anthracite, Motor Gasoline, Diesel Oil, Fuel Oil

(source: National GHG Inventory Report 2005 of Vietnam)

Activity Data: Fuel consumption by fuel types
Which Department?

Energy sector: Transportation (Mobile combustion)

Transport – Road transportation (CO_2, CH_4, N_2O)

- Transport sector includes aircraft for international civil aviation and domestic air transport; road transportation (cars, light duty trucks, heavy duty trucks and buses, motorcycles, etc.); railways; water-borne navigation for domestic and international; and other transportation activities, such as gas pipeline transport.
- Tier 1 method is used because there are no fuel combustion data by transportation category as well as country-specific emission factors in Viet Nam.

(source: National GHG Inventory Report 2005 of Vietnam)

CO_2 Emissions = Σ_i [(Fuel consumption × EF) – Carbon stored] × Fraction oxidised × 44/12

Non-CO_2 Emissions = Σ [EF_{ab} × Fuel consumption$_{ab}$]

where
a : fuel type
b: sector activity

Activity data
- ***Fuel consumption or***
- ***Vehicle kilometres travelled (VKT)***

Fuel consumption for Transport in 2005 Unit: 1,000 tons

Category	Mogas	Jet fuel	DO	FO
Airway		384.5		
Road	2410.8		3352.8	
Rail			54.9	
River and Seaway	37.8		197.7	310.0

Source: Energy Balance Table in 2005 (Institute of Energy)

Road Transport Default Emission Factors (kg/TJ)

Fuel type	EF (CO_2)
Motor Gasoline (Mogas)	69,300
Gas/ Diesel Oil	74,100
LPG	63,100
Kerosene	71,900
Lubricants	73,300
Compressed Natural Gas	56,100
Liquefied Natural Gas	56,100

Source: Table 3.2.1 on page 3.16 in Vol.2: Energy, Chapter 3: Mobile Combustion in IPCC Guideline 2006

Road Transport CH_4 and N_2O Default Emission Factors (kg/TJ)

Fuel type	EF (CH_4)	EF (N_2O)
Motor Gasoline - uncontrolled	33	3.2
Motor Gasoline – oxidation catalyst	25	8.0
Motor Gasoline – low mileage light duty vehicle	3.8	5.7
Gas/ Diesel oil	3.9	3.9
Natural Gas	92	3
LPG	62	0.2

Source: Table 3.2.2 on page 3.21 in Vol.2: Energy, Chapter 3: Mobile Combustion in IPCC Guideline 2006

Energy sector: Fugitive emissions

Fugitive emissions (CO_2, CH_4, N_2O)

- Fugitive emissions are intentional or unintentional release of GHG that may occur during the extraction, processing and delivery of fossil fuels to the point of final use.
- Fugitive emissions are emitted from mining, processing, storage and transportation of coal, and oil and natural gas systems. (source: National GHG Inventory Report 2005 of Vietnam)

1. Coal Mining and Handling (CH_4)

1-1. Underground coal mining and post-mining emissions:
1-2. Surface coal mining:
1-3. Abandoned underground coal mines:

2. Oil and Natural Gas (CO_2, CH_4, N_2O)

- Methane emissions within oil and gas system include emissions during normal operation, such as emissions associated with venting and flaring during oil and gas production, chronic leaks or discharges from process vents; emissions during repair and maintenance; and emissions during system upsets and accidents.

(source: National GHG Inventory Report 2005 of Vietnam)

$$E_{gas} = \Sigma_{industry\ segments}[A_{industry\ segment} \times EF_{gas,\ industry\ segment}]$$

where
E_{gas} : Annual emissions (Gg)
$A_{industry\ segment}$: Activity data (unit of activity)
$EF_{gas,\ industry\ segment}$: Emission factor (Gg/unit of activity)

Activity data
- ***Indigenous production of Oil and gas (e.g. Crude oil, associated-gas, non-associated gas)***

GHG emissions from waste sector

- Waste sector
  - 1. Solid waste disposal site
  - 2. Biological treatment of solid waste
  - 3. Wastewater treatment and discharge
    - Industrial wastewater
    - Domestic wastewater
    - → Water sector
  - 4. Incineration and open burning of waste
  - 5. Other

Reference:
GHG emission in waste sector accounted in "Viet Nam National GHG Inventory in 2005"
1.CH_4 emission from Solid waste disposal sites
2.CH_4 emission from industrial wastewater
3.CH_4 emission from domestic wastewater
4.N_2O emission from human sewage
5.CO_2 emission from waste incineration

Waste sector 1: Solid waste disposal sites

Emission from Solid waste disposal sites (CH_4)

Methodology: **First Order Decay (FOD) method** (or Default value)

Waste composition:

- Averaged composition of waste from "*Status environment reports of Department of Nature Resources and Environment of Provinces*"
- Average value of three waste composition survey conducted by Hitachi Zosen Corporation at Phuc Hiep Landfill site in August 2012, November 2012, and January 2013.

Composition	Rate (%)
Food, organic	59.24
Garden	2.76
Paper	2.7
Wood	1.05
Textile	3.30
Nappies	0.01
Plastic, other inert	30.94

Source: Status environment reports of Department of Nature Resources and Environment of Provinces

Composition	Rate (%)
Food, organic	67.9
Garden	0
Paper	2.8
Wood	0.6
Textile	6.4
Nappies	1.7
Plastic, other inert	20.6

Source: calculated based on the survey conducted by Hitachi Zosen Corporation

Generation factor: 0.7kg/capita/day

Fraction of urban solid waste disposal sites: 65% in 2000, 71% in 2003

Waste Management type: unmanaged and deep in urban area (0.8)

DONRE ?

Preliminary result

1,177,150 t-CO2 eq./year

* The amount of Industrial waste disposed in landfill is missing.

Waste sector 2: Biological treatment of solid waste

Composting

- **Waste amount Vietstar receives: 450t/day (=164.25Gg/year)**
(source: survey conducted by Hitachi Zosen Corp.)
- **Proportion of the received waste going to composting process: 35%**
(source: survey conducted by Hitachi Zosen Corp.)
- **Emission factors: 4g CH_4/kg waste treated, 0.3g N_2O/kg waste treated**
(IPCC 2006 Guideline)

$$\underbrace{(164.25\text{Gg/year} \times 0.35 \times 4\text{t } CH_4/\text{Gg}) \times 21}_{CH_4 \text{ emission}} + \underbrace{(164.25\text{Gg/year} \times 0.35 \times 0.3\text{t } N_2O/\text{Gg}) \times 310}_{N_2O \text{ emission}}$$

CO_2eq CO_2eq

= 10,175.2875 t-CO_2eq/year

* The amount of other composting plants (e.g. Tam Sinh Nghia) process to make composts is missing.

DONRE ?

Waste sector 3: Incineration and open burning of waste

Incineration and open burning of waste

- *CO_2 emissions resulting from waste incineration of carbon in waste of fossil origin (e.g. Plastics, certain textiles, rubber, liquid solvents, and waste oil) should be included in emissions estimates.*
- *Carbon fraction derived from biomass materials (e.g. Paper, food waste, and wooden materials, etc.) is not included.*

$$CO_2 \text{ Emissions} = \Sigma_i [IW_i \times CCW_i \times FCF_i \times EF_i] \times 44/12$$

where

i = MSW(municipal solid waste), ISW(industrial solid waste), HW(hazardous waste), MW (medical waste), SS (sewage sludge)

IW_i: Amount of incinerated waste type i (Gg/year) ***DONRE ?***

CCW_i : Fraction of carbon content in waste type i (default value = 60%)

FCF_i : Fraction of fossil carbon in waste type i (default value = 40%)

EF_i : Burn out efficiency of combustion of incinerator for waste type i (default value = 95%)

- *In Viet Nam, rate of solid waste burned in incinerator is very low and* *mainly hazardous medical solid waste (clinical waste) is burned in incinerators of hospitals.*
- *The amount of hazardous medical solid waste can be estimated by using total number of beds in hospital, volume of waste per bed, and rate of hazardous waste in medical waste.*

* If statistics for the amount of incinerated waste is available, activity data should be updated.

GHG emissions from water sector: Tap water production

Chemical input to 1m³ of water production

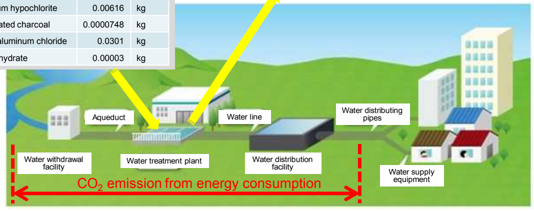
Category	amount	unit
sodium hydroxide	0.0000191	kg
liquid chlorine	0.00087	kg
sodium hypochlorite	0.00616	kg
activated charcoal	0.0000748	kg
Polyaluminum chloride	0.0301	kg
lime hydrate	0.00003	kg

Output from 1m³ of water production

Category	amount	unit
Sludge	0.014	kg

0.37616 kg-CO_2/m³

Source: LCA Software (MiLCA).



Source of picture: Waterworks Bureau of Osaka City

HCMC

0.23 kg-CO_2/m³

Source: TOTO and Mitsubishi UFJ Morgan Stanley Securities Co., Ltd.

Osaka city

0.205 kg-CO_2/m³

Source: Osaka City's Environmental Report (FY2012)

Water sector 1: Activity data of tap water production

$$CO_2 \text{ Emissions} = \Sigma_i [\text{Amount of water supply} \times \underbrace{EF_i}_{0.23 \text{ kg-}CO_2/m^3}]$$

where
i = Water supply plant

DONRE ?

Water treatment facility (Water supply facility)		Unit	Quantity [Unit/yr]	AD Reference	EF [kg CO2eq./Unit]	CO2 emissions [Gg CO2eq./yr]
Total		n.a.	505,127,840.00	n.a.	n.a.	116.18
	Thu Duc 1 Water Plant	m3	259,633,205.00	Real data from Saigon Water Supply Corporation (SAWACO)	0.230	59.72
	Tran Hiep Waster Plant	m3	98,787,774.00	same as above	0.230	22.72
	BOO Thu Duc Water Plant	m3	109,500,000.00	SAWACO Plan of Water Supply	0.230	25.19
	Binh An Water Plant	m3	36,500,000.00	same as above	0.230	8.40
	Ground Water	m3	706,861.00	same as above	0.230	0.16

Water sector 2: CH_4 emission from wastewater treatment and discharge

CH_4 emission from **industrial wastewater**

$$CH_4 \text{ Emissions} = \Sigma_i [TOW_i \times EF_i - MR_i]$$

where

TOW_i: Total organic wastewater type i (kgCOD/year)

EF_i : Emission factor of wastewater type i (kgCH_4/kgCOD)

MR_i: Total amount of methane recovered or flared from wastewater type i (kgCH_4)

Caverage of industrial categories for an estimate of CH_4 emissions from industrial wastewater in "Viet Nam National GHG Inventory in 2005"

- Beer & malt
- Fish processing
- Pulp and paper
- Iron & steel

Judgment by steering board?

DOIT ?

Activity Data

- ***Production of some important industries (ton/year)***
- *Unit wastewater generation (m³/ton)*
- *COD concentration in wastewater (kg COD/m³)*

CH_4 emission from **domestic wastewater**

$$CH_4 \text{ Emissions} = \Sigma_i [TOW_i \times EF_i - MR_i]$$

where

TOW_i: Total organic waste (kg BOD/year)

EF_i : Emission factor (kgCH_4/kgBOD)

MR_i: Total amount of methane recovered or flared (kgCH_4)

Fraction of domestic wastewater treatment

(expert judgment in National GHG Inventory, 2005)

- Centralized, aerobic treatment: 0%
- Septic system: 30%
- Untreated: 70%

Judgment by steering board?

DONRE-CCB ?

Activity Data

- ***Human population (1000 persons)***
- *Degradable organic component (kgBOD/1000persons/year)*
(default: 40gBOD/person/day=14,600kgBOD/1000persons/year)

Water sector 3: N_2O emission from wastewater treatment and discharge

N_2O emission

- N_2O emission can occur as direct emission from treatment plants or from indirect emissions from wastewater after disposal of effluent into waterways, lakes or the sea.
- Direct emission from nitrification and de-nitrification at wastewater treatment plants may be considered as a minor source.

$$N_2O\ Emission = Protein \times Frac_{NPR} \times NR_{people} \times EF$$

DONRE-CCB ?

where

Protein : annual per capita protein intake (kg/person/year) (26.3895 kg/person/year in 2005 (source: Annual report of Viet Nam nutrition institute))

$Frac_{NPRi}$: Fraction of nitrogen in protein (default=0.16, kg N/kg protein)

NR_{people} : Number of people

EF: emission factor (default=0.01, kg N_2O-N/kg N)

GHG emissions from Agriculture sector

Agriculture sector
- Enteric fermentation: cattle, buffalo, sheep, goats, camels, horses, mules and asses, swine, poultry, other
- Manure management: cattle, buffalo, sheep, goats, camels, horses, mules and asses, swine, poultry, other
- Aggregate sources and non-CO_2 emissions sources on land: GHG emissions from biomass burning, liming, urea application, rice cultivation, direct/indirect N_2O emissions from managed soils, etc.

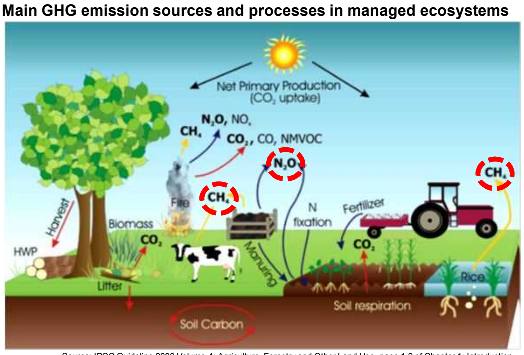
Reference:

GHG emission in Agriculture sector accounted in "Viet Nam National GHG Inventory, 2005"

1. **Enteric fermentation (CH_4)**
2. **Manure management (CH_4, N_2O)**
3. **Rice cultivation (CH_4)**
4. **Agricultural soils (N_2O)**
5. **Prescribed burning of savannas (CH_4, N_2O)**
6. **Field burning of agricultural residues (CH_4, N_2O)**

GHG emissions from Agriculture sector 1

Main GHG emission sources and processes in managed ecosystems



Source: IPCC Guideline 2006 Volume 4: Agriculture, Forestry and Other Land Use, page 1.6 of Chapter 1: Introduction

GHG emissions from Agriculture sector 2

DARD ?

Enteric fermentation (CH_4)

$$CH_4\ Emissions = \Sigma_i [A_i \times EF_i]$$

where
A_i: Population of livestock (head)
EF_i : Emission factor for specific population (kg/head/year)
$Index_i$: livestock categories

Manure management (CH_4)

$$CH_4\ Emissions = \Sigma_i [A_i \times EF_i]$$

where
A_i: Population of livestock (head)
EF_i : Emission factor for the defined livestock population (kg/head/year)
$Index_i$: livestock categories

Manure management (N_2O)

$$N_2O\ Emissions = \Sigma_s \{\Sigma_i [N_i \times Nex_i \times MS_i] \times EF_s\}$$

where
N_i: Number of head of livestock category i
Nex_i : Annual average N excretion per head of category i (kg N/1t animal/year)
MS_i : Fraction of total annual excretion for each livestock category i that is managed in manure management system S
EF_s : N_2O emission factor for manure management system S (kg N_2O-N/kg N)
i : Category of livestock, S : Manure management system

Rice cultivations (CH_4)

$$CH_4\ Emissions = \Sigma_i \Sigma_j \Sigma_k [EF_{ijk} \times A_{ijk} \times 10^{-6}]$$

where
EF_{ijk} : a daily emission factor for i, j, k conditions (kg CH_4/ha/year)
A_{ijk}: Annual harvested (irrigated) area of rice for i, j, k conditions (ha/year)
$Index_{i\,j\,k}$: represent different ecosystems, water regimes, type and amount of organic amendments, and other conditions, under which CH_4 emissions from rice may vary.

Emissions from Managed Soils (N_2O)

Direct emissions (N_2O)
Indirect emissions (N_2O)

where
F_{SN}: amount of synthetic fertilizer N applied to soils (kg N/year)
F_{ON}: amount of organic N additions applied to soils (kg N/year)

Schedule of this week for data collection

Date	Contents
July 9th (Wed)	• check with participants from each department for the data availability (at 1st round of Working Group Meeting)
July 10th (Thu)	• Meeting with DONRE-CCB & ETM Center
July 11th (Fri)	• Participants from each department are expected to bring the data (or report an availability of data) requested on July 9th (Wed) (at 2nd round of Working Group Meeting)

- DONRE-CCB will follow up for the data collection.
- DONRE-CCB and ETM Center will develop a manual for data collection from all departments of People's Committee of HCMC for a development of GHG inventory for government operation with a support from IGES.

Thank you for your attention!

Atmospheric and Thermal Environmental Engineering Laboratory
Department of Urban and Environmental Engineering
GRADUATE SCHOOL OF ENGINEERING, KYOTO UNIVERSITY

National Institute for Environmental Science, Japan

Mizuho Information & Research Institute - Japan

Design of Low Carbon City for Ho Chi Minh City, Vietnam

AIM team
July, 2014

Contents

Expected Table of contents of the final report

1. Objective

- To design the HCMC Low Carbon City (LCC) scenarios
- To support JCM project of HCMC study conducted by HCMC and Osaka City
- To support enhancing the capacity of Low Carbon policy development of related organizations by introducing simulation models (AIM) to give comprehensive and consistent pathways

2. List of related Policies

Parameters	Title	Organization	Year
Development	Decision no. 589/QD-TTg approval of the Master Plan for the development of HCMC by 2020 with vision to 2050	Vietnamese Government	May, 2008
	Decree 16-NQ/TW dated August 10, 2012: the Direction and Responsibility for the development of HCMC by 2020	Vietnamese Government	Aug, 2012
	Decision 2631/QD-TTg approval of Master plan for the socioeconomic development of HCMC until 2020 with vision to 2025	Vietnamese Government	Dec, 2013
	Decision 252/QD-TTg approval of Master plan for the socioeconomic development of Southern Key Economic Region until 2020 with vision to 2030	Vietnamese Government	Feb, 2014
Land use	Decision 24/QD-TTg approval of the adjustment of the Master plan for constructing HCMC by 2025	Vietnamese Government	Jan, 2010
	Decree 02-NQ/CP dated January 06, 2014: Land use planning by 2020 and Land use plan first 5-year 2011-2015 of HCMC	Vietnamese Government	Jan, 2014
Transport	Status and planning of the transportation development in HCMC by 2020	Department of Transportation, HCMC	Sep, 2010
	Decision 568/QD-TTg approval of Master plan for transportation development in HCMC by 2020 with vision beyond 2020	Vietnamese Government	Apr, 2013
Energy	Decision no. 2305/QD-UBND approval of Green energy program for HCMC by 2015	HCMC Government	May, 2012
Climate change	Directive no. 35/2005/CT-TTg dated October 17, 2005 on Organizing the implementation of the Kyoto Protocol to the UNFCCC	Vietnamese Government	Oct, 2005
	Decision no. 47/2007/QD-TTg approval of the Plan for the organization of the implementation of the Kyoto Protocol under UNFCCC for 2007-2010 period	Vietnamese Government	Apr, 2007
	Decision no. 158/2008-QD-TTg approval of the National Target program to respond to Climate Change	Vietnamese Government	Dec, 2008
	Decision no. 2139/QD-TTg approval of the National Climate Change Strategy	Vietnamese Government	Dec, 2011
	Decision no. 1393/QD-TTg approval of National Green Growth Strategy for Vietnam	Vietnamese Government	Sep, 2012
	Decision no. 1775/Qd-TTg approval of the Plan to manage GHG emission and Carbon trading activities to the world market	Vietnamese Government	Nov, 2012
	Decision no. 2484/QD-UBND Issuing Programs for implementing Climate change action plans of HCMC by 2015	HCMC People Committee	May, 2013
	Decision no. 5392/QD-UBND approval of Programs for implementing Climate change action plans of HCMC in 2013	HCMC People Committee	Sep, 2013
Projects on Climate change action plan for HCMC	Develop climate change integrated master plan for district 4 and NHA BE district	HCMC Climate Change Bureau	2014
	Project proposal for GHG emission inventories and MRV for HCMC	HCMC Climate Change Bureau	2014
	Project proposal on capacity building on Climate change adaptation and mitigation for officials and staff of Ho Chi Minh City in the period 2014-2020	HCMC Climate Change Bureau	2014
	Project Proposal on Developing Climate Change Action Plans for different regions in HCMC by 2020 with a vision towards 2030	HCMC Climate Change Bureau	2014
	Project proposal on Assessing the status and forecasting the trend of green house gas emissions in HCMC and proposing mitigation measures towards a low-carbon city	HCMC Department of Science and Technology	2014

3. Study framework

Scope of the study

- **Base year**: 2011
- **Target years**: 2020, 2025, 2030 (follow targets of some development plans), 2050 (preferred by GEC)
- **Sectors**: Energy, Transport, Industry, Waste, *(Agriculture, LULUCF)*
- **Area**: HCMC as 1 region
- **Target GHG**: CO_2, CH_4, N_2O, *(HFCs, PFCs,* SF_6*)*
- **Social**: 1 population group, 1 household type
- **Transportation**: consider both domestic and cross-border
- **Passenger transport mode**: Road (bicycle, motorcycle, car, taxi, bus, train) (with estimation for walk, MRT), waterway, aviation
- **Freight transport mode**: Road, waterway, maritime, aviation

Expected audients and related organizations

HCMC People Committee, HCMC CCB, DOST, Univ.NRE

3. Research framework

Work procedure

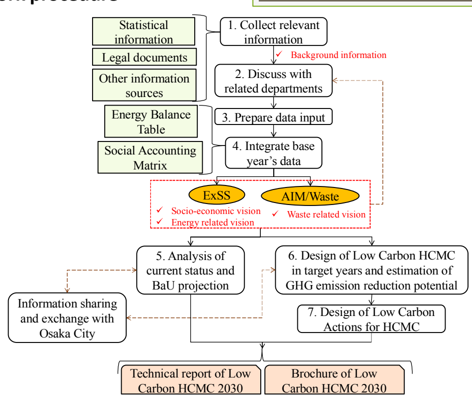


Table of contents of study report

"Low Carbon HCMC"

Foreword

Preface

This part will be discussed with HCMC CCB, related departments/organizations, Osaka City and so on.

Image of expected outputs (1)

Quantified socio-economic vision of HCMC

Table S-1 Estimation result of scenario quantification in 2030

	2005	2030	2030/2005
Population (10^4)	147	140	0.95
No. of households (10^4)	65	65	0.99
GDP (bill yen)	6124	8305	1.36
GDP per capita (mill yen/capita)	4.15	5.94	1.43
Gross output (bill yen)	9938	13400	1.35
Primary industry	17	19	1.13
Secondary industry	2735	3542	1.30
Tertiary industry	6947	9507	1.37
Passenger transport volume (mill p-km)	9251	8192	0.89
Freight transport volume (mill t-km)	3484	4571	1.31

(Example from Low Carbon Kyoto)

Image of expected outputs (2)

Tables of potential reduction countermeasures

Household sector

Sector	Low carbon countermeasure	Data		Source	Category (*)	Identified implementation intensity		Emissions reduction (kt-CO2)	Action (**)
Household sector	Air conditioner							50.1	3(***)
	Highest energy efficiency air conditioner	COP	6.60	2	[illegible]	Diffusion ratio (cooling and heating)	50%		
	High energy efficiency air conditioner	COP	2.54	1	[illegible]	Diffusion ratio (cooling and heating)	50%		
	High energy efficiency kerosene heating	COP	0.88	1	[illegible]	Diffusion ratio (heating: kerosene)	50%	12.9	3
	High energy efficiency gas heating	COP	0.88	1	[illegible]	Diffusion ratio (heating: gas)	50%	25.8	3
	High energy efficiency oil water heater	COP	0.83	1	[illegible]	Diffusion ratio (hot water: oil)	70%	6.1	3
	Gas water heater							55.0	3
	Latent heat recovery- type water heater	COP	0.83	1	[illegible]	Diffusion ratio (hot water: gas)	50%		
	High energy efficiency gas water heater	COP	0.83	1	[illegible]	Diffusion ratio (hot water: gas)	50%		
	Heat pump water heater	COP	4.50	3	[illegible]	Diffusion ratio (hot water: electricity)	70%	42.8	3
	High energy efficiency gas cooker	Thermal efficiency (base year=1)	0.53	1	[illegible]	Diffusion ratio (cooking: gas)	70%	12.5	3
	High energy efficiency IH cooker	Thermal efficiency (base year=1)	0.08	1	[illegible]	Diffusion ratio (cooking: electricity)	70%	8.0	3
	Fluorescent light								
	LED (substitute fluorescent light)	Electricity consumption (conventional type=1)	2.67	1	[illegible]	Diffusion ratio	50%	24.1	3
	Hf inverter fluorescent light	Electricity consumption (conventional type=1)	1.33	1	[illegible]	Diffusion ratio	50%		
	Incandescent light							51.5	3
	LED (substitute incandescent light)	Electricity consumption (conventional type=1)	8.70	1	[illegible]	Diffusion ratio	50%		
	Bulb- type fluorescent light	Electricity consumption (conventional type=1)	4.55	1	[illegible]	Diffusion ratio	50%		
	Refrigerator							72.1	3
	Super high energy efficiency refrigerator	Electricity consumption (conventional type=1)	2.82	1	[illegible]	Diffusion ratio	50%		
	Highest energy efficiency refrigerator	Electricity consumption (conventional type=1)	2.33	1	[illegible]	Diffusion ratio	50%		
	TV							31.8	3
	LCD TV	Electricity consumption (conventional type=1)	2.27	1	[illegible]	Diffusion ratio	50%		
	Highest energy efficiency TV	Electricity consumption (conventional type=1)	1.54	1	[illegible]	Diffusion ratio	50%		
	House insulation							100.7	2
	Next generation level	Thermal loss (base year=1)	0.36	4	[illegible]	Diffusion ratio	40%		
	New standard	Thermal loss (base year=1)	0.43	4	[illegible]	Diffusion ratio	40%		
	Energy- saving behavior	Energy service demand reduction ratio	10%	5	[illegible]	Diffusion ratio	25%	32.4	3
	Photovoltaic generation	Potential(ktoe)	295	6	[illegible]	Diffusion ratio	10%	26.9	3
	Solar water heating	Potential(ktoe)	1037	6	[illegible]	Diffusion ratio (hot water: all)	10%	30.8	3
	Other energy efficiency improvement				[illegible]			0.2	3
	Other fuel shifting				[illegible]			27.5	3
	Total							625.1	

(Example from Low Carbon Kyoto)

Similar tables for commercial, industrial, passenger transport, freight transport and waste.

Collecting and organizing necessary information

Table of content of "Background information report"

The necessary direct and frank discussion points are:

- Identification and relationship with related development programs by HCMC and national government
- Framing of structure and scopes of "Low Carbon Policies for HCMC"
- Compiling necessary information
- Long-term collaboration scheme, especially from a view point of research institution
- International networking and alliance scheme of Asian LCC development

Thank you very much for your attention

Xin chân thành cảm ơn!

AIM team

July, 2014

Example of Low Carbon
Iskandar Malaysia

13

Appendix: AIM experience (1)

Low Carbon Policies/Actions: Bundling potential measures to Policies/Actions

Actions	Contribution * ($ktCO_2eq$)	Share
Green Economy	**6,937**	**54%**
Action 1 Integrated Green Transportation	1,916	15%
Action 2 Green Industry	1,094	9%
Action 3 Low Carbon Urban Governance **	-	-
Action 4 Green Building and Construction	1,203	9%
Action 5 Green Energy System and Renewable Energy	2,725	21%
Green Community	**2,727**	**21%**
Action 6 Low Carbon Lifestyle	2,727	21%
Action 7 Community Engagement and Consensus Building**	-	-
Green Environment	**3,094**	**25%**
Action 8 Walkable, Safe and Livable City Design	263	2%
Action 9 Smart Urban Growth	1,214	10%
Action 10 Green and Blue Infrastructure and Rural Resources	392	3%
Action 11 Sustainable Waste Management	1,224	10%
Action 12 Clean Air Environment**	-	-
Total	**12,758**	**100%**

*Contribution to GHG emission reduction from 2025BaU to 2025CM ** Action 3, 7 and 12 does not have direct emission reduction, but their effect is included in other Actions. *** Since contribution of Action 10 includes carbon sink by forest conservation and urban tree planting, the total of contribution of the 12 Actions is greater than difference of the GHG emissions between 2025BaU and 2025CM in Figure 2 and Table2.

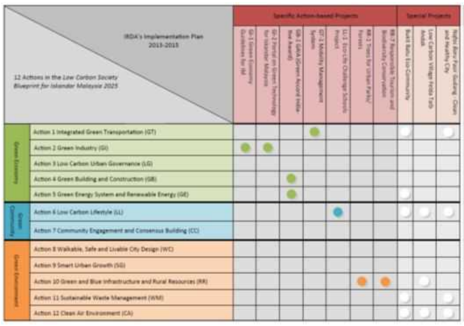
(Example of Low Carbon Iskandar)

Example of Low Carbon
Iskandar Malaysia

14

Appendix: AIM experience (2)

Low Carbon Projects : Initiating projects based on policies



(Example of Low Carbon Iskandar)

Suggestions for Structure & Contents for HCMC Climate Change Action Plan 2016-2020

The purpose of this paper is to share Osaka side's suggested ideas for structure/contents for HCMC Climate Change Action Plan (CCAP) 2016-2020 with HCMC CCB and relevant Departments/Authorities. Having reviewed the 1st draft of CCAP 2016-2020 we received in May, we would like to make the following suggestions to the structure/contents of CCAP based on our experiences and expertise.

A) Include the contents as follows

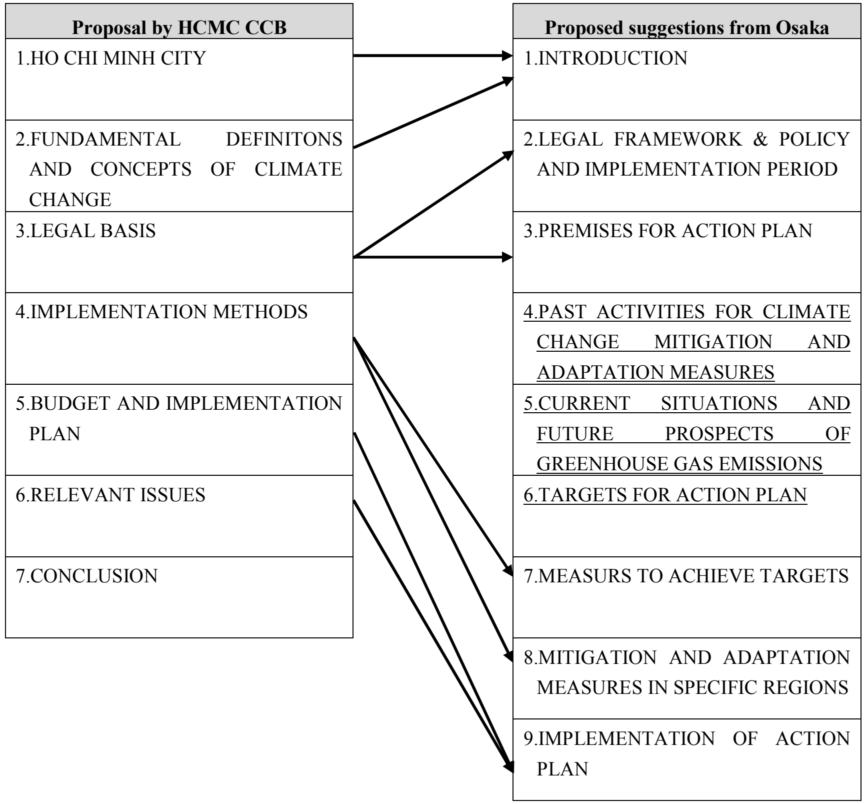
- past activities for climate change mitigation and adaptation measures (new chapter 4)
  Reason of inclusion: HCMC already has their CCAP 2015 and updated version CCAP should reflect its contents and progress.
- current situations and future prospects of GHG emissions (new chapter 5)
  Reason of inclusion: CCAP should touch upon the status-quo and future perspective, in order to show the process to achieve new CCAP objectives.
- targets for Action Plan (short-/med-/long-terms) (new chapter 6)
  Reason of inclusion: CCAP targets should be clearly described, including target year(s) (short-/mid-/long-term).

B) Change the structure as follows

- Incorporate Chapter 1 & 2 into one chapter
  Reason of change: The purpose and need of CCAP becomes more explicit in a comprehensive "Introduction" section.
- Divide Chapter 3 into two chapters
  Reason of change: The two components (legal background & upper-level plans as premises for considering future prospects) become more explicit
- Add three chapters to include our suggested contents described above under A)
- Divide Chapter 4 into two chapters to describe mitigation and adaptation measures on a sectoral basis and on a regional basis in separate chapters
  Reason of change: The two contents (mitigation and adaptation measures on a sectoral basis, and measures on a regional basis) should be described in separate chapters respectively to make the contents more clearly understandable.
- Incorporate Chapter 5 & 6 into one chapter to assemble all important issues, including financial resources

On the right side of this page, a comparison of proposed CCAP structures by HCMC and Osaka side is shown.

Comparison of proposed CCAP structures by HCMC and Osaka side



1. Introduction

- Describe the current situation of climate change and the need for climate change countermeasures as background for the development of Action Plan
- Describe the purpose of developing Action Plan

2. Legal Framework & Policy and Implementation Period

2.1 Legal Framework

- Describe national policies and legal bases for Climate Change Action Plan

2.2 Implementation Period

- Describe the target implementation period and concepts behind it

3. Premises for Action Plan

- Describe future population growth, development plans, land use planning, and other related plans that a future forecast for GHG emissions and Action Plan are based on

4. Past Activities for Climate Change Mitigation and Adaptation Measures

4.1 Progress Status for the existing measures (projects/programs)

- Organize and describe the progress status of projects (programs) listed in Action Plan for Climate Change Adaptation and Mitigation Towards 2015 (“Action Plan 2015”)
- Also organize and describe projects (programs) that are not listed in Action Plan 2015 but already implemented by HCMC
- For those projects (programs) that are not yet implemented as planned, describe reasons for not being implemented

4.2 Issues and Challenges for the Implementation of Measures

- Based on 4.1 (progress status for the existing measures), describe issues for implementing those measures

5. Current Situations and Future Prospects of Greenhouse Gas Emissions

5.1 Current Situations

- Estimate current GHG emissions and organize emission amounts by sector, GHG type, and emission source

5.2 Future Prospects

- Estimate future GHG emissions at each targeted year and describe future prospects for GHG emissions

6. Targets for Action Plan

- Based on 5 (current situations and future prospects of greenhouse gas emissions), set GHG emission reduction targets for the short- (2020), med- (2030), and long-terms (post-2030).

6.1 Short-term Targets (2020)

6.2 Med-term Targets (2030)

6.3 Long-term Targets (post-2030)

7. Measures to Achieve Targets

- Make a list of mitigation (and adaptation) measures to achieve GHG emission reduction
- For each measure, describe the followings
  - ✓ Title
  - ✓ Summary
  - ✓ Target area
  - ✓ Expected effects (benefits) by implementing the measure
  - ✓ Leading agency
  - ✓ Implementation period
- Categorize mitigation (and adaptation) measures by following sectors

7.1 Energy

7.2 Transportation

7.3 Industry

7.4 Water Resource and Management

7.5 Waster Management

7.6 Agriculture

7.7 Land Use

7.8 Healthcare

8. Mitigation and Adaptation Measures in Specific Regions

- Reorganize mitigation (and adaptation) measures in 7 (measures to achieve targets in each sector) into 6 regions (urban central area, 4 satellite regions, rural area)
- For each region, describe regional characteristics and enforcement policies in addition to the list of measures
- In addition to 6 regions, illustrate application of selected measures in priority areas (e.g. District 4, and Nha Be)

9. Implementation of Action Plan

9.1 Finance Resources

- Describe ways and means to secure financial resources to implement measures

9.2 Progress Management

- Illustrate implementation periods and methods at each stage of PDCA as the progress management

9.3 Implementation Structure

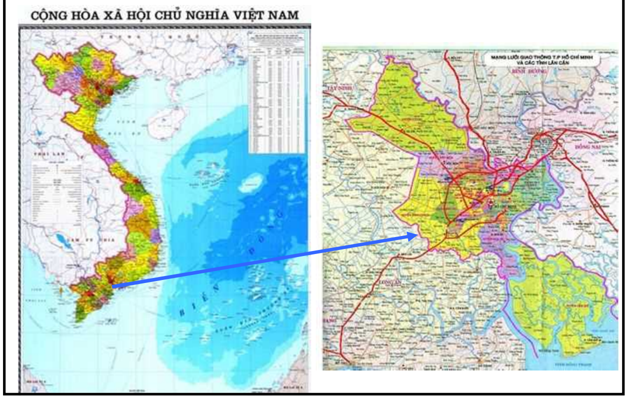
- Illustrate the implementation structure, including public-private cooperation with each sector`s role, and intercity cooperation between HCMC and Osaka City

HCMC CLIMATE CHANGE BUREAU

CLIMATE CHANGE ACTION PLAN IN 2016 – 2020 PERIOD

HCMC, 7/2014

HO CHI MINH CITY



GENERAL INFORMATION

- Area: 2,093.7 km²
  Population: 7,162,864 (2009) - 70% under 35 y.o
  Density: 3,419 persons/km²
- Forestry area: 37,000 ha, centralise in Can Gio District *(Can Gio Mangroves are recognized as a UNESCO Biosphere Reserve World in 2000)*
- Total length of rivers and canals network : 795.5 km

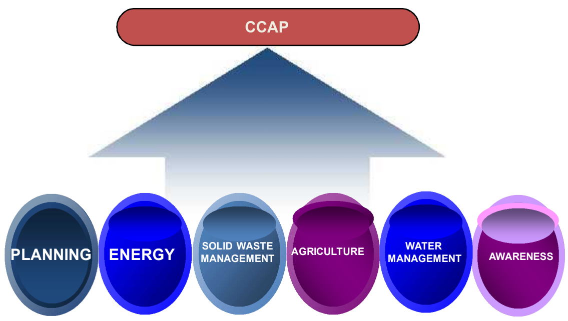
ACTION PLAN

- Climate change action plan of HCMC towards 2015 was approved by HCMC People's Committee on Feb-5-2013.
- This plan aims to develop programs to respond to climate change and to propose solutions for reducing greenhouse gas emissions.
- This will be a commitment to reduce emissions and to be a Green city of Ho Chi Minh City for the government and the world.

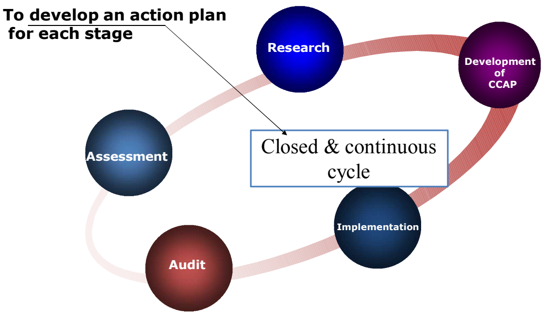
RESPONSIBILITIES & RESOLUTIONS

1. To assess the extent and impact of climate change in HCMC
2. To identify measures to respond to climate change
3. To build science and technology program on climate change
4. To enhance institutional capacity, institutional and policy on climate change
5. To enhance awareness and capacity
6. To enhance international cooperation
7. To integrate climate change issues into strategies, programs, planning and socio-economic development
8. To develop action plans for each sector to respond to climate change
9. To implement priority projects

PRIMARY RESULTS



CCAP DEVELOPMENT CYCLE



REGIONAL CCAP

LEGAL BASIS

- Decision No.1474/QĐ-TTg dated 10/05/2012 of Minister about publishing Climate Change Action Plan for the period 2012-2020.
- Resolution No. 24-NQ/TW the 7th Conference of the Central Executive Committee of the XIth actively respond to climate change, enhance resource management and environmental protection
- Resolution No. 08/NQ-CP dated 01.23.2014 issued by the Government on implementation of the action program Resolution 24-NQ/TW the 7th Conference of the Central Executive Committee of the initiative XI response to climate change, enhance resource management and environmental protection
- Action Plan of the City Commission 34-CTrHD/TU on the implementation of Resolution No. 24-NQ/TW of the Party Central Committee XI to actively respond to climate change, strengthen financial management Resources and environmental Protection
- The master plan of Ho Chi Minh City in 2025 by the Prime Minister approved the Decision dated 06/01/2010 24/QD-TTg;
  - 2484/QD-UBND dated 15.05.2013 Decision of the Municipal People's Committee approving action plan to respond to climate change in the area of Ho Chi Minh City to 2015 period;
- Framework Plan guides action in response to climate change of the industry, together with the local dispatch dated 13/10/2009 3815/BTNMT-KTTVBDKH Ministry of Natural Resources and Environment;
- Document dated 19/03/2014 1909/VP-DTMT of the municipal People's Committee for approval Affairs Department of Natural Resources and Environment Action Plan for the city of Ho Chi Minh.

OBJECTIVES

(1) the assessment of climate change impacts on various regions,

(2) the status quo of infrastructure,

(3) vulnerabilities of various regions,

(4) climate change responding capacity of each region to step by step fulfil the specified CCAP that is possible to apply for climate change responding actions in each period from short-term to long-term.

SCOPE

- Central urban region (existing 13 central districts): focusing on urban development.
- Eastern urban region (District 2, 9 and Thu Duc District with total area of 211 km² and the center is Thu Thiem): focusing on developing key high-classed service industry and hi-tech industry.
- Southern urban region (District 7, Nha Be District and a part of District 8 – southern area of Te Canal, and Binh Chanh District, area 194 km²): develop port services and commercial services.

SCOPE

- Northern urban region (District 12 and most of Hoc Mon District, area 149 km²): develop ecological service industry integrating hi-tech agriculture.
- Western urban region (Binh Tan District, a part of District 8 and Binh Chanh District, area 191 km²): develop service industry and industrial zones.
- Agricultural region (a part of District 8, Cu Chi and Can Gio Districts): develop agriculture, ecological and biosphere reservation areas.

METHOD

- Assess current situation and determine scenarios of socio-economic development
- Assess the impact of climate change and vulnerability
- Assess the risk of damage due to the impact of climate change
- Assess the capacity to adapt to climate change risks and to reduce vulnerability
- Propose adaptation and mitigation measures
- Evaluate, select and rank measures of adaptation and mitigation in order of priority

CONTENT

1. ***Assessment of current situation and determination of socio-economic development scenarios***

- Survey and collect information of regions about nature, socio-economy, culture, environment
- Strategy, planning, programs and regional development plans in 2020, vision to 2030

CONTENT

2. Assessment of climate change's impacts

- Building systems of criteria and evaluation standards
- Identify the economic, societal sectors that affected by climate change and the prioritization (spatial and time context)
- Assess the impacts of climate change and vulnerability in periods (2016-2020 and 2021-2030)
- Listing, evaluate lacking infrastructure, programs of HCMC.

CONTENT

3. Identification of action plan

- Establish methods to identify climate change reponding solutions in HCMC
- Establish methods to identify reponding demands in each industry/sector/region in HCMC
- Establish criteria and coefficient framework for identifying responding solutions
- Establish the assessment methods, select the priority solutions.
- Apply to methods CIP (Capital Investment Planning) of the World Bank (WB) to facilities and infrastructure assessment for the Action Plan for climate change adaptation and mitigation in HCMC.

IMPLEMENTATION PLAN

- Establishment and funding of plans : 3/2014 - 7/2014
- Survey: 7/2014 - 12/2014
- Assessment of climate change's impacts : 12/2014 - 3/2015
- Development of action plan: 3/2015 - 9/2015
- Approval: 9/2015

THANK YOU FOR YOUR LISTENING

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENT
HO CHI MINH CITY CLIMATE CHANGE BUREAU

INTEGRATING CLIMATE CHANGE ISSUES INTO URBAN PLANS OF DISTRICT 4

July 2014

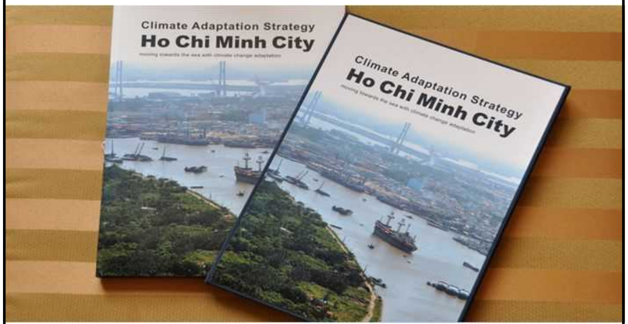
CONTENT

I. THE COOPERATION PROGRAM WITH ROTTERDAM CITY
II. INTRODUCTION OF DISTRICT 4
III. INTEGRATE CLIMATE CHANGE ISSUE IN DISTRICT 4

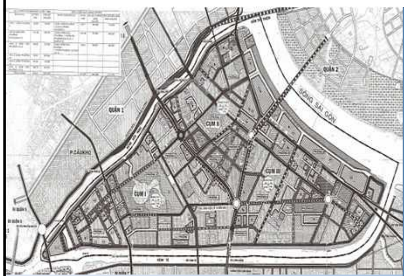
COOPERATION PROGRAM WITH ROTTERDAM CITY

- **Name:** Ho Chi Minh city Moving Toward the Sea Adaptation with Climate Change
- **Time:** 12/2011 – 02/2013
- **Objective:** Develop Climate Adaptation Strategy with specific recommendations in city and port development towards the sea in the context of climate change
- **Results:**
  1. The Atlas
  2. Climate Adaptation Strategy for Ho Chi Minh City (CAS)
  3. The Action Plan for CAS

IMPLEMENTATION OF CAS



DISTRICT 4



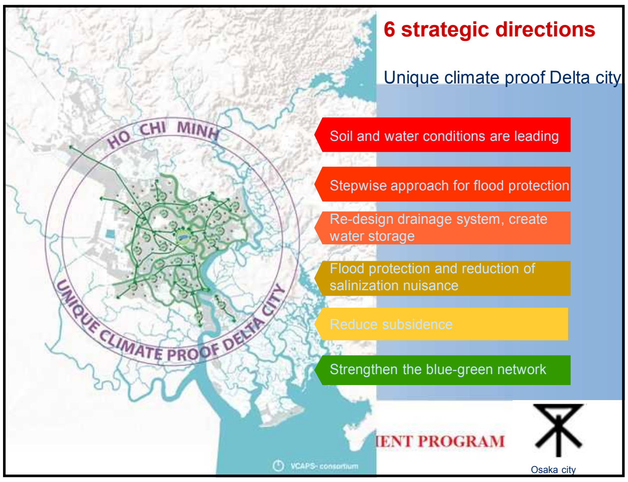
- Inner district of HCM city
- Area: 417.08 ha (smallest among 24 districts)
- Population: 184,114
- Density: 44,141 ppl/km^2 (second highest)
- Covered by Saigon River and canals
- Economic structure: Trade – Service, Industry - Handicraft Industry.

INTEGRATING CLIMATE CHANGE ISSUE

Rotterdam
- Planning
- Water Management

???
- Energy
- Transportation
- Health care
- Waste Management


THANK YOU!
LOW CARBON CITY DEVELOPMENT PROGRAM
Osaka city


6 strategic directions
Unique climate proof Delta city
HO CHI MINH
UNIQUE CLIMATE PROOF DELTA CITY
Soil and water conditions are leading
Stepwise approach for flood protection
Re-design drainage system, create water storage
Flood protection and reduction of salinization nuisance
Reduce subsidence
Strengthen the blue-green network
IENT PROGRAM
Osaka city

2. 2nd Working Group Meeting

Global Environment Centre Foundation

No.1

Khảo sát hỗ trợ phát triển thành phố phát thải các-bon thấp hợp tác giữa TP Hồ Chính Minh và TP Osaka
Năm tài khóa 2014

Họp nhóm công tác chuyên để lần thứ 2

Về việc xây dựng "Kế hoạch hành động ứng phó với biến đổi khí hậu TP Hồ Chí Minh giai đoạn 2016-2020"

Ngày 21 tháng 8 năm 2014

Trung tâm Môi trường Toàn cầu (GEC)

GEC

1

Global Environment Centre Foundation

Dự án hỗ trợ phát triển thành phố phát thải các-bon thấp hợp tác giữa TP Hồ Chí Minh và TP Osaka

TP Hồ Chí Minh

・TP Hồ Chí Minh là thành phố có quy mô dân số và kinh tế lớn nhất Việt Nam
・Nguy cơ gia tăng khí nhà kính và áp lực môi trường do đô thị hóa và tăng trưởng kinh tế nhanh

Hỗ trợ của Bộ Môi trường Nhật Bản

- Ký kết Cơ chế tín chỉ chung (JCM) song phương Nhật Bản-Việt Nam (7/2013)
- Được lựa chọn vào "Chương trình nghiên cứu khả thi hình thành các dự án JCM quy mô lớn" (2013-)

Hỗ trợ của TP Osaka

Thị trưởng và Chủ tịch UBND đã ký "Biên bản ghi nhớ về việc phát triển thành phố phát thải các-bon thấp giữa TP HCM và TP Osaka" (10/2013)

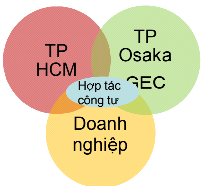
Phát triển thành phố phát thải các-bon thấp TP Hồ Chí Minh thông qua việc triển khai tích cực các nội dung của bản ghi nhớ

2

Global Environment Centre Foundation

Mục đích của dự án

・Cung cấp, hỗ trợ một cách hệ thống các công nghệ môi trường và cơ chế quản lý nhà nước về môi trường tiên tiến của Nhật Bản, Osaka
・Xác lập các cơ chế điều hành, duy trì, quản lý như xây dựng Kế hoạch hành động ứng phó với BĐKH hay đào tạo nguồn nhân lực, coi đó là cốt lõi của việc phát triển thành phố phát thải các-bon thấp trong dài hạn
・Tranh thủ các nguồn vốn quan trọng theo cơ chế tín chỉ chung JCM (Joint Crediting Mechanism) nhằm ứng dụng, chuyển giao các công nghệ sạch (phát thải các-bon thấp) cho TP Hồ Chí Minh



3

Global Environment Centre Foundation

Dự án của Team Osaka

Hình thành 2 dự án hỗ trợ thiết bị JCM từ FS thực hiện năm ngoái
(Bộ Môi trường hỗ trợ 50% chi phí đầu tư ban đầu)
Công nghệ phát thải thấp sẽ được triển khai tại TP Hồ Chí Minh.

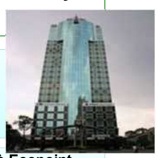
1. **Lên men và sử dụng khí mê-tan từ rác hữu cơ tại chợ đầu mối Bình Điền**
   Phía Việt Nam: SATRA; Phía Nhật Bản: Công ty Hitachi Zosen
   Tổng vốn dự án:7 triệu USD; Thời gian xây dựng: từ 2014-2016
   Lượng CO2 cắt giảm: 3.355t/năm

2. **Dự án lái xe thân thiện với môi trường sử dụng thiết bị giám sát hành trình kỹ thuật số (TP HCM và Hà Nội)**
   Phía Việt Nam: Công ty Nittsu Việt Nam; Phía Nhật Bản: Công ty Nittsu
   Tổng vốn dự án: 1 triệu USD (※): Lượng CO2 cắt giảm: 315t/năm (※)
   ※ Cộng gộp cả TP HCM và Hà Nội

Global Environment Centre Foundation

Mở rộng dự án của Team Osaka

・Thực hiện FS cho các dự án hỗ trợ thiết bị JCM trong năm nay
・Tìm kiếm những dự án mới



FS Ứng dụng công nghệ TKNL cho công trình xây dựng
Phía Việt Nam: Sun Wah Tower; Phía Nhật Bản: Công ty xây dựng Shimizu
Tổng vốn đầu tư: 3 triệu USD (dự kiến)

FS Khuyến khích sử dụng xe buýt với hệ thống Park-and-Ride và Ecopoint kết hợp với trung tâm thương mại
(Aeon cơ sở 1)
Phía Việt Nam: Sở GTVT (dự kiến)
Phía Nhật Bản: VNC Nikken Sekkei
Tổng vốn: 1 triệu USD (dự kiến)

FS Phát điện từ rác theo mô hình tổng hợp tại TP Hồ Chí Minh
Phía Việt Nam: Vietstar; Phía Nhật Bản: Công ty Hitachi Zosen
Tổng vốn đầu tư: 60 triệu USD (dự kiến)

Global Environment Centre Foundation

Mục đích của nhóm công tác

- Chia sẻ thông tin về tiến độ xây dựng "Kế hoạch hành động ứng phó với biến đổi khí hậu TP Hồ Chí Minh giai đoạn 2016-2020(HCMC CCAP 2016-2020)"
- Thảo luận về nội dung đề cập trong "HCMC CCAP 2016-2020"
- Thảo luận về các biện pháp, dự án cụ thể liên quan đến "HCMC CCAP 2016-2020"
- Thảo luận về dự báo lượng phát thải khí nhà kính

6

Global Environment Centre Foundation

Chương trình

Thời gian	Nội dung
8:30	1.Khai mạc ・Phát biểu khai mạc (Ông Kiệt, Giám đốc Sở TNMT TP Hồ Chí Minh) ・Phát biểu của khách mời (Ông Kitagawa, Thứ trưởng Bộ Môi trường Nhật Bản)
8:50	2.Khái quát nội dung cuộc họp (Team Osaka)
9:00	3.Về tiến độ của "Kế hoạch hành động ứng phó với biến đổi khí hậu TP Hồ Chí Minh giai đoạn 2016－2020" (HCCB)
9:40	4.Về các biện pháp, dự án cụ thể liên quan đến "Kế hoạch hành động ứng phó với biến đổi khí hậu TP Hồ Chí Minh giai đoạn 2016－2020" (HCCB)
10:30	Chụp hình lưu niệm
10:40	Nghỉ giữa giờ
11:00	4(tiếp). 4.Về các biện pháp, dự án cụ thể liên quan đến "Kế hoạch hành động ứng phó với biến đổi khí hậu TP Hồ Chí Minh giai đoạn 2016－2020" (HCCB)
12:00	Ăn trưa

7

Global Environment Centre Foundation

Chương trình

Thời gian	Nội dung
13:30	5.Về dự báo lượng phát thải khí nhà kính (IGES・NIES)
14:30	6.Về "Chương 7 Các biện pháp, dự án nhằm đạt mục tiêu" trong Kế hoạch hành động (HCCB・Team Osaka)
15:20	7.Về kết quả thảo luận của cuộc họp nhóm công tác (HCCB・Team Osaka)
15:30	8.Bế mạc

8

Global Environment Centre Foundation

Cảm ơn đã chú ý lắng nghe!

http://osaka-hcm-lcc.net/en/index.html

9

SỞ TÀI NGUYÊN VÀ MÔI TRƯỜNG

VĂN PHÒNG BIẾN ĐỔI KHÍ HẬU

KẾ HOẠCH HÀNH ĐỘNG ỨNG PHÓ BIẾN ĐỔI KHÍ HẬU GIAI ĐOẠN 2016 – 2020 CHO TP.HCM

ĐỀ ÁN

Thành phố Hồ Chí Minh

Tháng 8 năm 2014

NỘI DUNG TRÌNH BÀY

1. Sự cần thiết
2. Mục tiêu
3. Phạm vi
4. Phương pháp
5. Chiến lược
6. Quy hoạch phát triển
7. Kế hoạch, đề án
8. Đánh giá 10 linh vực

SỰ CẦN THIẾT

Theo yêu cầu của Trung ương

Từ nhu cầu thực tiễn của thành phố

- Thuận lợi trong hợp tác, kêu gọi đầu tư, chuyển giao công nghệ
- Phân chia thành các vùng có đặc điểm tự nhiên và đặc điểm KT-VH-XH tương đồng

→ **KHHĐ ứng phó với BĐKH cho từng vùng**

MỤC TIÊU CHUNG

Xây dựng và hoàn thiện từng bước KHHĐ cụ thể có tính khả thi để ứng phó BĐKH cho từng giai đoạn ngắn hạn và dài hạn, nhằm xây dựng thành phố phát thải các bon thấp, tăng trưởng xanh.

Đảm bảo sự phát triển bền vững của thành phố, thực hiện và tận dụng các cơ hội phát triển nền kinh tế theo hướng tiêu thụ năng lượng một cách hiệu quả nhất trong nỗ lực tham gia cùng cộng đồng quốc tế giảm nhẹ BĐKH, bảo vệ sự tồn tại của con người cùng các sinh vật sống trên trái đất.

MỤC TIÊU CỤ THỂ

Tùy thuộc vào đặc điểm tự nhiên, phát triển kinh tế - xã hội của từng vùng, mục tiêu sẽ tập trung vào mảng thích ứng (adaptation) hoặc giảm thiểu (mitigation) cụ thể như sau:

- Đánh giá mức độ tác động của biến đổi khí hậu, trên cơ sở kinh tế - xã hội và cơ sở hạ tầng, đến 6 vùng phát triển Thành phố (1 thành phố lõi, 4 thành phố vệ tinh và vùng nông thôn) theo định hướng mới về phân chia quản lý đô thị.
- Đề xuất các giải pháp ứng phó cho 6 vùng phát triển Thành phố (1 thành phố lõi, 4 thành phố vệ tinh và vùng nông thôn) theo đặc trưng của từng vùng, đảm bảo phát triển kinh tế - xã hội vùng theo hướng tăng trưởng xanh, phát thải các bon thấp.

PHẠM VI

Phạm vi địa lý: toàn bộ địa bàn 24 quận huyện của TP.HCM, dự kiến chia thành các vùng như sau:

- Khu đô thị lõi (13 quận nội thành hiện hữu): Vùng phát triển đô thị
- Khu đô thị Đông (gồm quận 2, 9 và Thủ Đức với diện tích 211 ha với trung tâm là khu đô thị mới Thủ Thiêm): Phát triển kinh tế trọng điểm các ngành dịch vụ cao cấp và công nghệ kỹ thuật cao

PHẠM VI

- Khu đô thị Nam (gồm quận 7, huyện Nhà Bè và một phần diện tích quận 8 (phần phía nam kênh Tẻ) và huyện Bình Chánh với diện tích 194 ha): Phát triển kinh tế theo xu hướng phát triển các dịch vụ cảng và dịch vụ thương mại
- Khu đô thị Bắc (gồm quận 12 và phần lớn huyện Hóc Môn với diện tích 149 ha): Phát triển kinh tế trọng điểm các ngành dịch vụ sinh thái gắn liền với nông nghiệp kỹ thuật cao.

PHẠM VI

- Khu đô thị Tây (gồm quận Bình Tân, một phần diện tích quận 8 và huyện Bình Chánh với diện tích 191 ha): Trọng điểm Phát triển các ngành dịch vụ, khu công nghiệp.
- Khu nông thôn (một phần quận 8, Củ Chi, Cần Giờ): vùng phát triển nông nghiệp, sinh thái và khu dự trữ sinh quyển.

PHƯƠNG PHÁP

1. Đánh giá hiện trạng và xác định các kịch bản phát triển kinh tế xã hội: phương pháp khảo sát thu thập số liệu, xây dựng tiêu chí/tiêu chuẩn đánh giá
2. Đánh giá tác động của biến đổi khí hậu và dễ bị tổn thương, Đánh giá các nguy cơ thiệt hại do tác động của biến đổi khí hậu: (impact assessment) checklist, MRV (định tính và định lượng)
3. Đánh giá năng lực để thích ứng với những rủi ro biến đổi khí hậu và giảm thiểu tính dễ tổn thương
4. Đề xuất giải pháp thích ứng và giảm thiểu: self-assessment, CIP
5. Đánh giá, lựa chọn và xếp hạng các biện pháp thích ứng và giảm thiểu theo thứ tự ưu tiên: xây dựng tiêu chí, trọng số và CIP

PHƯƠNG PHÁP

Khảo sát, điều tra số liệu hiện trạng tự nhiên – kinh tế – xã hội – văn hóa – môi trường

- Điều kiện tự nhiên
- Tình hình kinh tế - xã hội
- Thực trạng phát triển cơ sở hạ tầng
- Hiện trạng tài nguyên
- Hiện trạng môi trường

PHƯƠNG PHÁP

Thu thập Chiến lược, quy hoạch, chương trình và kế hoạch phát triển vùng đến năm 2020, tầm nhìn 2030

a. Các chiến lược (quốc gia, vùng, thành phố)

b. Các qui hoạch phát triển (tổng thể và chuyên ngành)
  + Qui hoạch phát triển quốc gia
  + Qui hoạch phát triển vùng
  + Qui hoạch phát triển thành phố

c. Các chương trình và kế hoạch phát triển
  + Các chương trình phát triển
  + Các kế hoạch phát triển

d. Các văn bản pháp luật liên quan (nếu có)

CHIẾN LƯỢC

- Kinh tế - Xã hội

- Nghị quyết 10/NQ-CP về ban hành Chương trình hành động của Chính phủ triển khai thực hiện Chiến lược phát triển KT-XH 2011-2020 và Phương hướng,nhiệm vụ phát triển đất nước 5 năm 2011-2015
- Chiến lược phát triển bền vững giai đoạn 2011 – 2020;
- Chiến lược quốc gia về tăng trưởng xanh.

- Quản lý nước

- Chiến lược quốc gia về cấp nước sạch và vệ sinh nông thôn đến năm 2020;
- Chiến lược quốc gia về tài nguyên nước đến năm 2020;
- Chiến lược khai thác, sử dụng bền vững tài nguyên và bảo vệ môi trường biển.

CHIẾN LƯỢC

- Giao thông
- Điều chỉnh Chiến lược phát triển giao thông vận tải Việt Nam đến năm 2020, tầm nhìn đến 2030;
- Chiến lược bảo đảm trật tự an toàn giao thông đường bộ quốc gia đến năm 2020 và tầm nhìn đến 2030.
- Năng lượng
- Chiến lược phát triển năng lượng Quốc gia của Việt Nam đến năm 2020, tầm nhìn 2025.
- Chất thải rắn
- Chiến lược quốc gia về quản lý tổng hợp chất thải rắn đến năm 2025, tầm nhìn đến năm 2050

CHIẾN LƯỢC

- Nông nghiệp
- Chiến lược phát triển chăn nuôi đến năm 2020;
- Chiến lược toàn diện về tăng trưởng và xoá đói giảm nghèo;
- Định hướng Chiến lược Phát triển thuỷ lợi Việt Nam;
- Chiến lược phát triển lâm nghiệp Việt Nam giai đoạn 2006 – 2020;
- Chiến lược phát triển thuỷ sản Việt Nam đến năm 2020;
- Chiến lược phát triển nông nghiệp, nông thôn giai đoạn 2011 – 2020;

CHIẾN LƯỢC

- Công nghiệp
- Chiến lược phát triển các ngành công nghiệp áp dụng công nghệ cao đến năm 2020.
- Khác
- Chiến lược quốc gia về phòng, chống và giảm nhẹ thiên tai đến năm 2020;
- Chiến lược quốc gia về biến đổi khí hậu.

QUY HOẠCH PHÁT TRIỂN VÙNG

- Quy hoạch tổng thể phát triển kinh tế - xã hội vùng Đông Nam Bộ đến năm 2020;
- Quy hoạch xây dựng vùng thành phố Hồ Chí Minh đến năm 2020 và tầm nhìn đến năm 2050;
- Quy hoạch sử dụng đất đến năm 2020 và kế hoạch sử dụng đất 5 năm (2011 - 2015) cấp quốc gia;
- Quy hoạch tổng thể phát triển các ngành công nghiệp Việt Nam theo các vùng lãnh thổ đến năm 2010, tầm nhìn đến năm 2020 ;
- Quy hoạch phát triển công nghiệp vùng Đông Nam Bộ đến năm 2020, tầm nhìn đến năm 2030;
- Quy hoạch phát triển vận tải biển Việt Nam đến năm 2020 và định hướng đến năm 2030;

QUY HOẠCH PHÁT TRIỂN VÙNG

- Quy hoạch phát triển hệ thống cảng biển Việt Nam đến năm 2020, định hướng đến 2030;
- Quy hoạch tổng thể phát triển giao thông vận tải đường thủy nội địa Việt Nam đến năm 2020 và định hướng đến năm 2030;
- Điều chỉnh quy hoạch tổng thể phát triển giao thông vận tải đường thủy nội địa Việt Nam đến năm 2020 và định hướng đến năm 2030;
- Quy hoạch chi tiết hệ thống Cảng đường thủy nội địa khu vực phía Nam đến năm 2020 và định hướng đến năm 2030;
- Quy hoạch phát triển hệ thống Cảng biển Việt Nam đến năm 2020, định hướng đến năm 2030;
- Quy hoạch phát triển viễn thông quốc gia đến năm 2020.

QUY HOẠCH PHÁT TRIỂN TP.HCM

- Quy hoạch tổng thể phát triển kinh tế - xã hội Thành phố Hồ Chí Minh đến năm 2020, tầm nhìn đến năm 2025;
- Điều chỉnh quy hoạch chung xây dựng Thành phố Hồ Chí Minh đến năm 2025
- Quy hoạch sử dụng đất đến năm 2020 và kế hoạch sử dụng đất 5 năm kỳ đầu (2011 - 2015) của Thành phố Hồ Chí Minh;
- Quy hoạch cấp nước Thành phố Hồ Chí Minh đến năm 2025;
- Quy hoạch tổng thể hệ thống thoát nước Thành phố Hồ Chí Minh đến năm 2020;
- Quy hoạch thủy lợi chống ngập úng khu vực Thành phố Hồ Chí Minh;
- Điều chỉnh Quy hoạch phát triển Giao thông Vận tải Thành phố Hồ Chí Minh đến năm 2020 và tầm nhìn sau năm 2020;
- Quy hoạch phát triển điện lực thành phố Hồ Chí Minh giai đoạn 2011-2015 có xét đến 2020;
- Quy hoạch phát triển ngành y tế TPHCM đến năm 2020 và tầm nhìn đến năm 2025.

QUY HOẠCH PHÁT TRIỂN TP.HCM

- Quy hoạch mạng lưới trường học ngành giáo dục và đào tạo thành phố đến năm 2020;
- Quy hoạch mạng lưới cơ sở vật chất ngành y tế thành phố Hồ Chí Minh đến năm 2020.
- Quy hoạch định hướng phát triển hệ thống chợ-siêu thị-trung tâm thương mại trên địa bàn thành phố Hồ Chí Minh giai đoạn 2009-2015, tầm nhìn 2020;
- Quy hoạch mạng lưới đường thủy và cảng, bến khu vực thành phố Hồ Chí Minh đến năm 2020;
- Quy hoạch hệ thống cửa hàng xăng dầu trên địa bàn thành phố giai đoạn 2007-2010, định hướng đến năm 2020;
- Quy định về quản lý việc san lấp và xây dựng công trình trên sông, kênh, rạch, đầm, hồ công cộng thuộc địa bàn thành phố Hồ Chí Minh.

KẾ HOẠCH, ĐỀ ÁN

- Chương trình hỗ trợ chuyển dịch kinh tế, chuyển đổi mô hình tăng trưởng kinh tế thành phố giai đoạn 2011-2015;
- Chương trình, giảm ùn tắc giao thông giai đoạn 2011-2015;
- Chương trình giảm ngập nước giai đoạn 2011-2015;
- Chương trình giảm ô nhiễm môi trường giai đoạn 2011-2015;
- Đề án trồng rừng và cây xanh thành phố giai đoạn 2011-2015, định hướng đến năm 2020;
- Đồ án quy hoạch chi tiết xây dựng đô thị tỷ lệ 1/2.000 (quy hoạch phân khu) khu trung tâm hiện hữu thành phố Hồ Chí Minh (930 ha).

ĐÁNH GIÁ 10 LINH VỰC

1. Đánh giá tác động của biến đổi khí hậu và dễ bị tổn thương, Đánh giá các nguy cơ thiệt hại do tác động của biến đổi khí hậu: (impact assessment) checklist, MRV (định tính và định lượng)
2. Đánh giá năng lực để thích ứng với những rủi ro biến đổi khí hậu và giảm thiểu tính dễ tổn thương
3. Đề xuất giải pháp thích ứng và giảm thiểu: self-assessment, CIP
4. Đánh giá, lựa chọn và xếp hạng các biện pháp thích ứng và giảm thiểu theo thứ tự ưu tiên: xây dựng tiêu chí, trọng số và CIP

ĐÁNH GIÁ 10 LINH VỰC

Quy hoạch sử dụng đất

- Các giải pháp thích nghi với biến đổi khí hậu
- Tiếp tục bảo tồn các rừng ngập mặn ở Cần Giờ;
- Phát triển đô thị ở khu vực nội thành theo định hướng đô thị nén (tăng mật độ dân số);
- Đưa các giải pháp thông gió tự nhiên vào trong quá trình lập quy hoạch;
- Hạn chế phát triển khu dân cư ở các khu vực có rủi ro ngập cao;
- Gìn giữ và mở rộng những vùng đệm xanh và các không gian mở dọc sông, kênh rạch;

ĐÁNH GIÁ 10 LINH VỰC

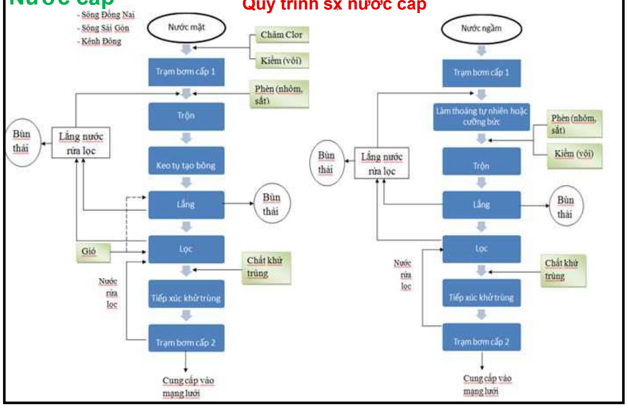
Quy hoạch sử dụng đất

- Các giải pháp thích nghi với biến đổi khí hậu
- Nghiêm cấm việc san lấp kênh rạch;
- Tại các khu dân cư mới, các khu đô thị bắt buộc các nhà đầu tư phải xây dựng hồ điều tiết nước;
- Phát triển nhiều mảng xanh lớn tại những vùng đất thấp và tận dụng tối đa những phần đất trống để tạo mảng xanh cho đô thị.

ĐÁNH GIÁ 10 LINH VỰC

Nước cấp

Quy trình sx nước cấp



ĐÁNH GIÁ 10 LĨNH VỰC

Nước cấp

Nguồn phát sinh khí gây hiệu ứng nhà kính

- Lượng điện năng sử dụng tại trạm bơm cấp 1, các công trình xử lý nước, trạm bơm cấp 2
- Lượng hóa chất sử dụng tại các công trình xử lý nước phèn (Al hoặc Fe), kiềm (vôi), chất khử trùng (chlorine), Flouride)
- Lượng bùn thải phát sinh từ quá trình xử lý nước cấp
- Lượng nước cấp bị thất thoát trên mạng lưới (quá trình cung cấp)

ĐÁNH GIÁ 10 LINH VỰC

Nước cấp

Các ảnh hưởng của biến đổi khí hậu

- Chất lượng nguồn nước bị suy giảm (do nhiệt độ tăng, xâm nhập mặn, ngập lụt đưa các chất ô nhiễm vào nguồn nước, …)
- Tăng nguy cơ biến dạng nhiệt các đường ống
- Nguy cơ ngập lụt các nhà máy xử lý, công trình thu nước

Các giải pháp giảm nhẹ biến đổi khí hậu

- Giảm hệ số thất thoát nước trên mạng lưới
- Thu gom và sử dụng nước mưa

ĐÁNH GIÁ 10 LINH VỰC

Nước cấp

Các giải pháp thích nghi biến đổi khí hậu

- Giảm lượng khai thác nước ngầm; lấp các giếng nước ngầm không còn sử dụng
- Quy hoạch, phân vùng khai thác nước ngầm hợp lý
- Áp dụng các biện pháp bổ cập nước ngầm
- Phối hợp với các đơn vị quản lý hồ Dầu Tiếng, hồ Trị An xây dựng chế độ vận hành phù hợp để xả nước đẩy mặn
- Xây dựng hệ thống quan trắc (online) để đảm bảo cảnh báo sớm
- Xây dựng và hoàn thiện các giải pháp tiết kiệm nước ở tất cả các lĩnh vực (sinh hoạt, nhà hàng khách sạn, hệ thống tưới tiêu, thay đổi công nghệ sản xuất, v.v...)

ĐÁNH GIÁ 10 LINH VỰC

Nước cấp

- Di dời các điểm lấy nước lên thượng nguồn, nghiên cứu phương án nối ống để sử dụng nguồn nước hồ Dầu Tiếng, hồ Trị An
- Cải tạo, thay thế các tuyến ống truyền tải tại những vị trí có thể bị tác động khi mực nước biển dâng
- Nghiên cứu xây dựng hồ dự trữ nước thô và tiền xử lý
- Xây dựng các công trình ngăn mặn phía hạ lưu sông Sài Gòn, Đồng Nai
- Tái sử dụng lượng nước sau xử lý tại các nhà máy xử lý nước thải

ĐÁNH GIÁ 10 LINH VỰC

Nước thải

Các ảnh hưởng của biến đổi khí hậu

- Mưa lớn bất thường làm tăng lượng nước thải gây quá tải mạng lưới đường ống
- Triều cường cao gây cản trở hệ thống thoát nước, đặc biệt khi đỉnh triều cao hơn cửa xả
- Gây quá tải tại các công trình xử lý nước thải

Các giải pháp giảm nhẹ và thích nghi biến đổi khí hậu

- Thu gom và sử dụng nước mưa
- Tăng cường các mảng xanh đô thị
- Xây dựng các nhà máy xử lý nước thải sinh hoạt và tái sử dụng lượng nước sau xử lý

ĐÁNH GIÁ 10 LINH VỰC

Nước thải

- Phát triển bản đồ nguy cơ ngập lụt và tiêu chuẩn nguy cơ ngập lụt
- Xây dựng và áp dụng quy chế thực thi các tiêu chuẩn thoát nước và trữ nước
- Nạo vét, khơi thông dòng chảy kênh rạch
- Tại các khu đô thị mới, trước mắt xây dựng hệ thống thoát nước riêng, trong quá trình xây dựng đô thị phải dành đất để xây dựng hệ thống cống riêng khi điều kiện cho phép
- Xây dựng hồ điều hòa tại chỗ
- Xây dựng các công trình đê bao, cống ngăn triều

ĐÁNH GIÁ 10 LĨNH VỰC

CTRSH

- Tổng lượng CTR phát sinh: 7.500 – 8.000 tấn/ngày
- Trong đó, lượng CTR lên BCL: 6.500 – 6.700 tấn/ngày
- Có 7 nguồn phát sinh CTRSH ở tp Hồ Chí Minh

  + Khu vực dân cư

  + Khu vực cơ quan

  + Khu vực thương mại

  + Khu vực khách sạn, nhà nghỉ

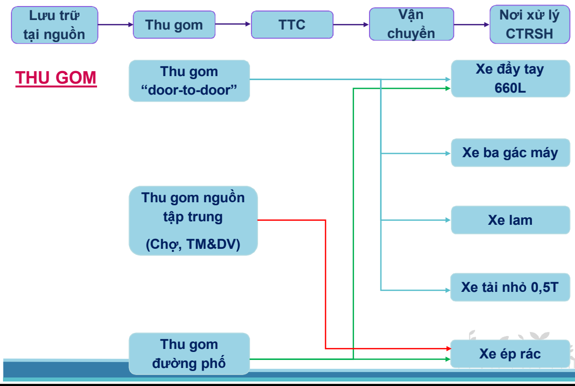
  + Khu vực công cộng

  + Khu vực sản xuất

  + Khu vực chăm sóc sức khỏe cộng đồng

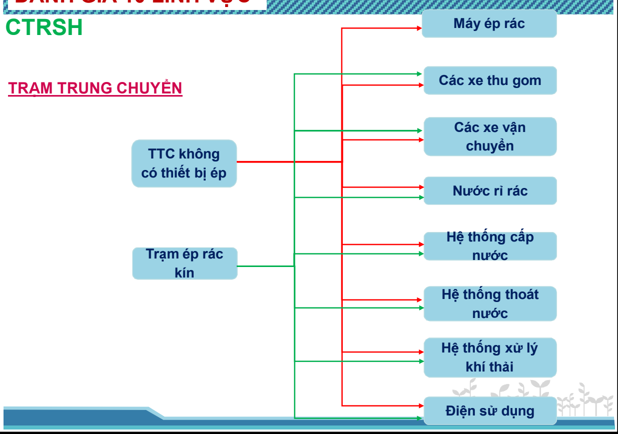
ĐÁNH GIÁ 10 LĨNH VỰC

CTRSH



ĐÁNH GIÁ 10 LINH VỰC

CTRSH



ĐÁNH GIÁ 10 LINH VỰC

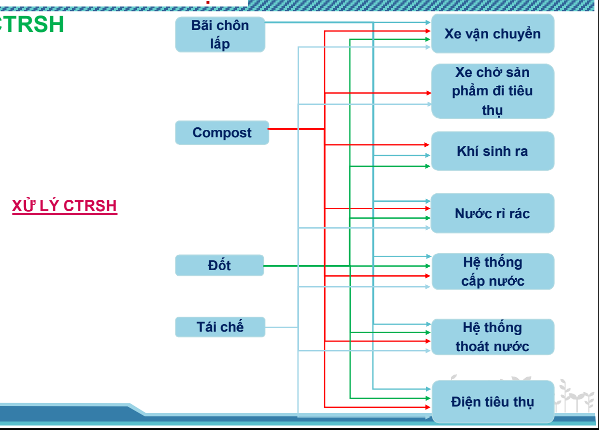
CTRSH

VẬN CHUYỂN

Vận chuyển từ trạm trung chuyển đến khu xử lý CTRSH	Vận chuyển trực tiếp đến khu xử lý CTRSH

ĐÁNH GIÁ 10 LĨNH VỰC

CTRSH



ĐÁNH GIÁ 10 LINH VỰC

Xây dựng

- Nguồn phát sinh khí gây hiệu ứng nhà kính
- Tiêu thụ năng lượng (hoạt động);
- Vật liệu xây dựng (sản xuất và vận chuyển);
- Off – road (công trường xây dựng);
- Tiêu thụ nước;
- Thoát nước;
- Quản lý chất thải rắn và bùn thải;

ĐÁNH GIÁ 10 LĨNH VỰC

Xây dựng

- Các ảnh hưởng của biến đổi khí hậu
  - Nhà cửa và công trình xây dựng;
  - Cơ sở hạ tầng: cầu, đường, hệ thống cấp thoát nước,…
- Các giải pháp giảm nhẹ biến đổi khí hậu
  - Quy hoạch xây dựng một cách hợp lý
  - Ứng dụng các loại vật liệu mới tiêu thụ ít năng lượng;
  - Nâng cao ý thức của người dân;
  - Nâng cao hiệu quả của bộ máy quản lý hành chính nhà nước;

ĐÁNH GIÁ 10 LINH VỰC

Xây dựng

- Các giải pháp thích nghi biến đổi khí hậu
- Thay đổi nguyên tắc xây dựng;
- Nâng cao tính bền vững của công trình với các tiêu chuẩn mới;
- Nâng cao thu nhập của người dân;
- Thay đổi kiến trúc công trình và trang thí nội thất theo nguyên lý mới mang tính thiên nhiên sử dung năng lượng thấp nhất.

ĐÁNH GIÁ 10 LINH VỰC

Năng lượng

Điện — Nhiên liệu

Nguồn cung cấp (Điện)	Tiêu thụ	Nguồn cung cấp (Nhiên liệu)
- Thủy điện - Điện lưới - Nhiệt điện (điện nhiên liệu) - Điện từ chất thải - Điện hạt nhân - Điện từ nguồn khác	1. Sản xuất 2. Sinh hoạt tiêu dùng 3. Kinh doanh dịch vụ 4. Y tế 5. Hành chính 6. Giáo dục: 7. Chiếu sáng công cộng 8. Chiếu sáng dân lập 9. Giao thông 10. Xây dựng	- Dầu: DO, FO, dầu hỏa - Xăng: A92, A95, sinh học E5 - Gas - Than - Củi

ĐÁNH GIÁ 10 LINH VỰC — Điện

- Thủy điện, điện hạt nhân và các nguồn khác không có sản xuất ở TP.HCM
- Điện lưới: Dạng sản xuất đặc biệt của thủy điện
- Nhiệt điện (điện nhiên liệu): Các loại dầu, than, củi, các loại khí đốt
- Điện từ chất thải: Bãi chôn lấp và các dạng khác như biogas, RDF

→ Thu thập số liệu tổng lượng điện cung cấp cho thành phố từ Tổng Công ty Điện lực TPHCM (EVNHCMC) và các nhà máy điện trên địa bàn thành phố

1. Sản xuất: Hoạt động công, nông, lâm nghiệp tiêu thụ lượng điện rất lớn phục vụ sản xuất. Đặc biệt là công nghiệp.
2. Sinh hoạt tiêu dùng: Phục vụ cho chiếu sáng, giải trí, điều hòa nhiệt độ.
3. Chiếu sáng dân lập
4. Chiếu sáng công cộng
5. Kinh doanh dịch vụ
6. Y tế
7. Hành chính
8. Giáo dục
9. Xây dựng

→ Các hoạt động được sắp xếp theo thứ tự giảm dần lượng điện tiêu thụ. Các hoạt động kinh doanh, y tế, hành chính, giáo dục, xây dựng chủ yếu sử dụng lượng điện ít phục vụ chiếu sáng và vận hành máy móc là chính.

ĐÁNH GIÁ 10 LĨNH VỰC — Nhiên liệu

- Dầu: DO, FO, dầu hỏa
- Xăng: A92, A95, sinh học E5
- Gas
- Than: than đá, than bùn, than củi, than nâu (than cám) → than tổ ong
- Củi

→ Thu thập thông tin tổng lượng nhiên liệu cung cấp cho thành phố từ các doanh nghiệp đầu mối nhập khẩu xăng dầu trên địa bàn thành phố.

1. Giao thông: Lượng xăng tiêu thụ cho giao thông rất lớn vì liên quan đến gần như toàn bộ các hoạt động của các lĩnh vực khác
2. Sản xuất: Xăng, dầu được sử dụng để vận hành máy móc sản xuất hoặc đốt sinh nhiệt sinh lượng CO_2 rất lớn.
3. Sinh hoạt tiêu dùng: Chủ yếu dùng dầu hỏa, than củi, than tổ ong, củi cho nấu ăn.
4. Kinh doanh dịch vụ
5. Y tế
6. Hành chính
7. Giáo dục
8. Xây dựng

→ Hoạt động giao thông vận tải và sản xuất tiêu thụ lượng nhiên liệu lớn tương ứng với phát sinh lượng CO_2 rất lớn. Các hoạt động khác sử dụng nhiên liệu chủ yếu cho vận hành máy móc, thiết bị nên tiêu thụ nhiên liệu ít hơn.

ĐÁNH GIÁ 10 LINH VỰC

Nông nghiệp

- **Gồm có 6 mảng chính**

1. **Trồng trọt**
2. **Chăn nuôi**
3. **Thủy sản**
4. **Lâm nghiệp**
5. **Thủy lợi**
6. **Phát triển nông thôn**

ĐÁNH GIÁ 10 LINH VỰC

Nông nghiệp

Nguồn gây phát thải

1. Trồng lúa, cây ngắn ngày, cây ăn quả, đất nông nghiệp,…
2. Đốt phụ phẩm nông nghiệp
3. Chất thải của gia súc, gia cầm
4. Quá trình tiêu hóa của gia súc, gia cầm
5. Sử dụng phân bón hóa học, thuốc trừ sâu trong nông nghiệp
6. Các loại phương tiện, máy móc
7. Khai thác lâm sản, phá rừng
8. Hệ thống thủy lợi

ĐÁNH GIÁ 10 LĨNH VỰC

Nông nghiệp

Tác động

1. Suy giảm quỹ đất, diện tích rừng
2. Thay đổi cơ cấu sản xuất
3. Năng suất thu hoạch giảm
4. Ảnh hưởng xấu đến môi trường đất, nước, thủy sinh, không khí

Giải pháp

1. Sử dụng bơm năng lượng tái tạo
2. Thu gom, tái sử dụng phụ phẩm
3. Nâng cao hiệu quả sử dụng hóa chất, phân bón
4. Ứng dụng công nghệ biogas

ĐÁNH GIÁ 10 LINH VỰC

Công nghiệp

Phát thải khí nhà kính từ hoạt động sản xuất công nghiệp tại Tp.HCM

- Ngành công nghiệp khoáng phi kim loại (sản xuất ximăng, thủy tinh, gạch, vôi v.v…)
- Công nghiệp luyện kim (sắt thép, nhôm, magie,…)
- Công nghiệp điện điện tử
- Công nghiệp thực phẩm và đồ uống
- Ngành sản xuất giấy, bột giấy
- Từ ngành công nghiệp hóa chất
- Từ ngành công nghiệp chế biến các sản phẩm dầu khí
- Ngành khác: may mặc, dệt nhuộm, thủy sản v.v…

Ghi chú: không đề cập đến các hoạt động phát thải từ tiêu thụ năng lượng và xử lý nước thải từ lĩnh vực công nghiệp.

ĐÁNH GIÁ 10 LINH VỰC

Công nghiệp

Giải pháp giảm thiểu phát thải từ công nghiệp

➢Cải tiến công nghệ sản xuất và sử dụng nhiên liệu đốt thân thiện với môi trường

Cải tiến công nghệ sản xuất một số lò nung gốm sứ chuyển đổi từ lò nung bằng nguyên liệu dầu sang sử dụng nhiên liệu khí gas trong quy trình sản xuất;

➢Sử dụng tối đa các phế phẩm, phế liệu làm nguyên, nhiên liệu đầu vào trong quy trình sản xuất

Các phế thải dạng khí, lỏng, rắn phát sinh từ hoạt động sản xuất sẽ được tận thu và tái quay vòng vào trong quy trình, điển hình:

+ Quá trình tận dụng nhiệt thải từ lò nung cấp cho quá trình sấy;
+ Tái sử dụng nước thải;
+ Tăng tỷ lệ phần trăm sử dụng thủy tinh vụn trong quy trình sản xuất.

ĐÁNH GIÁ 10 LĨNH VỰC

Công nghiệp

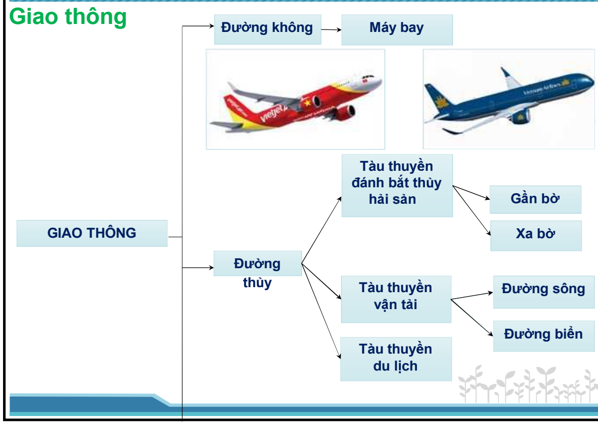
Giải pháp giảm thiểu phát thải từ công nghiệp

➢ Giải pháp về quản lý các hoạt động tiêu thụ năng lượng trong công nghiệp
- Xây dựng chương trình quản lý năng lượng cho nhà máy.
- Tăng cường số lượng cây xanh trong doanh nghiệp/ khu chế xuất và khu công nghiệp
- Giải pháp đóng cửa và di dời các cơ sở gây ô nhiễm ra khỏi thành phố.
- Giữ vững và phát huy phong trào giáo dục/nâng cao ý thức bảo vệ môi trường và sử dụng tiết kiệm năng lượng cho toàn bộ nhân viên của nhà máy.

➢ Giải pháp về kỹ thuật trong hoạt động tiêu thụ năng lượng trong công nghiệp
- Thay thế nhiên liệu sạch
- Thay đổi hoặc cải tiến công nghệ

ĐÁNH GIÁ 10 LINH VỰC

Giao thông



ĐÁNH GIÁ 10 LĨNH VỰC

Giao thông

- GIAO THÔNG
  - Đường bộ
    - Xe khách
      - 46 chỗ
      - 34 chỗ
      - 29 chỗ
      - 16 chỗ
    - Xe máy
    - Xe chuyên dụng
    - Xe Buýt
    - Xe chở rác, quét đường, rửa đường
    - Ô tô
      - Taxi
      - Xe ô tô cá nhân
    - Xe vận tải hàng
  - Đường sắt
    - Tàu hỏa

ĐÁNH GIÁ 10 LINH VỰC

Du lịch

Phát thải từ du lịch dịch vụ - văn hóa

- Phát thải từ quá trình sử dụng năng lượng: điện, gas, dầu…
- Phát thải từ quá trình sử dụng nước
- Phát thải từ giao thông
- Phát thải từ hệ thống quảng cáo ngoài trời
- Phát thải từ các khu vui chơi giải trí
- Giảm phát thải từ hệ thống công viên cây xanh

ĐÁNH GIÁ 10 LĨNH VỰC

Du lịch

Các tác động trực tiếp

- Ảnh hưởng đến hoạt động của cảng hàng không Tân Sơn Nhất và các khu du lịch xung quanh thành phố (thời tiết bất thường tăng) sẽ giảm lượng khách du lịch.
- Giảm du lịch do các dịch bệnh theo mùa tăng với các biến thể mới và lan rộng như SARs, H5N1.
- Tăng chi phí cho việc xây dựng và hoạt động của các khu du lịch do tăng nguy cơ thời tiết bất thường và nắng nóng kéo dài;

ĐÁNH GIÁ 10 LINH VỰC

Y tế

- Tăng cường phòng chống các dịch bệnh do biến đổi khí hậu;
- Nâng cao năng lực đội ngu cán bộ y tế các địa phương trong bối cảnh biến đổi khí hậu;
- Nâng cấp, cải tạo, xây mới cơ sở hạ tầng phục vụ chăm sóc sức khỏe cộng đồng.

ỨNG DỤNG CÁC PHƯƠNG PHÁP

1. Đánh giá tác động của biến đổi khí hậu, khả năng thích ứng và khả năng dễ bị tổn thương => theo hướng dẫn của Bộ Tài nguyên và Môi trường
2. Liệt kê, đánh giá và các công trình hạ tầng, các chương trình còn thiếu của thành phố Hồ Chí Minh => ứng dụng phương pháp Self Assessment
3. Đánh giá cơ sở và các công trình hạ tầng phục vụ Kế hoạch hành động ứng phó Biến đổi khí hậu của thành phố => ứng dụng phương pháp Capital Investment Planning (CIP) của Ngân hàng Thế giới

KẾ HOẠCH THỰC HIỆN

Công việc	Thời gian thực hiện
Xây dựng phương án, xin kinh phí	3/2014 – 7/2014
Khảo sát dữ liệu	7/2014 – 12/2014
Đánh giá tác động	12/2014 – 3/2015
Xây dựng KHHĐ	3/2015 – 9/2015
Trình duyệt	9/2015

NHÂN SỰ & KINH PHÍ

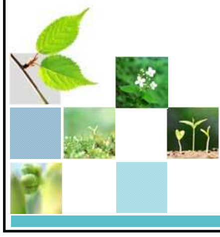
Đơn vị chủ trì: **Văn phòng Biến đổi khí hậu**

Đơn vị phối hợp:

- Ủy ban nhân dân 24 quận huyện
- Các Sở ban ngành có liên quan
- Tổ chuyên viên giúp việc Ban chỉ đạo, tổ công tác biến đổi khí hậu tại các quận huyện, sở ngành
- Một số trường đại học, viện nghiên cứu
- Các công ty, cơ quan, đơn vị có liên quan
- Thành phố Osaka, Trung tâm Môi trường toàn cầu, một số viện nghiên cứu Nhật Bản
- Các tổ chức phi chính phủ (NGOs)

Kinh phí: đăng ký nguồn kinh phí từ ngân sách thành phố

Cảm ơn đã lắng nghe!



Hitz Hitachi Zosen

No.4

Về các dự án JCM tại Việt Nam

21/8/2014

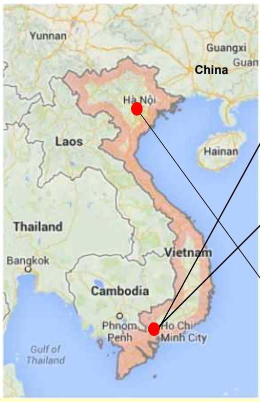
Công ty Hitachi Zosen

Hitz Hitachi Zosen

Các dự án liên quan tới rác thải tại Việt Nam

Các dự án liên quan đến rác thải tại Việt Nam

Hitz Hitachi Zosen



TP Hồ Chí Minh/Rác thải đô thị
(Bộ Môi trường/Nghiên cứu hình thành dự án JCM)
Dự án đốt rác phát điện tổng hợp
Thời gian thực hiện: 2014

TP Hồ Chí Minh/Rác thải chợ đầu mối
(Bộ Môi trường/Dự án hỗ trợ thiết bị JCM)
Lên men và sử dụng khí mê tan từ rác hữu cơ chợ đầu mối
Thời gian thực hiện: 2014~2016

TP Hà Nội/Rác thải công nghiệp
(NEDO/Dự án thực chứng công nghệ)
Dự án thực chứng công nghệ đốt rác công nghiệp phát điện
75 t/ngày×1 dây chuyền=75 t/ngày
Dự kiến hoạt động: 2015

Hitz Hitachi Zosen

Dự án đốt rác phát điện từ rác thải đô thị

Quá trình triển khai

Hitz Hitachi Zosen

<Năm tài khóa 2012, 2013>

Đã tiến hành khảo sát "Dự án thu hồi năng lượng theo mô hình tổng hợp từ chất thải rắn tại TP Hồ Chí Minh, Việt Nam" trong khuôn khổ chương trình nghiên cứu khả thi nhằm thúc đẩy phổ biến ngành công nghiệp tuần hoàn của Nhật Bản ra nước ngoài do bộ Môi trường chủ trì.

Hoạt động khảo sát này do Hitachi Zosen, Sở Môi trường TP Osaka, Viện nghiên cứu Đô thị Ex và Trung tâm Môi trường Toàn cầu phối hợp thực hiện trong khuôn khổ "cử đoàn khảo sát kỹ thuật" của TP Osaka sang TP Hồ Chí Minh liên quan tới nội dung quản lý chất thải rắn.

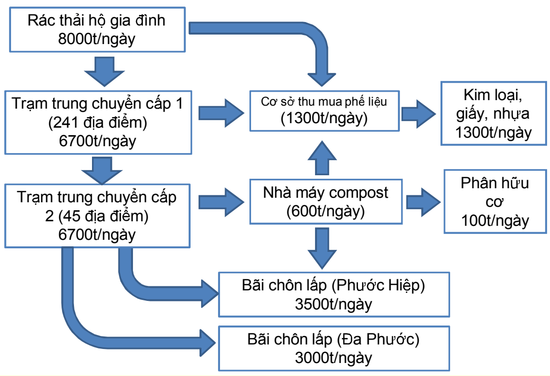
<Năm tài khóa 2014>

Hiện nay Hitachi Zosen và SatisFactory đang phối hợp thực hiện khảo sát "đốt rác phát điện tổng hợp tại TP Hồ Chí Minh" trong khuôn khổ chương trình nghiên cứu hình thành dự án JCM của Bộ Môi trường.

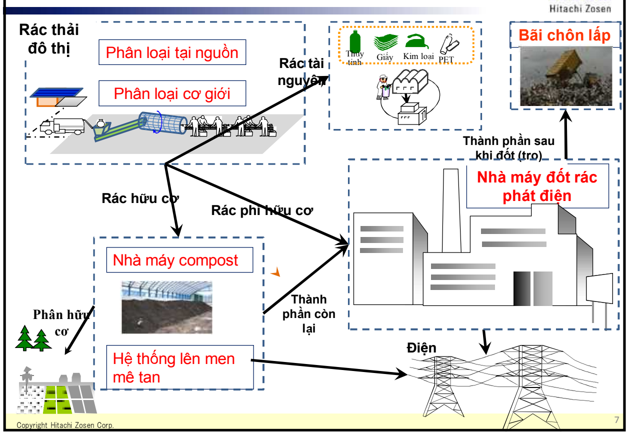
- **Ngày 5/8 đã đệ trình Thư đề nghị chấp thuận về mặt nguyên tắc (REQUEST FOR IN-PRINCIPAL APPROVAL) đối với dự án đốt rác phát điện lên Ủy ban Nhân dân TP Hồ Chính Minh.**

Sơ đồ thu gom, vận chuyển rác thải đô thị TP Hồ Chí Minh

Hitz Hitachi Zosen



Dự án thu hồi năng lượng theo mô hình tổng hợp



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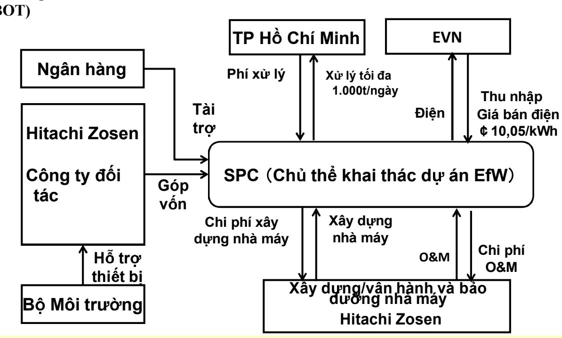
Phương án thực hiện

Hình thức dự án:
Build Operate Transfer (BOT)



Lên men khí mê tan từ rác chợ đầu mối

9

KHÁI QUÁT DỰ ÁN

Phân loại, thu hồi rác hữu cơ từ nguồn rác thải chợ đầu mối Bình Điền, TP Hồ Chí Minh, và tiến hành xử lý yếm khí bằng hệ thống lên men mê tan xây dựng trong chợ.

Sau đó, cung cấp khí sinh học thu hồi được cho nhà máy chế biến cá trong chợ làm nhiên liệu thay thế cho dầu diesel hiện đang sử dụng.

Ngoài ra, các thành phần sau khi lên men sẽ được dùng để sản xuất phân bón cung cấp cho các hộ nông dân trong vùng.

Quá trình triển khai

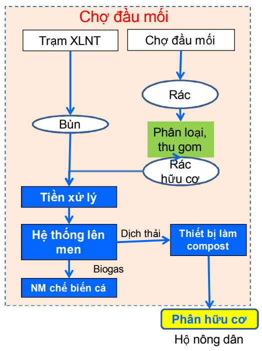
<Năm tài khóa 2012>
Đã phối hợp với Sở Tài nguyên và Môi trường TP Hồ Chí Minh tiến hành khảo sát thí điểm việc phân loại, thu hồi rác tại nguồn.

<Năm tài khóa 2013>
Hitachi Zosen và SatisFactory đã phối hợp thực hiện khảo sát “đốt rác phát điện tổng hợp tại TP Hồ Chí Minh” trong khuôn khổ chương trình nghiên cứu hình thành dự án JCM của Bộ Môi trường.

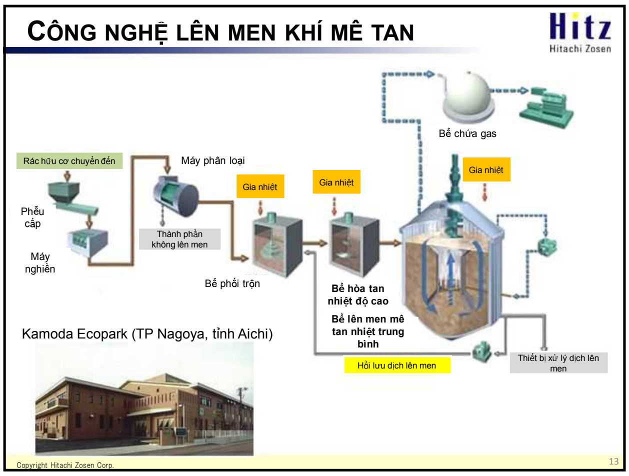
<Năm tài khóa 2014>
Theo kết quả khảo sát, dự án đã được lựa chọn là dự án hỗ trợ thiết bị JCM của Bộ Môi trường, và ngày 1/8 đối tác phối hợp thực hiện là Tổng công ty Thương mại Sài Gòn (SATRA) đã trình Ủy ban Nhân dân TP Hồ Chí Minh thư bày tỏ quan tâm đối với dự án này.

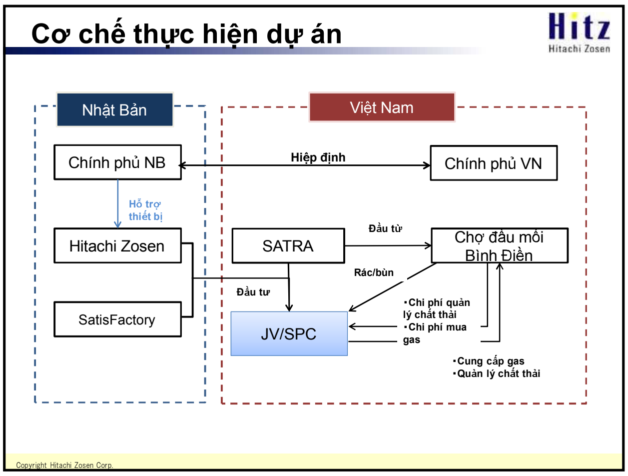
 11

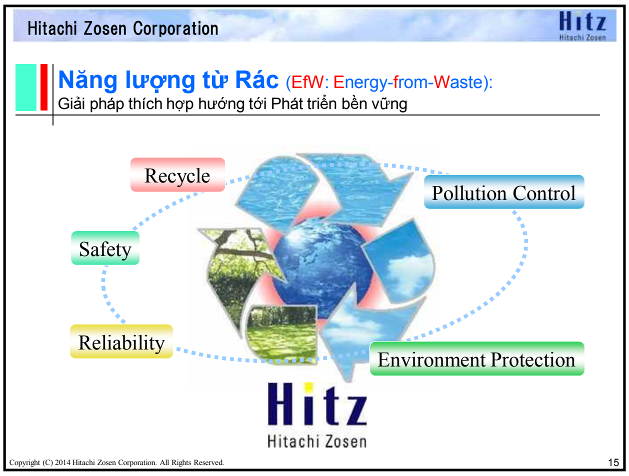
SƠ ĐỒ QUY TRÌNH

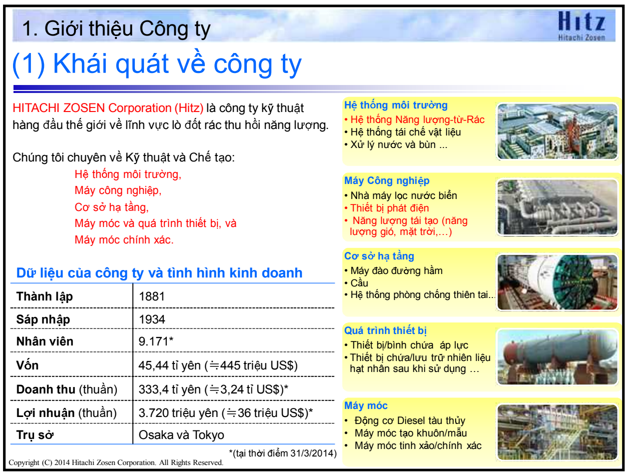


Sơ đồ quy trình của dự án

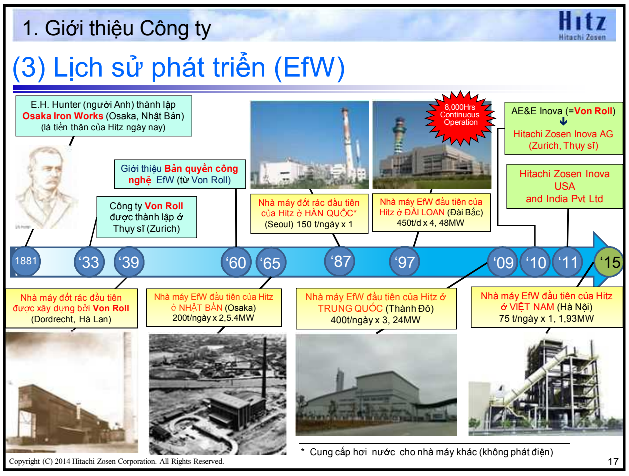


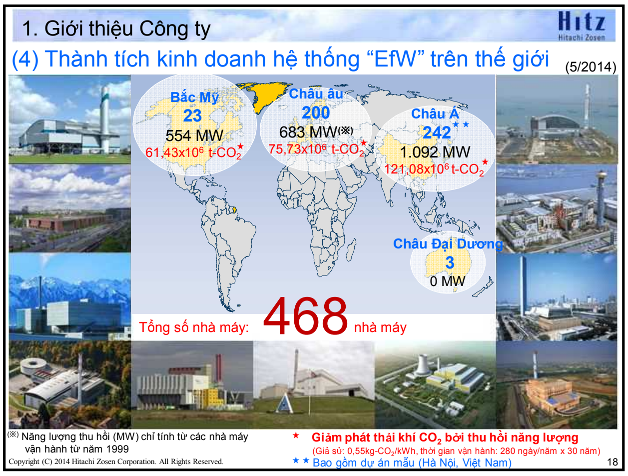






Thành lập	1881
Sáp nhập	1934
Nhân viên	9.171*
Vốn	45,44 tỉ yên (≒445 triệu US$)
Doanh thu (thuần)	333,4 tỉ yên (≒3,24 tỉ US$)*
Lợi nhuận (thuần)	3.720 triệu yên (≒36 triệu US$)*
Trụ sở	Osaka và Tokyo





1. Giới thiệu Công ty

Hitz
Hitachi Zosen

(6) Khái quát các hoạt động ở Việt Nam

Dự án mẫu
Nhà máy đốt rác Công nghiệp thu hồi năng lượng
(Nam Sơn – Sóc Sơn)
75 t/ngày × 1 tổ máy = 75 t/ngày
Vận hành : 2015

Mô hình 3D
của nhà máy

Nghiên cứu khả thi
Hệ thống xử lý rác tổng hợp bao gồm
thu hồi năng lượng

Nghiên cứu quy hoạch
– Dự án JCM –
Lên men yếm khí rác hữu cơ từ chợ đầu mối để đồng phát
năng lượng (điện và nhiệt)

JCM: Joint Crediting Mechanism - Cơ chế Tín chỉ chung 19

Institute for Global Environmental Strategies

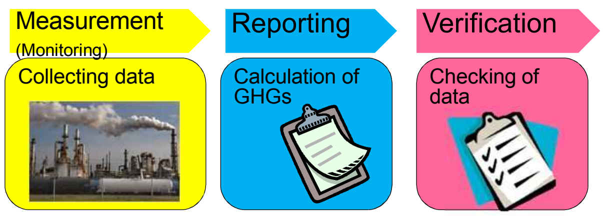
MRV Project in HCMC: Progress and Activities in FY2014

Shiko Hayashi and Junko Akagi, IGES Kitakyushu Urban Centre

2nd Working Group Meeting for the Development of HCMC Climate Change Action Plan 2020

21st August 2014, Ho Chi Minh City

MRV – Visualizing GHG emissions

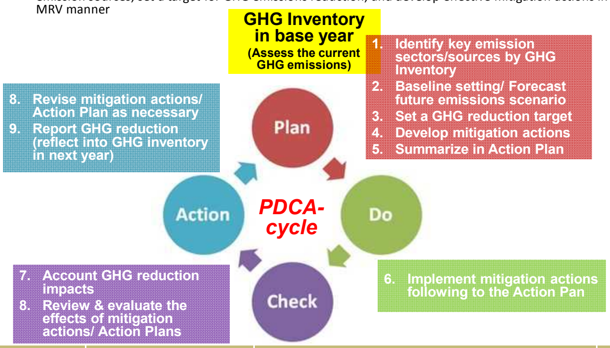


MRV is a tool for:

- Setting goals and designing policies/projects
- Proving the credibility of efforts
- Facilitate/attract further support

Why is GHG Inventory important?

- Management-cycle for low-carbon city development/green growth
  → A fundamental tool for local governments assess the amount of current GHG emissions, identify key emission sources, set a target for GHG emissions reduction, and develop effective mitigation actions in MRV manner



National GHG Emissions in Viet Nam (in 2000 and 2005)

National GHG Emissions in 2000

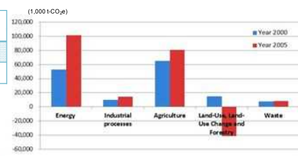
(1,000 t-CO_2e)

Total emissions and removals	150,899
Emissions	226,647
Removals	-75,749

National GHG Emissions in 2005

(1,000 t-CO_2e)

Total emissions and removals	163,697
Emissions	221,081
Removals	-57,384

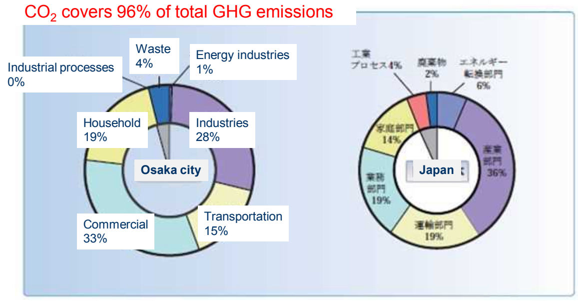


Source: Viet Nam Second National Communication to the United Nations Framework Convention on Climate Change (http://unfccc.int/resource/docs/natc/vnmnc02.pdf)

Source: National GHG Inventory Report 2005 of Vietnam: The Project for Capacity Building for National Greenhouse Gas Inventory in Viet Nam

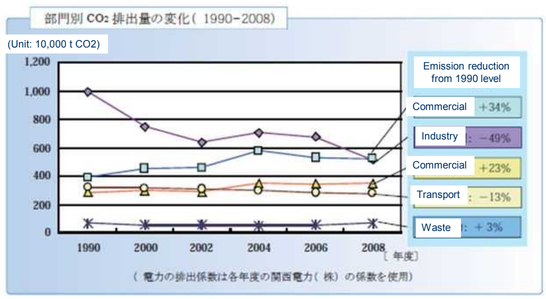
CO_2 emissions by sector in FY2008 (Osaka City)

CO_2 covers 96% of total GHG emissions



Source: Osaka City, City-wide activities. http://www.city.osaka.lg.jp/kankyo/page/0000119515.html

CO_2 emissions trend by sector (Osaka City)



Source: Osaka City, City-wide activities. http://www.city.osaka.lg.jp/kankyo/page/0000119515.html

HCMC's GHG inventory (city-wide)

○ : Data is collected/collecting
△ : Data is identified
✖ : Data is not identified

Sector		Activity	Gas	Year	AD	EF	Data
Energy	Stationary units	Energy Generation	CO_2, CH_4, N_2O	2013	Energy balance table,	IPCC default	✖
		Industrial	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Commercial/ Institutional	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Residential	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Agriculture/ Forestry/ Fishing	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
		Fugitive emissions	CO_2, CH_4, N_2O	2013	Energy balance table	IPCC default	✖
	Mobile units	Road transportation	CO_2, CH_4, N_2O	2013	Fuel consumption or Km travelled	IPCC default	✖
		Off-road transportation	–	–	–	–	–
		Railways	–	–	–	–	–
		Water-borne navigation	–	–	–	–	–
		Aviation	–	–	–	–	–
Water		Tap water production	CO_2	2013	Amount of water supply	Country specific	○
		Waste water treatment/discharge	CH_4, N_2O	2013	Industry production, Population	IPCC default	△
Waste		Solid waste disposal	CH_4	2013	Composition, generation per capita	FOD method	○
		Biological treatment	CH_4, N_2O	2013	Waste amount processed	IPCC default	△
		Incineration & open burning	CO_2	2013	Waste amount incinerated	IPCC default	△
IPPU		–	–	–	–	–	–
AFOLU	Agriculture	Enteric fermentation	CH_4	2013	Population of livestock (head)	IPCC default	△
		Manure Management	CH_4, N_2O	2013	Population of livestock (head)	IPCC default	△
		Rice cultivations	CH_4	2013	Harvested (irrigated) area of rice	IPCC default	△
		Emission from managed soils	N_2O	2013	Amount of N (nitrogen) to soils, etc.	IPCC default	△
	Forestry, Land Use	–	–	–	–	–	–
Other Indirect Emissions		–	–	–	–	–	–

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Overview of GHG emissions in water resource sector

GHG emissions in water resource sector in HCMC (2013)

Category	Emission (Gg)			
	CO_2	CH_4	N_2O	CO_2 equivalent
CO_2 emission from tap water production	116.18			116.18
CH_4 emission from industrial wastewater		–		–
CH_4 emission from domestic wastewater		0.028		0.58
N_2O emission from waste water treatment and discharge			0.25	79.00
Total	116.18	0.28	0.25	195.76

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Overview of GHG emissions in waste sector

GHG emissions in waste sector in HCMC (2013)

Category	Emission (Gg)			
	CO_2	CH_4	N_2O	CO_2 equivalent
CH_4 emission from solid waste disposal sites		56.05		1,177.15
CH_4 & N_2O emission from biological treatment		1.11	0.83	49.24
CO_2 emission from waste incineration	–			–
Total	–	57.16	0.83	1,226.39

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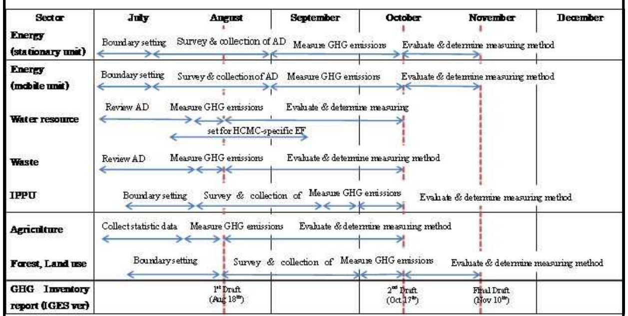
Schedule of GHG Inventory development in HCMC



AD: Activity Data
IPPU: Industrial Processes and Product Use

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Thank you for your attention!

IGES | http://www.iges.or.jp Not for citation 11

Low Carbon Scenarios for HCMC, Vietnam 2030

Research team:

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  NGUYEN Dinh Tuan

August, 2014

Political background

2

Decision no. 1474/QD-TTg (Oct. 5, 2012)
"Publishing National Climate Change Action Plan (CCAP) for the Period 2012-2020"

Decision no. 1393/QD-TTg (Sep. 25, 2012)
"Approval of National Green Growth Strategy for Vietnam"
- The period 2011-2020: Reduce the intensity of GHG emissions by 8-10% as compared to the 2010 level; reduce energy consumption per unit of GDP by 1-1.5% per year. Reduce GHG emissions from energy activities by 10% to 20% compared to BaU
- Orientation towards 2030: Reduce annual GHG emissions by at least 1.5-2%; reduce GHG in energy activities by 20 to 30% compared to BaU

Decision no. 2484/QD-UBND (May 15, 2013)
"Issuing Programs for Implementing Climate Change Action Plans of HCMC by 2015"

Proposal for **"Climate Change Action Plan in the 2016-2020 period, with a vision towards 2030"**

Decision no. 2631/QD-TTg (Dec. 31, 2013)
"Approval of Master Plan for Socio-economic Development of HCMC till 2020 with vision to 2025"
- Annual GDP growth: 10-10.5% (2011-2015), 9.5-10% (2016-2020), 8.5-9% (2021-2025)
- Population (mil.): 8.2 (2015), 9.2 (2020), 10 (2025)
- Ratio of electricity consumption growth and GDP growth: 1, try to below 0.8 (more than 20% reduction)

Decision no. 568/QD-TTg (Apr 8, 2013)
"Approval of Master plan for Transportation development for HCMC by 2020 with vision beyond 2020"
Share of transport mode:
- 2020: public (20-25%), private (72-77%), others
- 2030: public (35-45%), private (51-61%), others
- Beyond 2030: public (50-60%), private (35-45%), others

Decision no. 2305/QD-UBND (May 5, 2012)
"Approval of Green Energy Program for HCMC by 2015"

One Socio-Economic vision and Two mitigation scenarios

3

- The Socio-economic Vision is mainly followed after **Decision 2631/QD-TTg**

	Unit	2011	2030	2030/2011
Population	persons	7,590,138	10,869,565	1.4
No. of households	households	1,789,630	3,623,188	2.0
GDP per capita	mil. Dongs	67	256	3.8
GDP	bil. Dongs	509,334	2,783,178	5.5
Passenger transport demand	mil.per.km	68,339	145,121	2.1
Freight transport demand	mil.ton.km	73,485	350,944	4.8

- Two scenarios are developed for the analysis

Scenario	Characteristics
Business as Usual (BaU)	- Socio-economic assumptions in the above table - Share of public transport mode complies with Decision 568/QG-TTg with the assumption that only 50% of the urban public transport is constructed **- Energy intensity (Energy/GDP reduction) reduction more than 20% in 2030 compared with 2011 following after Decision No.1393/QD-TTg**
Counter Measure (CM)	- Socio-economic assumptions in the above table - Share of public transport mode complies with Decision 568/QG-TTg with the assumption of 100% implementation - Additional measures are implemented to achieve the **CO_2 emission reduction more than 20% reduction compared with 2030BaU**

Final energy consumption and CO_2 emission

4

- Rapid growth of driving forces (GDP, population, transport demand) leads to the increasing consumption of energy and CO_2 emission.

	2011	2030BaU	BaU/2011
Final energy consumption (ktoe)	9,404	37,894	4.0
CO_2 emission ($ktCO_2$)	35,649	161,818	4.5

➢Industry is the main energy consumer (52%) and CO_2 emitter (55%)

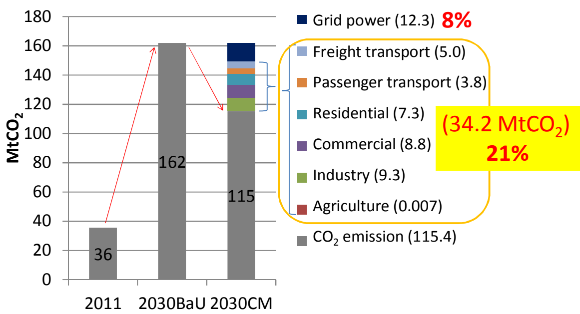
- Energy intensity in 2030BaU reduces 26% compared with 2011, which complies with Decision 2631/QD-TTg (20%) and Decision 1393/QD-TTg (17 %)

	2011	2030BaU	2030CM
Energy intensity (toe/bil. Dongs)	18.5	13.6	10.8
CO_2 emission per GDP (tCO_2/bil. Dongs)	70.0	58.1	41.4
CO_2 emission per capita (tCO_2)	4.7	14.9	10.6

CO_2 emission and its reduction

5

- **By the 2030 CM scenario, the direct CO_2 emission reduction is expected to 21% of total emission of Business as Usual (2030BaU)**
- In addition to it, 8% reduction is expected from the mitigation of grid power



Proposal of Mitigation Actions and their Impacts

6

To realize this 21% reduction, FIVE actions are proposed

Low carbon actions \ Sector	Agriculture and Industry	Commercial	Residential	Passenger transport	Freight transport	**Total ($ktCO_2$)**	**Reduction share**
Action 1. **Green agriculture and industry** (Energy efficient equipment, fuel shift)	9,309	0	0	0	0	**9,309**	**27%**
Action 2. **Green house and building** (Energy efficient equipment, fuel shift)	0	6,578	4,910	0	0	**11,489**	**34%**
Action 3. **Diffusion of energy saving behavior** (Appropriate use of energy device)	0	2,181	2,339	0	0	**4,520**	**13%**
Action 4. **Smart transportation system** (Energy efficient vehicle, modal shift)	0	0	0	3,597	4,870	**8,467**	**25%**
Action 5. **Growth of renewable energy** (Solar, biofuel, CNG)	0	25	24	163	159	**370**	**1%**
Total ($ktCO_2$)	**9,309**	**8,784**	**7,273**	**3,760**	**5,029**	**34,155**	**100%**
Reduction share	**27%**	**26%**	**21%**	**11%**	**15%**	**100%**	

Conclusion and discussion

7

- FIVE mitigation actions are proposed to reduce 21% of CO_2 emission in energy-use activities (Agriculture and Industry, Commercial, Residential, Transport)
- With mitigations analyzed in this brochure, most of the targets prescribed in "decisions" will be complied, except national GHG emission (less than 2 times compared with 2010). Further actions must be searched, especially in the field of LULUCF, such as with s collaboration with Mekong Delta region)

Comparison of the Actions' performance and related targets prescribed in "Decisions"
Numbers in the table denote the multiplication factors compared with base years

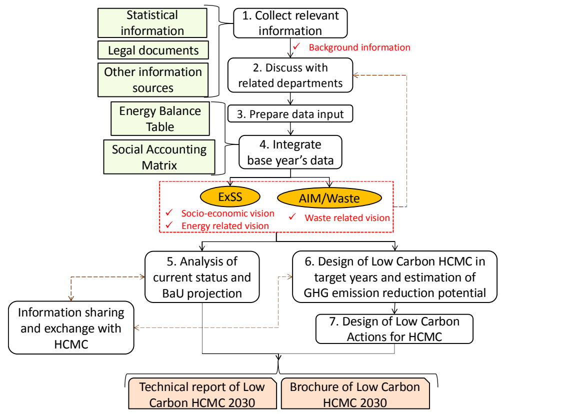
Index	Performance of the proposed Scenarios in 2030		Quantified GHG emission objectives and related targets based on Decisions		Reference
	CM	BaU	2020	2030	
GHG emission	3.2(1)	4.5(1)	2.3 - 2.4(2)	2.0(2)	Decision No.1393/QD-TTg Decision No.2631/QD-TTg
GHG emission intensity	0.59(1)	0.83(1)	0.90 - 0.92(2)	-	Decision No.1393/QD-TTg
GHG emission from energy activity compared with BaU	0.79	1.00	0.80(3) - 0.90(4)	0.70(3) - 0.80(4)	Decision No.1393/QD-TTg
GDP	5.5 (5)	5.5 (5)	2.5 - 2.7(6)	5.7 - 6.3(6)	Decision No.2631/ QD-TTg
Energy Intensity	0.58(5)	0.74(5)	0.80(6)	-	Decision No.1393/ QD-TTg

Most are in the allowable ranges except the first row

(1) compared with 2011, and only consider the CO_2 emission from energy-use activities
(2) compare with 2010, with the assumption that HCMC adopts the same intensity target as national one
(3) compare with 2010, with the assumption that HCMC adopts the same target as national one, and with voluntary and additional international supports
(4) compare with 2010, with the assumption that HCMC adopts the same target as national one, and with a voluntary effort
(5) compare with 2011
(6) compare with 2010

Working procedure

8



This study has not covered Waste sector

9

Thank you very much for your kind attention!

3. International Symposium

Ban chỉ đạo thực hiện Kế hoạch hành động ứng phó với Biến đổi khí hậu
Thành phố Hồ Chí Minh

Kế hoạch hành động ứng phó với biến đổi khí hậu tại TP. Hồ Chí Minh giai đoạn 2013- 2015

(KHHĐ 2013-2015)

Văn phòng Biến đổi khí hậu TP.HCM
Thành phố Hồ Chí Minh, 16/01/2015

NỘI DUNG TRÌNH BÀY

I. Mục tiêu của KHHĐ 2013-2015
II. Những nhiệm vụ chính
   1. Nhiệm vụ trong nước
   2. Nhiệm vụ hợp tác quốc tế
   3. Một số dự án TP.HCM đang thực hiện
III. Đề xuất thực hiện các chương trình, dự án hợp tác với TP. Osaka

2

I. Mục tiêu của KHHĐ 2013-2015

- Tổ chức thực hiện các chương trình, dự án nhằm từng bước nâng cao năng lực thích ứng với biến đổi khí hậu của TPHCM.
- Tổ chức thực hiện các chương trình, dự án góp phần giảm thiểu biến đổi khí hậu (giảm phát thải khí nhà kính).
- Tổ chức thực hiện các nhiệm vụ của Nghị quyết số 24-NQ/TW Hội nghị lần thứ 7 Ban Chấp hành Trung ương khóa XI về chủ động ứng phó với biến đổi khí hậu, tăng cường quản lý tài nguyên và bảo vệ môi trường.

3

II. Những nhiệm vụ chính
1. Nhiệm vụ trong nước

- Nghiên cứu, đánh giá tác động của biến đổi khí hậu đến đời sống kinh tế xã hội, đến các lĩnh vực quản lý.
- Triển khai các dự án nâng cao khả năng thích nghi với BĐKH và giảm nhẹ phát thải khí nhà kính.
- Tuyên truyền nâng cao nhận thức về biến đổi khí hậu cho cán bộ công chức, tổ chức chính trị xã hội, doanh nghiệp, cộng đồng.
- Tập huấn nâng cao năng lực cán bộ công chức trong công tác quản lý để ứng phó với biến đổi hậu.

4

II. Những nhiệm vụ chính
2. Nhiệm vụ hợp tác quốc tế

Hợp tác với thành phố Rotterdam, Hà Lan

- Giai đoạn 2011- 2013: Thực hiện Chương trình "TP.HCM phát triển hướng về phía biển thích ứng với BĐKH".
  - *Mục tiêu: giúp TPHCM định hướng phát triển hướng về phía Nam và Đông Nam thành phố thích ứng được với BĐKH.*
  - *Kết quả: tập ATLAS và Chiến lược thích ứng khí hậu (CAS) với nội dung chính tập trung vào công tác quản lý nước như quản lý nguồn nước, nước cấp, thoát nước, chống ngập, chống xâm nhập mặn.*
- Giai đoạn 2014- 2015: Thực hiện Chương trình "TP.HCM phát triển hướng về phía biển thích ứng với BĐKH- giai đoạn 2"- tích hợp CAS vào các quy hoạch, kế hoạch phát triển của quận 4.

5

II. Những nhiệm vụ chính
2. Nhiệm vụ hợp tác quốc tế

Hợp tác với thành phố Osaka, Nhật Bản

- Giai đoạn 2011- 2013: Thực hiện Chương trình "Quản lý tổng hợp chất thải bao gồm thu hồi năng lượng
  - *TP.HCM hỗ trợ đội ngũ nghiên cứu phía TP Osaka tiến hành khảo sát và nghiên cứu hệ thống quản lý chất thải rắn trên địa bàn TPHCM.*
  - *TP.Osaka hỗ trợ TP.HCM tập huấn nâng cao năng lực cán bộ công chức sở ngành, quận huyện trong công tác quản lý chất thải rắn, 3R và ứng phó BĐKH; hỗ trợ triển khai thí điểm chương trình phân loại CTR tại nguồn tại quận 1.*

6

II. Những nhiệm vụ chính
2. Nhiệm vụ hợp tác quốc tế

❖ **Hợp tác với thành phố Osaka, Nhật Bản**

- Giai đoạn 2014- 2015: Phát triển chương trình hợp tác Thành phố phát thải carbon thấp trên cơ sở ứng dụng cơ chế JCM giữa Việt Nam và Nhật Bản.
  - *Xây dựng HCMC CCAP 2016-2020;*
  - *Phát triển các dự án xử lý chất thải thu hồi năng lượng ứng dụng cơ chế JCM;*
  - *Mở ra các lĩnh vực hợp tác mới: quy hoạch, năng lượng, giao thông, công nghiệp, quản lý nước (bao gồm nước thải), nông nghiệp, y tế, xây dựng và du lịch.*

7

II. Những nhiệm vụ chính
3. Một số dự án TP.HCM đang thực hiện

TT	Tên chương trình/dự án	Thời gian thực hiện
1	Sử dụng 300 xe bus CNG	2012
2	Xây dựng tuyến Metro 1	2008-2018
3	Xây dựng tuyến Metro 2	2013
4	Tuyến BRT số 1 trên đường Võ Văn Kiệt- Mai Chí Thọ	2014-2018
5	Dự án giảm thất thoát nước sạch	2006-2014
6	Dự án đầu tư giảm thất thoát nước, tăng cường mở rộng mạng lưới cấp nước và tăng cường thể chế cho SAWACO	2011-2015
7	Trồng 500.000 cây xanh ven sông, kênh, rạch	2011-2015
8	Dự án trồng mới và chuyển hóa rừng phòng hộ, rừng sản xuất trong công viên Lịch sử - Văn hóa dân tộc TPHCM	2012-2016
9	Trồng rừng chắn sóng chống sạt lở tại huyện Cần Giờ	2014

8

III. Đề xuất thực hiện các chương trình, dự án hợp tác với TP. Osaka

- ❖ Dự án Biogas chợ Bình Điền (*đã nhận được chủ trương của UBND TPHCM*);
- ❖ Dự án Xử lý đốt chất thải rắn tái sinh năng lượng;
- ❖ Dự án xử lý bùn tái sinh năng lượng, sản xuất compost;
- ❖ Dự án xử lý nước thải sinh hoạt/đô thị: Nhu cầu năm 2015 kêu gọi đầu tư xây dựng 12 nhà máy với tổng lượng nước cần xử lý gần 3 triệu m^3/ngày*(hiện nay tỷ lệ xử nước thải đô thị đạt khoảng 13,2%);*
- ❖ Chương trình nghiên cứu quản lý tổng hợp chất thải ở TPHCM (chất thải rắn đô thị, chất thải công nghiệp, chất thải nguy hại, bùn thải, nước thải đô thị, nước thải công nghiệp);
- ❖ Chương trình đào tạo, tập huấn nâng cao năng lực cho cán bộ quản lý;
- ❖ Dự án thu hồi sử dụng nước mưa;
- ❖ Dự án tái sử dụng nước thải;
- ❖ Dự án sử dụng năng lượng mặt trời tại các trường học.

9

Chân thành cảm ơn Quý vị.

10

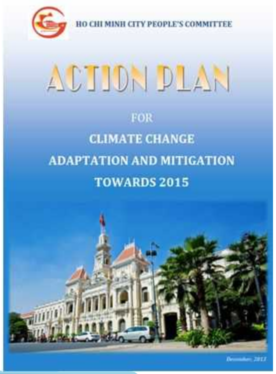
BAN CHỈ ĐẠO THỰC HIỆN KẾ HOẠCH HÀNH ĐỘNG ỨNG PHÓ VỚI BIẾN ĐỔI KHÍ HẬU
THÀNH PHỐ HỒ CHÍ MINH

Kế hoạch hành động ứng phó với Biến đổi khí hậu cho Thành phố Hồ Chí Minh giai đoạn 2016-2020 hướng đến một thành phố cac-bon thấp

Văn phòng Biến đổi khí hậu Thành phố Hồ Chí Minh

TP.HCM, 16 tháng 01 năm 2015

1. Cơ sở xây dựng KHHĐ



Kế hoạch hành động ứng phó với biến đổi khí hậu trên địa bàn Thành phố Hồ Chí Minh giai đoạn 2013-2015 được ban hành năm 2013 để triển khai các giải pháp thích nghi và giảm nhẹ đến năm 2015.

1. Cơ sở xây dựng KHHĐ

Lễ ký kết MoU với chính quyền thành phố Osaka

1. Hợp tác xây dựng KHHĐ 2016-2020
2. Tổ chức Hội nghị đối thoại cấp Thị trưởng
3. Triển khai các dự án hợp tác Công-Tư

1. Cơ sở xây dựng KHHĐ

Hợp tác với TP. Osaka

2. Dự thảo cấu trúc KHHĐ 2016-2020

➢ Dự thảo cấu trúc KHHĐ 2016-2020

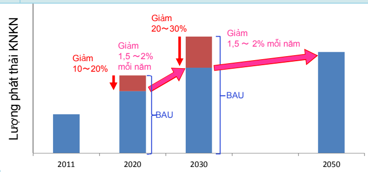
1. Giới thiệu
2. Cơ sở pháp lý Giai đoạn thực hiện
3. Tiền đề cho KHHĐ
4. Các hoạt động ứng phó BĐKH đã thực hiện
5. Hiện trạng & Kịch bản BĐKH
6. Mục tiêu của KHHĐ
7. Các giải pháp
8. Giải pháp trong các lĩnh vực
9. Dự án cụ thể
10. Triển khai KHHĐ

3. Mục tiêu của KHHĐ

➢ Mục tiêu giảm phát thải KNK của Chính phủ

- Chiến lược Tăng trưởng xanh (2012) ※Mục tiêu cho lĩnh vực Năng lượng

Năm	Mục tiêu giảm phát thải KNK
2020	Giảm 10% ～ 20% so với kịch bản phát thải KNK thông thường
2030	Giảm 20% ～ 30% so với kịch bản phát thải KNK thông thường Tối thiểu giảm 1,5 ～ 2% mỗi năm
2050	Giảm 1,5 ～ 2% mỗi năm



3. Mục tiêu của KHHĐ

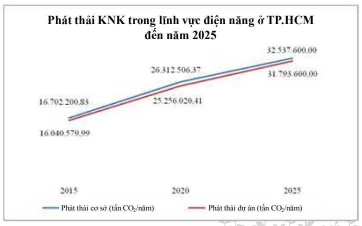
- **Khó khăn của TP. Hồ Chí Minh**
  - Thiếu số liệu cụ thể đáng tin cậy và mục tiêu quy hoạch.
  - Các mục tiêu tính theo % thường không rõ ràng và không phù hợp.
- **Đề xuất hướng xác định mục tiêu**
  - Xác định mục tiêu theo giá trị tuyệt đối (có thể bổ sung giá trị % khi cần thiết).
  - Tính toán dựa vào các giải pháp giảm phát thải tiềm năng.

3. Mục tiêu của KHHĐ

- **ĐIỆN NĂNG**

	2015	2020	2025
Phát thải cơ sở (tấn CO_2/năm)	16.702.200,83	26.312.506,37	32.537.600,00
Phát thải dự án (tấn CO_2/năm)	16.040.579,99	25.256.020,41	31.793.600,00
Lượng giảm phát thải (tấn CO_2/năm)	661.620,84	1.056.485,96	744.000,00

Giải pháp tiềm năng:
- Chương trình tiết kiệm điện
- Giảm tỷ lệ tổn thất điện năng
- Thay đèn LED cho hệ thống chiếu sáng hẻm
- Khuyến khích sử dụng năng lượng tái tạo



3. Mục tiêu của KHHĐ

- **NHIÊN LIỆU**

	2015	2020	2025
Lượng giảm phát thải (tấn CO_2/năm)	9.246,18	91.014,72	431.461

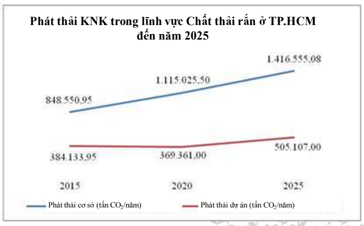
Giải pháp tiềm năng:
- Khuyến khích sử dụng xăng E5
- Xe buýt CNG
- Taxi LPG
- Vận hành metro
- Khuyến khích sử dụng phương tiện giao thông chạy bằng điện

3. Mục tiêu của KHHĐ

- **CHẤT THẢI RẮN**

	2015	2020	2025
Phát thải cơ sở (tấn CO_2/năm)	848.550,95	1.115.025,50	1.416.555,08
Phát thải dự án (tấn CO_2/năm)	384.133,95	369.361,00	505.107,00
Lượng giảm phát thải (tấn CO_2/năm)	464.417,00	745.664,50	911.448,08

Giải pháp tiềm năng:
- Sản xuất compost
- Lên men kỵ khí chất thải thực phẩm
- Sản xuất khí sinh học
- Lò đốt

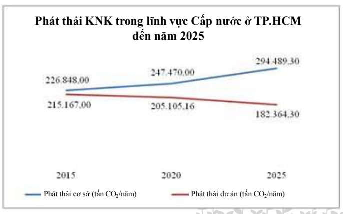


3. Mục tiêu của KHHĐ

- **CẤP NƯỚC**

	2015	2020	2025
Phát thải cơ sở (tấn CO_2/năm)	226.848,00	247.470,00	294.489,30
Phát thải dự án (tấn CO_2/năm)	215.167,00	205.105,16	182.364,30
Lượng giảm phát thải (tấn CO_2/năm)	11.681,00	42.364,84	112.125,00

Giải pháp tiềm năng:
- Giảm tỷ lệ thất thoát nước
- Sử dụng điện và hóa chất hiệu quả trong các nhà máy xử lý nước
- Thu hồi nước mưa
- Tái sử dụng nước sau xử lý
- Khuyến khích sử dụng các thiết bị nâng cao hiệu quả sử dụng nước



3. Mục tiêu của KHHĐ

- **QUY HOẠCH & XÂY DỰNG**

	2015	2025
Lượng giảm phát thải (tấn CO_2/năm)	28.515,304	76.946,304

Giải pháp tiềm năng:
- Tăng cường mảng xanh
- Khuyến khích sử dụng gạch không nung

3. Mục tiêu của KHHĐ

- **NÔNG NGHIỆP**

	2015	2020	2025
Lượng giảm phát thải (tấn CO_2/năm)	5.878.019,90	1.101.779,91	724.795,95

Giải pháp tiềm năng (bên cạnh việc giảm phát thải KNK tự nhiên do xu hướng giảm diện tích và các hoạt động nông nghiệp):

- Khuyến khích sản xuất compost và khí sinh học trong công tác quản lý phân chuồng
- Khuyến khích sản xuất năng lượng sinh khối

3. Mục tiêu của KHHĐ

- **Y TẾ**

	2020	2025
Lượng giảm phát thải (tấn CO_2/năm)	5,030.430	11,318.467

Giải pháp tiềm năng:

- Khánh thành 3 bệnh viện mới phục vụ khu vực ngoại thành → giúp giảm khoảng cách di chuyển vào trung tâm thành phố.

3. Mục tiêu của KHHĐ

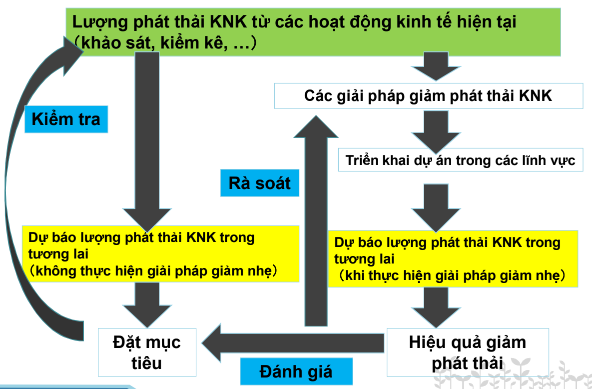
- **Mục tiêu giảm phát thải tối thiểu:**

	2015	2020	2025
Lượng giảm phát thải (tấn CO_2/năm)	1,200,000	2,000,000	2,300,000

Giải thích:

- Dựa trên tính toán lượng giảm phát thải KNK từ các giải pháp tiềm năng (làm tròn lên tổng lượng giảm phát thải);
- Đây là giới hạn tối thiểu cho mục tiêu giảm phát thải KNK;
- Kết quả này thể hiện lượng giảm so với kịch bản phát thải thông thường (cơ sở).

4. Kiểm tra, Rà soát, và Đánh giá KHHĐ



5. Các giải pháp để thực hiện mục tiêu

10 lĩnh vực cho HCM CCAP 2016-2020

1. Quy hoạch sử dụng đất
2. Năng lượng
3. Giao thông
4. Công nghiệp
5. Quản lý nguồn nước
6. Quản lý Chất thải (nước thải và chất thải rắn)
7. Nông nghiệp
8. Y tế
9. Xây dựng
10. Du lịch

5. Các giải pháp để thực hiện mục tiêu

- Quy hoạch sử dụng đất
  - Phân bố đất thích hợp cho cơ sở hạ tầng của ngành công nghiệp tĩnh mạch: theo Nghị quyết về vấn đề chính trị do quy hoạch; Cải thiện các giá trị thành phố.
  - Xem xét các kế hoạch sử dụng đất và đề xuất điều chỉnh phù hợp với cơ sở hạ tầng, không gian và phát triển mảng xanh.
  - Thay đổi mục đích sử dụng đất phù hợp
  - Thích hợp cho 10 lĩnh vực

5. Các giải pháp để thực hiện mục tiêu

- Năng lượng
  - Phát triển các chương trình nâng cao nhận thức
  - Công nghệ tiết kiệm năng lượng áp dụng cho các tòa nhà
  - Thực hiện các dự án ESCO
  - Phát triển các chương trình sử dụng năng lượng tiết kiệm và hiệu quả
  - Giảm sử dụng nhiên liệu hóa thạch và đồng thời tăng cường sử dụng năng lượng sạch và tái tạo.

5. Các giải pháp để thực hiện mục tiêu

- Giao thông
  - Phát triển chương trình nâng cao nhận thức trong giao thông
  - Phát triển các trung tâm thương mại ngầm, an toàn người đi bộ, giảm thiểu ùn tắc giao thông
  - Phát triển cơ sở hạ tầng giao thông, vận tải công cộng, giao thông thủy, giảm thiểu việc sử dụng xe cá nhân
  - Tăng cường việc năng lượng sạch qua các chương trình tuyên truyền

5. Các giải pháp để thực hiện mục tiêu

- Công nghiệp
  - Cải thiện Kỹ thuật / Công nghệ Kiln Operation
  - Phủ xanh khu nhà máy và khu công nghiệp
  - Chính sách hỗ trợ và khuyến khích chuyển giao công nghệ và áp dụng công nghệ mới.

5. Các giải pháp để thực hiện mục tiêu

- Quản lý nước
  - Phát triển các chương trình nâng cao nhận thức
  - Giảm chi phí hoạt động từ việc giảm lượng tiêu thụ nước sạch.
  - Cải thiện hệ thống cấp nước, giảm thiểu rò rỉ từ hệ thống đường ống cấp nước sạch
  - Tái chế mưa và nước thải
  - Chương trình nghiên cứu cung ứng tài nguyên nước bền vững

5. Các giải pháp để thực hiện mục tiêu

- Quản lý chất thải rắn
  - Phí phân loại và thu gom chất thải nhà bếp
  - Khí sinh học phát điện từ nước thải và chất thải hữu cơ rắn
  - Phát điện từ việc đốt chất thải rắn

5. Các giải pháp để thực hiện mục tiêu

- Nông nghiệp
  - Phát triển các chương trình nâng cao nhận thức
  - Phòng chống sạt lở đất do cây trồng
  - Giới thiệu về Bơm nước tiết kiệm bằng nguồn năng lượng tái tạo.
  - Chương trình giảm phát thải khí nhà kính vào các hoạt động nông nghiệp

5. Các giải pháp để thực hiện mục tiêu

- Y tế
  - Xây dựng năng lực cho đội ngu cán bộ
  - Tăng cường nhận thức về biến đổi khí hậu và vệ sinh môi trường
  - Cải thiện hệ thống chăm sóc sức khỏe y tế (Phát triển nguồn nhân lực của cán bộ y tế tại bệnh viện)
  - Cung cấp dịch vụ chăm sóc sức khỏe an toàn và đảm bảo

5. Các giải pháp để thực hiện mục tiêu

- Xây dựng
  - Giới thiệu các ưu đãi cho các công trình âm thanh môi trường
  - Giới thiệu về Vật liệu xây dựng hiệu quả về năng lượng

5. Các giải pháp để thực hiện mục tiêu

- Du lịch
  - Cải thiện Mạng lưới giao thông thủy để thúc đẩy du lịch
  - Bảo vệ các khu du lịch sinh thái
  - Bảo vệ các làng nghề truyền thống

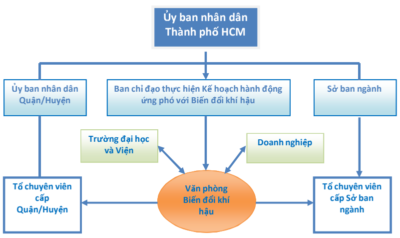
Xúc tiến dự án

Các đơn vị tham gia trong việc xây dựng để xúc tiến dự án

6.Thực hiện HCM CCAP 2016-2020

➢ **Thành lập Cơ cấu thực hiện**

Nhóm tư vấn từ các Sở ngành & quận huyện quản lý tiến độ của việc xây dựng và thực hiện CCAP và từng bước đưa các chuyên gia khoa học và đại diện doanh nghiệp để tổ chức thực hiện



6.Thực hiện HCM CCAP 2016-2020

Nâng cao năng lực cho đội ngu cán bộ để thực hiện HCMC CCAP

7. Kế hoạch tương lai

Tiến độ

- Hoàn thành KHHĐ 2016-2020: Tháng 9/2015
- Trình UBND TP và phê duyệt: Quý IV năm 2015

CHÂN THÀNH CẢM ƠN QUÝ VỊ.

Văn phòng Biến đổi khí hậu Tp.HCM

TP. Hồ Chí Minh, ngày 16 tháng 01 năm 2015

Osaka City

VỀ HỢP TÁC GIỮA TP HỒ CHÍ MINH VÀ TP OSAKA HƯỚNG TỚI VIỆC XÂY DỰNG THÀNH PHỐ CARBON THẤP

TP OSAKA

Osaka City

HỘI THẢO QUỐC TẾ HƯỚNG TỚI VIỆC XÂY DỰNG THÀNH PHỐ CARBON THẤP

TỔ CHỨC NGÀY 21/10/2013 TẠI OSAKA

Osaka City

KÝ BIÊN BẢN GHI NHỚ GIỮA TP HỒ CHÍ MINH VÀ TP OSAKA

1 LẬP KẾ HOẠCH HÀNH ĐỘNG ỨNG PHÓ BIẾN ĐỔI KHÍ HẬU
2 THƯỜNG XUYÊN TỔ CHỨC ĐỐI THOẠI VỀ CHÍNH SÁCH
3 THÚC ĐẨY DỰ ÁN THÔNG QUA LIÊN KẾT VỚI DÂN

Osaka City

THÀNH PHỐ HỒ CHÍ MINH KHÔNG NGỪNG PHÁT TRIỂN

Tầm quan trọng của việc quy hoạch tổng quát thành phố

Osaka City

XÂY DỰNG XÃ HỘI CARBON THẤP SONG SONG VỚI TĂNG TRƯỞNG KINH TẾ

Tầm quan trọng của lĩnh vực năng lượng
trong ứng phó hiệu ứng nhà kính

Osaka City

ĐẢM BẢO ĐẤT CHO CƠ SỞ HẠ TẦNG TĨNH MẠCH

Cơ sở hạ tầng tĩnh mạch đối với phát triển tương lai
Đảm bảo đất sử dụng cho công tác (xử lý chất thải và xử lý chất lượng nước)

XÂY DỰNG HỆ THỐNG QUẢN LÝ CHẤT THẢI MỘT CÁCH ĐỒNG BỘ

Đánh giá lượng chất thải gia tăng, từ đó thực hiện sớm dự án phát điện từ chất thải

PHỐ NGẦM Ở THÀNH PHỐ OSAKA

(Nguồn: ©Osaka Government Tourism Bureau)

Tạo không gian an toàn, dễ chịu cho người đi bộ

NÂNG CẤP PHỐ NGẦM

(Nguồn: Nikken Sekkei Civil)

NÂNG CẤP BỆNH VIỆN THÂN THIỆN VỚI MÔI TRƯỜNG

Lắp đặt thiết bị phát điện từ năng lượng mặt trời (Nguồn: Bệnh viện Osaka Gyomeikan)
Lấy ánh sáng tự nhiên và LED hóa toàn tòa nhà

ĐÀO TẠO NHÂN LỰC Y TẾ

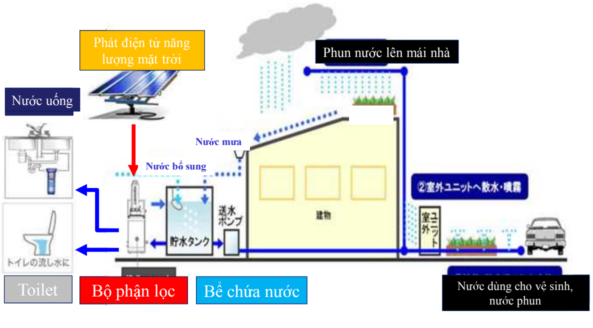
(Nguồn : Trung tâm cấp cứu thuộc đại học TP Osaka

NÂNG CẤP CƠ SỞ THIẾT BỊ SỬ DỤNG NƯỚC MƯA VÀ PHÁT ĐIỆN TỪ NĂNG LƯỢNG MẶT TRỜI ĐỐI VỚI TRƯỜNG HỌC

Trường tiểu học Đặng Trần Côn (Quận 4)

Osaka City

DỰ ÁN KẾT HỢP SỬ DỤNG NƯỚC MƯA VÀ PHÁT ĐIỆN TỪ NĂNG LƯỢNG MẶT TRỜI



(Nguồn: Lấy từ tài liệu do đơn vị tham gia dự án cung cấp)

Osaka City

HỖ TRỢ THƯỜNG XUYÊN ĐỐI VỚI VIỆC XÂY DỰNG THÀNH PHỐ CARBON THẤP

Hỗ trợ chính sách dựa trên phương châm hướng tới việc xây dựng thành phố carbon thấp
Hỗ trợ lập kế hoạch hành động ứng phó biến đổi khí hậu
Thực hiện sớm các dự án liên kết với doanh nghiệp của Osaka cũng như khu vực Kansai

Hiệu qủa được mong được từ hợp tác giữa hai thành phố

- Nâng cao mức sống theo phát triển kinh tế của thành phố Hồ Chí Minh, đồng thời xây dựng được xã hội carbon thấp, xã hội tuần hoàn, xã hội thân thiện với môi trường.
- Thành phố Hồ Chí Minh trở thành thành phố đi đầu về mô hình xây dựng thành phố carbon thấp ở Châu Á.

Dự án hỗ trợ thiết bị cơ chế tín chỉ chung JCM (Joint Crediting Mechanism)

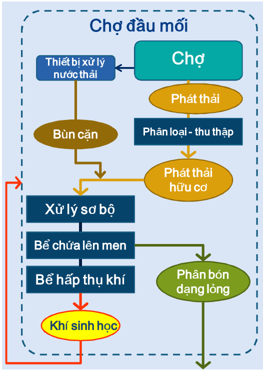
Dự án sử dụng khí và lên men metan đối với phát thải hữu cơ ở chợ đầu mối

Tháng 1 năm 2015

Bên thực hiện dự án:
(Phía Nhật Bản) Hitachi Zosen Corporation,
K.K. Satisfactory International
(Phía Việt Nam) Tổng công ty thương mại Sài Gòn (SATRA)

Hitz
Hitachi Zosen

Khái quát dự án

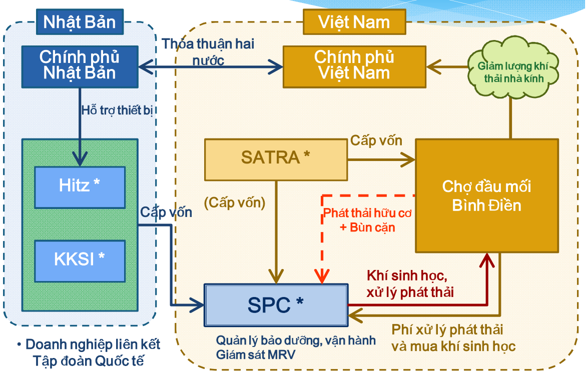


Bằng việc phân loại, thu thập phát thải hữu cơ từ phát thải ở chợ đầu mối Bình Điền trong thành phố Hồ Chí Minh, sau đó tiến hành xử lý kỵ khí bằng hệ thống lên men metan lắp đặt ở cùng địa điểm, khí sinh học thu được sẽ cung cấp cho nhà máy chế biến thủy sản.

Thực hiện giảm lượng phát thải hữu cơ được xử lý chôn lấp bằng cách xử lý ngay tại nguồn thải ra, sau đó phát thải hữu cơ sẽ được vận chuyển từ chợ đầu mối Bình Điền đến nơi xử lý cuối cùng, đến nay, dự án có thể giảm lượng khí metan thải ra từ các bãi chôn lấp.

Đồng thời, khí sinh học thu được sẽ cung cấp cho nhà máy chế biến thủy sản làm năng lượng thay thế dầu mỏ, đến nay, có thể giảm lượng sử dụng nhiên liệu hóa thạch đang được sử dụng trong nhà máy chế biến thủy sản.

Cơ chế thực hiện dự án



Nội dung điều tra năm 2013

1. Điều tra lượng phát thải thải ra từ chợ đầu mối
   - Lượng phát thải thải ra
   - Tỷ lệ phát thải hữu cơ
2. Thí nghiệm kiểm chứng phân tích thành phần phát thải hữu cơ, lượng khí đốt phát sinh, v.v…
   - Phân tích thành phần
   - Thí nghiệm liên tục trong phòng
3. Phát triển phương pháp luận cơ chế tín chỉ chung JCM (Joint Crediting Mechanism)
4. Điều tra tìm hiểu về thiết kế cơ bản cơ sở, doanh nghiệp thực hiện ở địa phương - nhà sản xuất thiết bị

Điều tra phát thải ở chợ đầu mối: phần 1

Điều tra về lượng phát thải thải ra

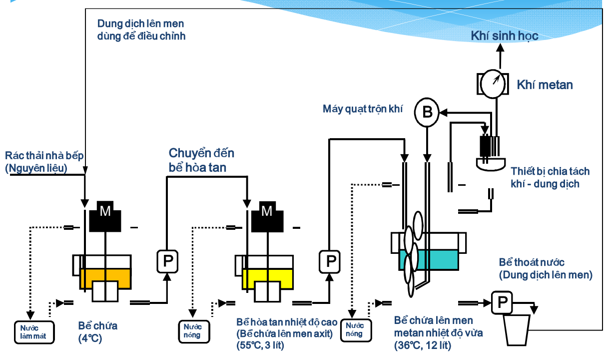
Nắm bắt tổng khối lượng phát thải thải ra từ chợ đầu mối thông qua số lượng xe tải và xe đẩy tay chở rác.

Điều tra phát thải ở chợ đầu mối: phần 2

Điều tra về thành phần phát thải

Tiến hành phân loại - định lượng rác hữu cơ và rác không phù hợp lên men, ngoài ra định lượng rác không phù hợp lên men với mỗi thành phần như vỏ sò, tre, đồ nhựa, v.v…

Khái quát thiết bị thí nghiệm trong phòng



Thí nghiệm trong phòng

Thiết bị thí nghiệm

Rác thải nhà bếp được dùng thí nghiệm

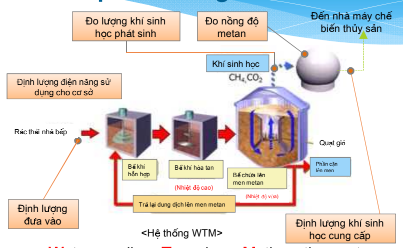
Kết quả điều tra năm 2013

Mục	Kết quả điều tra: Tổng khối lượng phát thải		Lượng phát thải hữu cơ
Tổng khối lượng		46,8 Tấn/ngày	38,0 Tấn/ngày
Quầy rau quả		59,2 %	72,8 %
Quầy trái cây	13,5	13,5 %	16,6 %
Quầy hải sản	1,8	1,8 %	2,2 %
Quầy hoa tươi	0,9	0,9 %	1,1 %
Quầy thịt	1,3	1,3 %	1,6 %
Rác không phù hợp lên men	18,8	18,8 %	--
Bùn cặn xử lý thoát nước	4,7	4,7 %	5,8 %

*Rác không phù hợp lên men: Vỏ sò, tre, túi-dây ni lông, giấy thải, bìa cứng, cốc nhựa-ống hút, nhựa xốp polixtiren, các loại vải, túi bao cát, vỏ dừa.

Mục	Nhật Bản	Việt Nam
Thực phẩm - nguyên liệu	Rác thải nhà bếp hỗn hợp	Rác thải nhà bếp (Chủ yếu là rau)
Thời gian duy trì	15 ngày	15 ngày
Nồng độ đưa vào bể chứa lên men	Khoảng 10 %	Từ 10 % trở xuống
Hệ số tỷ lệ phát sinh khí sinh học	150 Nm³/tấn	32,7 L/L
Tốc độ phân hủy nồng độ khí metan m³/kg-CODcr	0,35	Cùng mức độ
Tốc độ phân hủy chất hữu cơ Quy đổi ra CODcr	70 ~ 75 %	Từ 75 % trở lên
Nồng độ metan	50 ~ 65 %	Khoảng 60 %

Giản đồ thiết bị và điểm giám sát

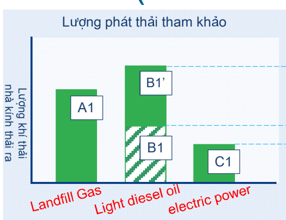


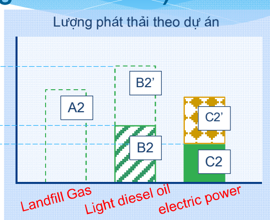
<Hệ thống WTM>

Water-needless Two-phase Methanation system

Mục định lượng	Nội dung giám sát
Lượng đưa vào	Lượng phát thải xử lý ở cơ sở (Lượng phát thải thay thế xử lý chôn lấp)
Lượng khí sinh học thu được	Lượng khí sinh học thu được bằng phương pháp lên men metan
Nồng độ metan	Nồng độ metan trong khí sinh học thu được
Lượng khí sinh học cung cấp	Lượng khí sinh học sử dụng ở nhà máy chế biến thủy sản (Ngoại trừ phần nhiệt sử dụng từ lượng khí sinh học thu được ở cơ sở)
Năng lượng điện sử dụng	Lượng điện năng đã sử dụng để vận hành thiết bị

Phương pháp luận cơ thế tín chỉ chung JCM (Joint Crediting Mechanism)





Lượng phát thải tham khảo = A1 + B1 + B1' + C1

Lượng phát thải theo dự án = B2 + C2 + C2'

*A1 = A2, B1 = B2 → B1' = B2', C1 = C2

*C1 (= C2): Lượng điện năng tiêu thụ của nhà máy chế biến thủy sản

C2': Lượng điện năng tiêu thụ của cơ sở lên men metan

Giảm lượng khí thải nhà kính
= A2 + B2' – C2'
= A1 + B1' – C2'

Thông số giám sát MRV:

A1: Khối lượng rác thải nhà bếp đưa vào

B1': Nồng độ metan và lượng khí sinh học sử dụng

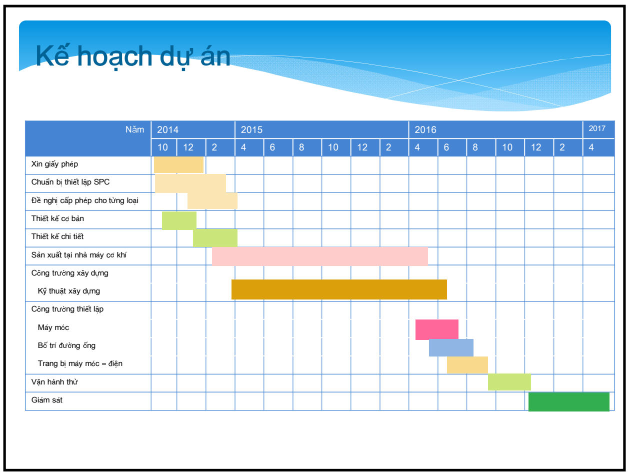
C2': Lượng điện năng tiêu thụ ở cơ sở lên men metan

Điều kiện thiết kế cơ bản (Dự án hỗ trợ thiết bị)

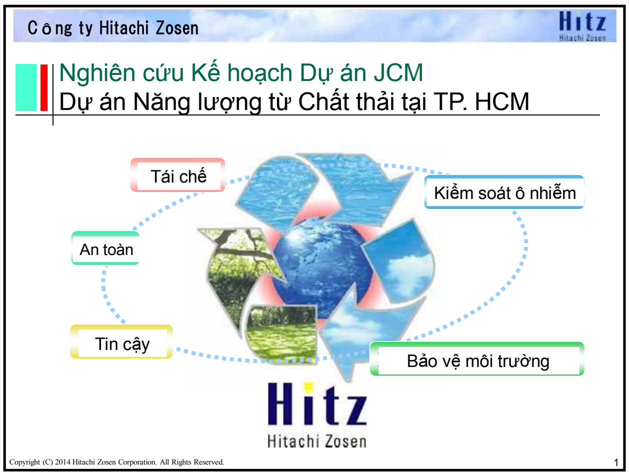
Mục	Giá trị tính toán	Đơn vị
Đối tượng rác xử lý Rác thải nhà bếp Bùn cặn thải ra	50 (trong đó rác không thích hợp lên men chiếm 5 %) 3	Tấn/ngày Tấn/ngày
Lượng khí sinh học phát sinh	1.500	m³/ngày
Nồng độ metan	55	%
Nhiệt lượng khí sinh học	30.000	MJ/ngày
Nhiệt lượng khí đốt cung cấp*1	25.740	MJ/ngày
Giá trị quy đổi dầu mỏ	672	L/ngày

*1 Ngoại trừ năng lượng tiêu thụ bên trong nhằm bảo quản thiết bị (Hiệu suất nồi hơi: 80%)

Tổng chi phí xây dựng: khoảng 678 triệu Yên Nhật



Kế hoạch dự án
Năm
2014
2015
2016
2017
10
12
2
4
6
8
10
12
2
4
6
8
10
12
2
4
Xin giấy phép
Chuẩn bị thiết lập SPC
Đề nghị cấp phép cho từng loại
Thiết kế cơ bản
Thiết kế chi tiết
Sản xuất tại nhà máy cơ khí
Công trường xây dựng
Kỹ thuật xây dựng
Công trường thiết lập
Máy móc
Bố trí đường ống
Trang bị máy móc – điện
Vận hành thử
Giám sát


Công ty Hitachi Zosen
Nghiên cứu Kế hoạch Dự án JCM
Dự án Năng lượng từ Chất thải tại TP. HCM
Tái chế
Kiểm soát ô nhiễm
An toàn
Tin cậy
Bảo vệ môi trường
Hitz
Hitachi Zosen
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1


Quá trình triển khai
Hitz
Hitachi Zosen
＜Từ năm 2013＞
● Công ty Hitachi Zosen ("Hitz") đã thực hiện nghiên cứu khả thi về quản lý chất thải rắn tại TP. Hồ Chí Minh trong gần 03 năm qua kể từ khi ký kết Biên bản Thỏa thuận hợp tác giữa TP. Hồ Chí Minh và TP. Osaka và tổ chức Hội thảo khởi động về quản lý tổng hợp chất thải rắn ngày 16/02/2012.
● Ngày 22/10/2013 tại TP. Osaka, đã diễn ra lễ ký kết Biên bản ghi nhớ hợp tác giữa TP. Osaka và TP. HCM về Phát triển TP. Carbon thấp. TP. HCM đã đề nghị TP. Osaka hỗ trợ trong việc triển khai dự án Năng lượng từ chất thải (EfW) tại TP. Hồ Chí Minh.
＜Năm 2014＞
● Ngày 05/08/2014, Hitz đã đệ trình Thư đề xuất chấp thuận chủ trương đầu tư lên UBND TP. Hồ Chí Minh. Sau đó UBND TP. HCM có văn bản ngày 14/08/2014 ủy quyền cho Sở TNMT phụ trách xem xét đề xuất này.
● Ngày 30/09/2014, HITZ đã có cuộc họp đầu tiên với Sở TNMT và các sở ngành liên quan về giới thiệu đề xuất dự án
● Ngày 13/11/2014, HITZ đã có cuộc họp lần 2 với Sở TNMT để làm rõ các điều kiện dự án và lịch trình triển khai.
● Ngày 03/12/2014, Sở TNMT đệ trình báo cáo về tính khả thi của các điều kiện dự án Năng lượng từ Chất thải lên UBND TP. HCM.
＜Năm 2015＞
Sau khi nhận được Chấp thuận chủ trương của UBND TP. HCM về việc thực hiện Dự án Năng lượng từ Chất thải, HITZ sẽ trình nộp đề xuất chương trình hỗ trợ tài chính JCM từ Bộ Môi trường Nhật Bản (MOEJ)
LỄ PHÁT ĐỘNG
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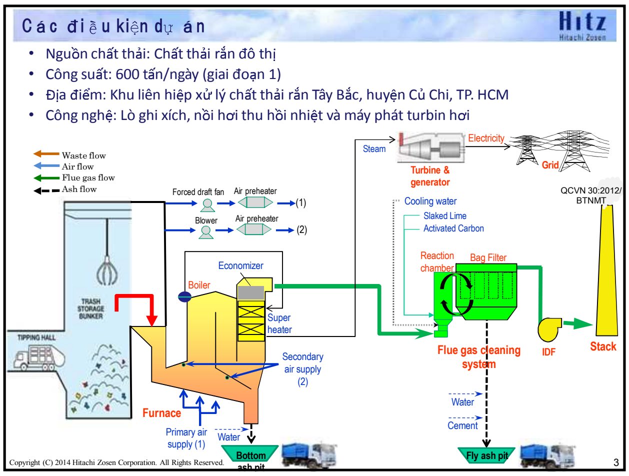
2


Các điều kiện dự án
Hitz
Hitachi Zosen
• Nguồn chất thải: Chất thải rắn đô thị
• Công suất: 600 tấn/ngày (giai đoạn 1)
• Địa điểm: Khu liên hiệp xử lý chất thải rắn Tây Bắc, huyện Củ Chi, TP. HCM
• Công nghệ: Lò ghi xích, nồi hơi thu hồi nhiệt và máy phát turbin hơi
Waste flow
Air flow
Flue gas flow
Ash flow
Steam
Electricity
Turbine & generator
Grid
QCVN 30:2012/BTNMT
Forced draft fan
Air preheater
Blower
Cooling water
Slaked Lime
Activated Carbon
Economizer
Boiler
Reaction chamber
Bag Filter
TRASH STORAGE BUNKER
TIPPING HALL
Super heater
Secondary air supply (2)
Flue gas cleaning system
IDF
Stack
Furnace
Primary air supply (1)
Water
Cement
Bottom ash pit
Fly ash pit
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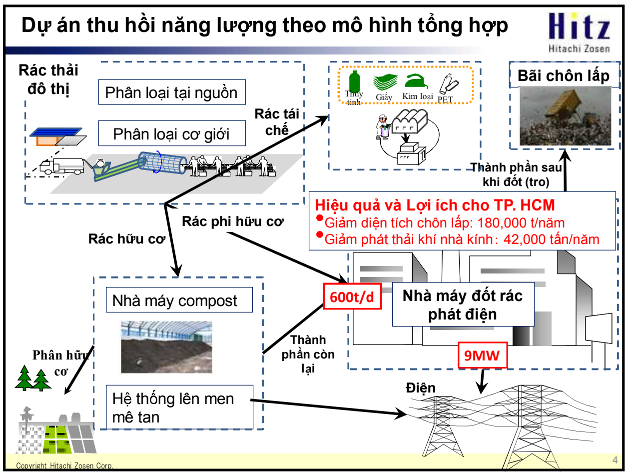
3


Dự án thu hồi năng lượng theo mô hình tổng hợp
Hitz
Hitachi Zosen
Rác thải đô thị
Phân loại tại nguồn
Phân loại cơ giới
Rác tái chế
Thủy tinh
Giấy
Kim loại
PET
Bãi chôn lấp
Thành phần sau khi đốt (tro)
Hiệu quả và Lợi ích cho TP. HCM
•Giảm diện tích chôn lấp: 180,000 t/năm
•Giảm phát thải khí nhà kính: 42,000 tấn/năm
Rác hữu cơ
Rác phi hữu cơ
Nhà máy compost
600t/d
Nhà máy đốt rác phát điện
Phân hữu cơ
Thành phần còn lại
9MW
Điện
Hệ thống lên men mê tan
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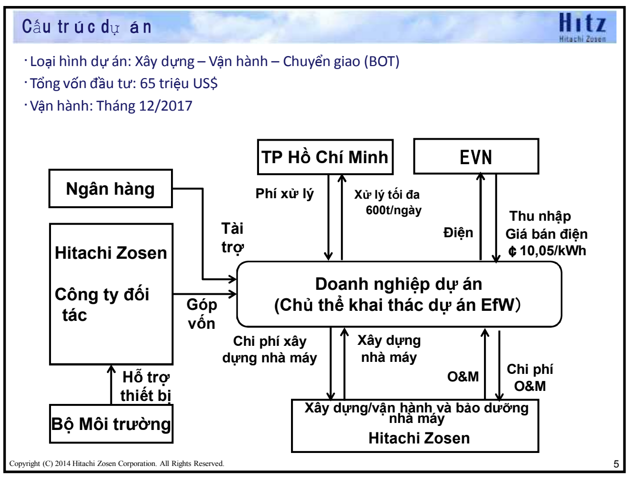
4


Cấu trúc dự án
Hitz
Hitachi Zosen
·Loại hình dự án: Xây dựng – Vận hành – Chuyển giao (BOT)
·Tổng vốn đầu tư: 65 triệu US$
·Vận hành: Tháng 12/2017
Ngân hàng
TP Hồ Chí Minh
EVN
Phí xử lý
Xử lý tối đa 600t/ngày
Tài trợ
Điện
Thu nhập Giá bán điện ¢ 10,05/kWh
Hitachi Zosen
Công ty đối tác
Góp vốn
Doanh nghiệp dự án (Chủ thể khai thác dự án EfW)
Chi phí xây dựng nhà máy
Xây dựng nhà máy
O&M
Chi phí O&M
Hỗ trợ thiết bị
Bộ Môi trường
Xây dựng/vận hành và bảo dưỡng nhà máy
Hitachi Zosen
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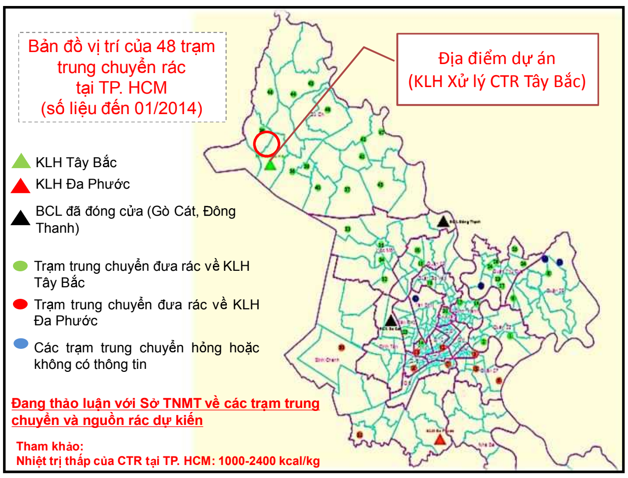
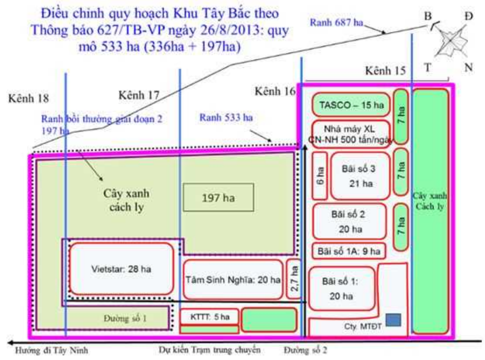
5


Bản đồ vị trí của 48 trạm trung chuyển rác tại TP. HCM (số liệu đến 01/2014)
Địa điểm dự án (KLH Xử lý CTR Tây Bắc)
KLH Tây Bắc
KLH Đa Phước
BCL đã đóng cửa (Gò Cát, Đông Thanh)
Trạm trung chuyển đưa rác về KLH Tây Bắc
Trạm trung chuyển đưa rác về KLH Đa Phước
Các trạm trung chuyển hỏng hoặc không có thông tin
Đang thảo luận với Sở TNMT về các trạm trung chuyển và nguồn rác dự kiến
Tham khảo:
Nhiệt trị thấp của CTR tại TP. HCM: 1000-2400 kcal/kg

Khu Liên hợp xử lý chất thải rắn Tây Bắc

Hitz
Hitachi Zosen



Đang thảo luận với Sở TNMT về địa điểm cụ thể của dự án trong khu liên hợp này

7

Hitz
Hitachi Zosen

Thank you very much
for kind attention!

http://www.hitachizosen.co.jp/english/index.html

8

DỰ ÁN LÁI XE THÂN THIỆN VỚI MÔI TRƯỜNG SỬ DỤNG THIẾT BỊ GIÁM SÁT HÀNH TRÌNH KỸ THUẬT SỐ

~ Eco-driving by Utilizing Digital Tachograph System ~
(Host Country : VIETNAM)

Tháng 1 Năm 2015
Tập đoàn Nittsu

1

KHÁI QUÁT DỰ ÁN

- Số xe tải Nittsu Việt Nam sử dụng (khoảng 130 chiếc)
- Gắn hệ thống khuyến khích lái xe thân thiện với môi trường sử dụng thiết bị giám sát hành trình kỹ thuật số.
- Thông qua mạng cloud để tập hợp và phân tích dữ liệu về các thông tin như lượng cấp dầu nhiên liệu, cự ly chạy xe,và các hoạt động lái xe khác.
- Liên tục phản hồi kết qủa phân tích tới người lái để thực hiện lái xe thân thiện với môi trường và an toàn.

- Chương trình hỗ trợ thiết bị dự án áp dụng cơ chế tín chỉ chung giữa hai nước năm 2014. (Bộ môi trường)

2

ĐỊA ĐIỂM THỰC HIỆN DỰ ÁN

1) Tỉnh Bình Dương
(Ngoại ô TP Hồ Chí Minh)

2) TP Hà Nội

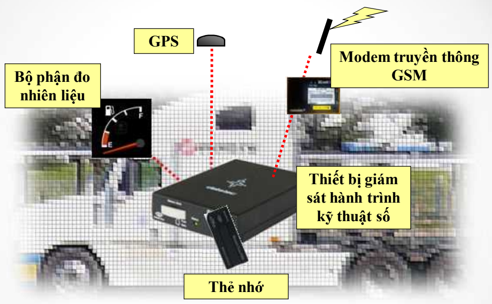
3

HỆ THỐNG KHUYẾN KHÍCH LÁI XE THÂN THIỆN VỚI MÔI TRƯỜNG SỬ DỤNG THIẾT BỊ GIÁM SÁT HÀNH TRÌNH KỸ THUẬT SỐ

- Thông qua mạng cloud để tập hợp và phân tích dữ liệu về các thông tin như lượng cấp dầu nhiên liệu, cự ly chạy xe,và các hoạt động lái xe khác.
- Giúp cải thiện hoạt động lái xe thông qua việc hướng dẫn, đưa ra lời khuyên cho người lái, từ đó đánh giá dựa trên hiệu qủa đạt được.

4

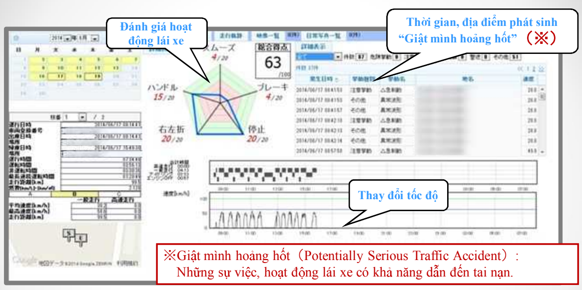
1. CƠ CẤU HỆ THỐNG THIẾT BỊ GẮN TRÊN XE



- Hệ thống bao gồm thiết bị giám sát hành trình,bộ phận đo nhiên liệu, modem truyền thông, và GPS .

5

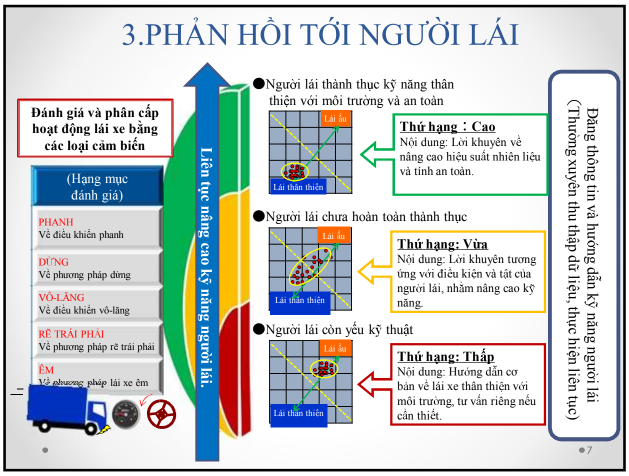
2. ĐÁNH GIÁ HOẠT ĐỘNG LÁI XE BẰNG CÁC LOẠI CẢM BIẾN

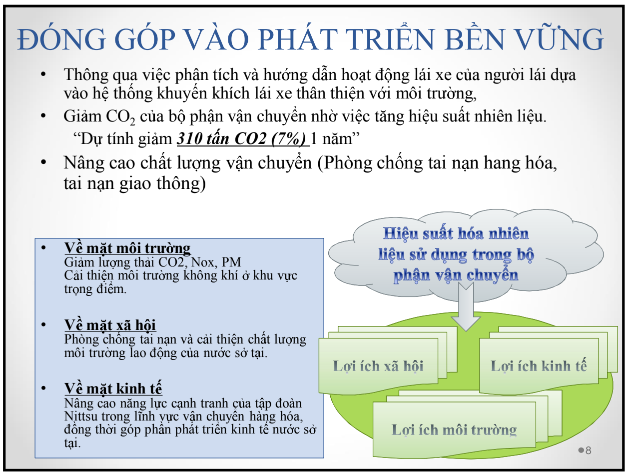


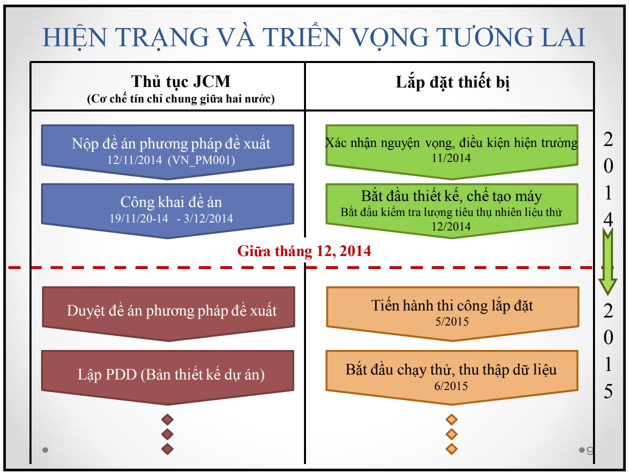
（Nguồn : Theo tài liệu công ty TEC）

- Dựa vào dữ liệu thu được từ các loại cảm biến để đánh giá và phân cấp hoạt động lái xe của tất cả người lái, trên quan điểm lái xe thân thiện với môi trường và an toàn.

6


3.PHẢN HỒI TỚI NGƯỜI LÁI
Đánh giá và phân cấp hoạt động lái xe bằng các loại cảm biến
(Hạng mục đánh giá)
PHANH
Về điều khiển phanh
DỪNG
Về phương pháp dừng
VÔ-LĂNG
Về điều khiển vô-lăng
RẼ TRÁI PHẢI
Về phương pháp rẽ trái phải
ÊM
Về phương pháp lái xe êm
Liên tục nâng cao kỹ năng người lái.
●Người lái thành thục kỹ năng thân thiện với môi trường và an toàn
Lái ẩu
Lái thân thiện
Thứ hạng：Cao
Nội dung: Lời khuyên về nâng cao hiệu suất nhiên liệu và tính an toàn.
●Người lái chưa hoàn toàn thành thục
Lái ẩu
Lái thân thiện
Thứ hạng: Vừa
Nội dung: Lời khuyên tương ứng với điều kiện và tật của người lái, nhằm nâng cao kỹ năng.
●Người lái còn yếu kỹ thuật
Lái ẩu
Lái thân thiện
Thứ hạng: Thấp
Nội dung: Hướng dẫn cơ bản về lái xe thân thiện với môi trường, tư vấn riêng nếu cần thiết.
Đăng thông tin và hướng dẫn kỹ năng người lái
(Thường xuyên thu thập dữ liệu, thực hiện liên tục)
7


ĐÓNG GÓP VÀO PHÁT TRIỂN BỀN VỮNG
• Thông qua việc phân tích và hướng dẫn hoạt động lái xe của người lái dựa vào hệ thống khuyến khích lái xe thân thiện với môi trường,
• Giảm CO2 của bộ phận vận chuyển nhờ việc tăng hiệu suất nhiên liệu.
"Dự tính giảm 310 tấn CO2 (7%) 1 năm"
• Nâng cao chất lượng vận chuyển (Phòng chống tai nạn hang hóa, tai nạn giao thông)
• Về mặt môi trường
Giảm lượng thải CO2, Nox, PM
Cải thiện môi trường không khí ở khu vực trọng điểm.
• Về mặt xã hội
Phòng chống tai nạn và cải thiện chất lượng môi trường lao động của nước sở tại.
• Về mặt kinh tế
Nâng cao năng lực cạnh tranh của tập đoàn Nittsu trong lĩnh vực vận chuyển hàng hóa, đồng thời góp phần phát triển kinh tế nước sở tại.
Hiệu suất hóa nhiên liệu sử dụng trong bộ phận vận chuyển
Lợi ích xã hội
Lợi ích kinh tế
Lợi ích môi trường
8


HIỆN TRẠNG VÀ TRIỂN VỌNG TƯƠNG LAI
Thủ tục JCM
(Cơ chế tín chỉ chung giữa hai nước)
Lắp đặt thiết bị
Nộp đề án phương pháp đề xuất
12/11/2014 (VN_PM001)
Xác nhận nguyện vọng, điều kiện hiện trường
11/2014
Công khai đề án
19/11/20-14 - 3/12/2014
Bắt đầu thiết kế, chế tạo máy
Bắt đầu kiểm tra lượng tiêu thụ nhiên liệu thử
12/2014
2014
Giữa tháng 12, 2014
Duyệt đề án phương pháp đề xuất
Tiến hành thi công lắp đặt
5/2015
Lập PDD (Bản thiết kế dự án)
Bắt đầu chạy thử, thu thập dữ liệu
6/2015
2015
9


GREEN
FUEL EFFICIENCY
Cảm ơn quý vị đã chú ý lắng nghe
通
ECO DRIVING
Tháng 1 Năm 2015
Tập đoàn Nittsu
10

Dự án kiểm chứng thúc đẩy tiết kiệm năng lượng trong khách sạn bằng cách phát triển V-BEMS phiên bản Việt Nam (2013 - 2016)

NEDO

Khái quát dự án

Dựa trên các phương tiện hoạt động tiết kiệm năng lượng đã thành công ở Nhật (BEMS, SLC, Hệ thống cung cấp nước nóng), phát triển thành các sản phẩm có thể mở rộng ở Việt Nam, chứng minh hiệu quả tiết kiệm năng lượng bằng cách tích hợp với các kỹ thuật Nhật Bản liên quan.

Thực hiện chính sách tiết kiệm năng lượng một cách hiệu quả đối với 3 ứng dụng là điều hòa không khí, chiếu sáng, và cung cấp nước nóng vốn chiếm 85% tỷ lệ tiêu thụ năng lượng trong các khách sạn thông thường ở Việt Nam.

Quốc gia là đối tượng của dự án	Việt Nam
Công ty nhận ủy thác	Hibiya Engineering, Ltd. Mitsubishi UFJ Morgan Stanley Securities Co., Ltd
Địa điểm thực hiện dự án	Địa điểm tại Hà Nội: Khách sạn A Địa điểm tại Thành phố Hồ Chí Minh: Khách sạn B
Đối chiếu	Bộ Tài nguyên và Môi trường Đại học Tài nguyên và Môi trường Tp.Hồ Chí Minh
Hiệu quả giảm khí thải nhà kính	Tỷ lệ giảm theo giả định: khoảng 12% Biến đổi khí CO_2: 605 tấn/năm

* Giá trị hiệu quả là giá trị dự kiến

Khái quát kỹ thuật đưa vào sử dụng

(1) Hệ thống quản lý nguồn nhiệt điều hòa không khí (Phát triển BEMS phiên bản Việt Nam)

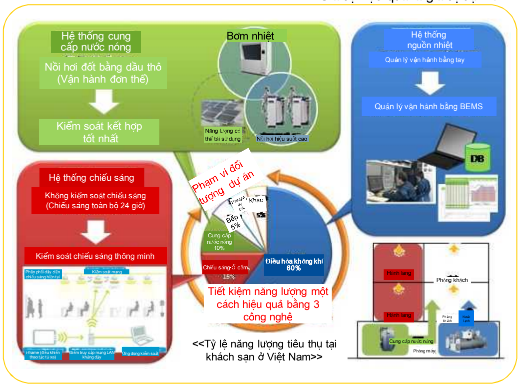
Phát triển BEMS (V-BEMS) kết hợp phần mềm chức năng cao với phần cứng giá rẻ dựa trên BEMS tính năng cao đã thành công ở Nhật, thúc đẩy mở rộng, tạo tài liệu hướng dẫn sử dụng phù hợp với nhu cầu của Việt Nam.

(2) Hệ thống chiếu sáng (Phát triển SLC phiên bản Việt Nam)

Phát triển hệ thống kết hợp phần mềm quản lý và thiết bị kiểm soát phù hợp với tiêu chuẩn của Việt Nam (V-SLC) dựa trên hệ thống kiểm soát chiếu sáng riêng biệt, thúc đẩy mở rộng phương thức hoạt động và văn hóa tiết kiệm năng lượng.

(3) Hệ thống cung cấp nước nóng (Phát triển phương pháp xây dựng hệ thống tối ưu)

Kiểm chứng tính hiệu quả trong việc tiết kiệm năng lượng bằng cách kiểm soát kết hợp tốt nhất sản phẩm tiết kiệm năng lượng vượt trội của Nhật Bản như bơm nhiệt, nồi hơi hiệu suất cao, v.v…



<<Tỷ lệ năng lượng tiêu thụ tại khách sạn ở Việt Nam>>

Dự án thúc đẩy bệnh viện xanh bằng cách cải thiện môi trường / tiết kiệm năng lượng tại các bệnh viện nhà nước ở Việt Nam (2013 - 2016)

NEDO

Khái quát dự án

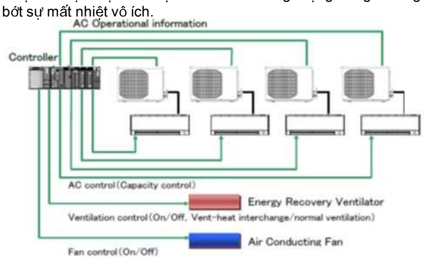
Về tính hiệu suất cao trong các bệnh viện nhà nước ở Hà Nội và Thành phố Hồ Chí Minh tại Việt Nam, kết hợp một cách hiệu quả tất cả quạt thông gió chuyển nhiệt với máy điều hòa không khí Inverter (có chức năng làm sạch không khí) đáng tin cậy, vừa lập kế hoạch nâng cao sự thoải mái và chất lượng không khí trong bệnh viện bằng công nghệ phát triển thông số kỹ thuật trong nước thuộc công nghệ hệ thống quản lý năng lượng (EMS), vừa xúc tiến "Bệnh viện xanh" thực hiện tiết kiệm khá nhiều năng lượng.

Quốc gia là đối tượng của dự án	Việt Nam
Công ty nhận ủy thác	Mitsubishi Electric Corporation Mitsubishi Corporation Mitsubishi UFJ Morgan Stanley Securities Co., Ltd
Địa điểm thực hiện dự án	Trung tâm thử nghiệm-kiểm định công nghiệp / Viện cơ khí năng lượng và mỏ (Hà Nội) Địa điểm tại Hà Nội: Bệnh viện A Địa điểm tại Thành phố Hồ Chí Minh: Bệnh viện B
Đối chiếu	Bộ Công Thương
Hiệu quả giảm khí thải nhà kính	Tỷ lệ giảm theo giả định: khoảng 40% Biến đổi khí CO_2: 1.749 tấn/năm

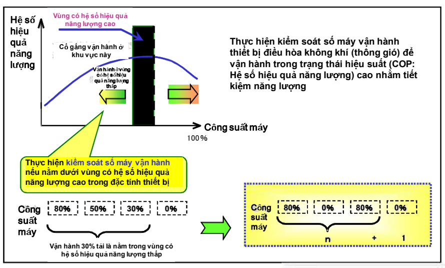
* Giá trị hiệu quả là giá trị dự kiến

Khái quát kỹ thuật đưa vào sử dụng

Thực hiện kiểm soát tối ưu từng thiết bị bằng cách đưa vào sử dụng nhiều máy điều hòa không khí (sử dụng máy nén Inverter hiệu suất cao có chức năng làm sạch không khí) đang phổ biến tại Nhật, thu thập dữ liệu về trạng thái vận hành (như tần số, dòng điện, nhiệt độ đường ống, vận tốc gió, v.v…) từ thiết bị ngoài trời, phán đoán công suất máy. Ngoài ra, lập kế hoạch cải thiện môi trường bên trong bệnh viện bằng cách đưa vào sử dụng tất cả quạt thông gió chuyển nhiệt và thực hiện tiết kiệm khá nhiều năng lượng bằng cách giảm bớt sự mất nhiệt vô ích.



Hệ thống kiểm soát tối ưu thiết bị điều hòa không khí



Kiểm chứng tính năng máy điều hòa không khí

Sử dụng thiết bị đo lượng nhiệt trong phòng theo hình thức cân bằng nhiệt (Nhiệt lượng kế) và thực hiện kiểm chứng hiệu quả của tính trong suốt và độ chính xác.

Thông số kỹ thuật

Tỷ lệ cân bằng trong ngoài	Từ 2% trở xuống
Độ chính xác lặp lại	Từ 1% trở xuống
Tiêu chuẩn kiểm tra	JIS B8615-1:1999 ISO 5151:1994

Hội nghị quốc tế hướng tới việc hình thành thành phố có lượng CO2 thấp Thành phố Hồ Chí Minh・thành phố Osaka

Năm 2014 Điều tra tính khả thi dự án JCM điều tra hỗ trợ hình thành thành phố có lượng CO2 thấp dựa trên sự liên kết giữa Thành phố Hồ Chí Minh・Thành phố Osaka

「Áp dụng kỹ thuật tiết kiệm năng lượng cho công trình xây dựng」

Ngày 16 tháng 1 năm 2015

Công ty cổ phần xây dựng Shimizu

Bối cảnh và khái quát

Bối cảnh	➢ Cùng với sự phát triển của đô thị hóa thì nhu cầu nâng cao môi trường sống ngày càng tăng cao, việc sử dụng năng lượng trong các công trình xây dựng tại đô thị không ngừng gia tăng. ➢ Khi cải tạo trên quy mô lớn các công trình xây dựng hiện có thì phát sinh nhu cầu áp dụng các phương pháp tiết kiệm năng lượng, gia tăng các công trình giảm thiểu tác động tiêu cực tới môi trường.
Khái quát dự án	➢ Tối ưu hóa hệ thống điều hòa không khí và điều kiện sử dụng điều hòa không khí v.v... ➢ Tối ưu hóa thiết bị chiếu sáng. ➢ Quản lý, điều khiển năng lượng bằng cách đưa vào sử dụng BEMS smart v.v... Hướng tới việc tiết kiệm năng lượng, cắt giảm GHG bằng cách kết hợp sản phẩm, kỹ thuật tiên tiến của đất nước chúng tôi.

Nội dung thực hiện điều tra trong năm nay

Cuối tháng 5: Sau khi thảo luận với văn phòng tại Thành phố Hồ Chí Minh của công ty cổ phần xây dựng Shimizu thì quyết định công trình đối tượng của FS là Sun Wah Tower

Ngày 1 ~ 5 tháng 6: công tác tại thực địa
・Họp với chủ tòa nhà Sun Wah Tower để họ hiểu được việc điều tra công trình trong năm nay. Ngoài ra, thực hiện điều tra trước đối với công trình

Ngày 7 tháng 7 ~ ngày 1 tháng 8: điều tra thực địa đối với công trình đối tượng lần thứ 1
・Thực hiện điều tra thực địa công trình Sun Wah Tower lần thứ 1 đúng vào mùa mưa của Thành phố Hồ Chí Minh, tiến hành đo lượng tiêu thụ điện trong tòa nhà, nhiệt độ trong và ngoài phòng, môi trường chất lượng không khí v.v...

Ngày 8 ~ ngày 12 tháng 7: Điều tra thực địa
・Thực hiện giới thiệu dự án mẫu của công ty xây dựng Shimizu tại buổi họp giải thích dự án (JCM) theo hình thức tín dụng giữa hai nước dành cho tổ chức tại Việt Nam

Ngày 20 2~ Ngày 22 tháng 8: công tác tại thực địa
・Vào ngày 21/8 tham gia dự thính hội thảo được diễn ra với sự góp mặt của đại diện Thành phố Hồ Chí Minh, thứ trưởng Bộ môi trường Nhật Bản, đại diện thành phố Osaka v.v...

Ngày 15 ~ngày 17 tháng 10: công tác tại thực địa
・Họp với chủ tòa nhà Sun Wah Tower, giải thích kế hoạch cải tạo công trình.

Khái quát về công trình đối tượng đánh giá

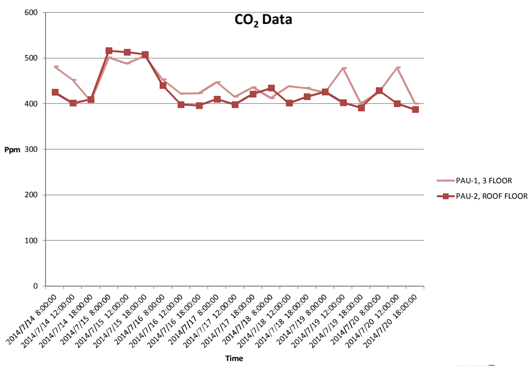
Tại Thành phố Hồ Chí Minh, các công trình được xây dựng nhiều vào nửa thập niên 1990 đều đang chuẩn bị nâng cấp trang thiết bị.

Chúng tôi đã chọn tòa nhà Sun Wah Tower do công ty chúng tôi thi công vào năm 1997 làm công trình đối tượng đánh giá.

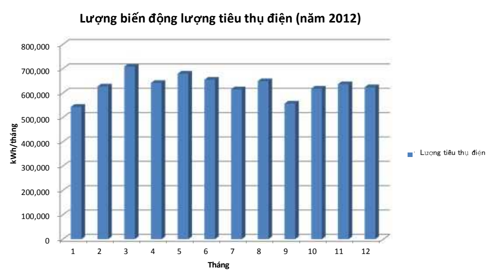
Cấu trúc công trình, mục đích	Xây dựng dạng bê tông cốt thép
Năm hoàn thành	Năm 1997
Tổng diện tích sàn	Khoảng 20,000 m^2
Số tầng	21 tầng
Phương thức nguồn nhiệt điều hòa không khí	Bình ngưng lạnh
Phương thức điều hòa	Điều hòa ở các tầng + FCU
Phương thức chiếu sáng	Đèn huỳnh quang (không có chức năng chỉnh sáng)
Phương thức Thông gió	Bộ xử lý không khí bên ngoài + thoát khí các tầng
Điều khiển, đo đạc, khác	Điều hòa tổng

Bên ngoài công trình

Kết quả điều tra thực địa lần 1: giá trị đo nồng độ CO_2 bên ngoài công trình



Năng lượng sử dụng của công trình đối tượng (điện năng)



Lượng tiêu thụ điện hàng năm = 7,553 MWh/năm (378kWh/m^2・năm)
Lượng thải khí CO_2 hàng năm = 4,716 t-CO_2/năm (236 kg-CO_2/m^2・năm)

Hệ số thải hệ thống tại Việt Nam (CM) = 0.6244 t-CO_2/MWh (nguồn: MONRE)

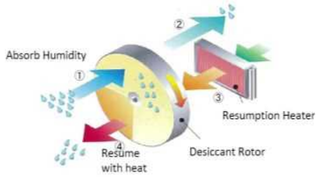
Kỹ thuật tiết kiệm năng lượng của công trình và ước tính hiệu quả

Loại kỹ thuật	Tên kỹ thuật	Khái quát kỹ thuật	Ước tính hiệu quả tiết kiệm năng lượng
Điều hóa	Xử lý không khí bên ngoài bằng máy hút ẩm	Khi lấy nguồn không khí bên ngoài nóng ẩm thì thực hiện『khử ẩm theo phương thức hấp phụ』mà không sử dụng máy lạnh.	4.8%
	Làm nóng nhiệt độ nước lạnh	Để làm mát trong phòng có thể thay đổi nhiệt độ từ 7℃ như ban đầu lên 12℃ và có thể nâng cao hiệu suất máy làm lạnh.	15.5%
	Điều khiển lượng nước lạnh tại các tầng	Điều khiển lưu lượng tối thiểu cần thiết để tiết kiệm năng lượng bằng cách lắp đặt máy bơm nước lạnh dùng cho máy điều hòa ở các tầng.	1.2%
Chiếu sáng	Chiếu sáng tập trung & xung quanh	Cắt giảm chiếu sáng không gian bằng cách kết hợp sử dụng hình thức chiếu sáng tập trung, cắt giảm lượng lớn năng lượng chiếu sáng bằng cách kết hợp hình thức sử dụng ánh sáng ban trưa, cảm biến chuyển động, sử dụng toàn bộ đèn LED v.v...	7.9%
Điều khiển	BEMS smart	Tiết kiệm năng lượng bằng cách kết hợp vận hành tối ưu thiết bị trong công trình (máy điều hòa・điện) và điều khiển tối ưu nguồn năng lượng	3.5%
Thông gió	INV hóa quạt thông gió v.v...	Triển khai phương pháp điều khiển biến tần quạt thông gió bằng cảm biến CO v.v... khi lưu thông lượng không khí lớn	0.7%

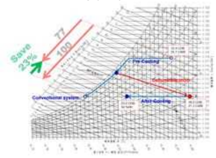
→33.6%

CO_2Ước tính lượng cắt giảm lượng khí thải = 4,716 t-CO_2/năm × 33.6% = 1,585 t-CO_2/năm

Khái quát kỹ thuật ①: Xử lý không khí bên ngoài bằng máy hút ẩm (khử ẩm)



Nguyên lý của điều hòa hút ẩm



Thiết kế điều kiện không khí

① Khử ẩm hấp phụ
Hút độ ẩm của không khí bên ngoài (hơi ẩm) vào chất hấp phụ của cánh quạt máy hút ẩm.

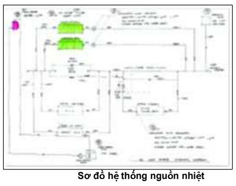
② Hút khí vào trong phòng
Làm lạnh không khí bên ngoài đã hạ thấp độ ẩm rồi hút vào trong phòng (làm nóng nhiệt độ của nước lạnh)

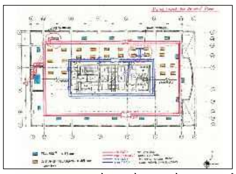
③ Gia nhiệt khí thải trong phòng
Gia nhiệt khí thải để phân tách hơi ẩm đã hấp phụ được

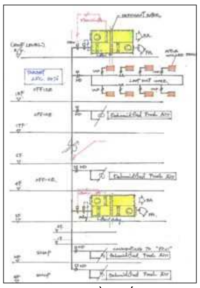
④ Quay lại cánh quạt
Quay lại cánh quạt chứa hơi ẩm dựa vào không khí đã gia nhiệt

Cắt giảm khoảng 4.8 % năng lượng của toàn công trình

Khái quát kỹ thuật ②: Thay đổi phương thức điều hòa (xử lý không khí bên ngoài + làm nóng nước lạnh)


Sơ đồ hệ thống nguồn nhiệt


Sơ đồ mặt bằng các tầng tiêu chuẩn


Sơ đồ hệ thống thông gió

Bằng cách làm nóng nước lạnh (7℃→12℃) có thể cắt giảm khoảng 15.5% năng lượng của toàn công trình

Nhiệm vụ trong tương lai･Phương hướng

- Kế hoạch vốn của dự án và kế hoạch tổ chức thực hiện dự án:
  Là chủ thể thực hiện dự án, lập kế hoạch vốn và phương thức tổ chức thực hiện dự án cho việc thành lập công ty đa quốc gia
  đăng ký xin kinh phí hỗ trợ thiết bị và những phần khác
  không bao gồm trong các thiết bị phụ trợ

- Kế hoạch thi công:
  Lập kế hoạch thi công dựa trên kế hoạch vốn và kế hoạch tổ chức năng hiện

- Phương hướng cho tương lai (dự kiến)

tháng năm	Hạng mục
Tháng 5 năm 2015	Xin tham gia vào dự án hỗ trợ thiết bị JCM của Bộ Môi trường
Tháng 9 năm 2015	Có được sự hỗ trợ thiết bị, bắt đầu cải tạo công trình
Tháng 3 năm 2017	Hoàn thành cải tạo công trình
Tháng 4năm 2017~	Bắt đầu vận hành theo công trình đã cải tạo

Cảm ơn quý vị đã chú ý lắng nghe

Today's Work, Tomorrow's Heritage

SHIMIZU CORPORATION

Điều tra tính khả thi của dự án JCM
thông qua việc liên kết sử dụng hạ tầng cơ sở kinh doanh tư nhân của Park and Ride
và hệ thống Eco Point (Eco Point system) nhằm thúc đẩy việc sử dụng xe bus

Ngày 16 tháng 1 năm 2004

Công ty cổ phần - Viện nghiên cứu tổng hợp Nikken Sekkei

Tổng quan về dự án đề xuất

Khái quát phương pháp cắt giảm GHG

Phương án ①: Park・And・Bus Ride sử dụng hạ tầng siêu thị Aeon (P&BR)

・Người có phiếu mua hàng trước đó của siêu thị **được đỗ xe tại bãi đỗ xe của siêu thị**, và sử dụng xe bus đi làm.

Phương án ②: Điểm thưởng giao thông Eco point

・Người sử dụng xe buýt sẽ được cộng điểm thưởng giao thông Eco point. Thúc đẩy sử dụng P&BR.
・Điểm thưởng có thể sử dụng để giảm giá mua hàng hoặc đổi quà.

Lợi ích của người sử dụng
- Được giải thoát khỏi môi trường đi làm bằng xe máy tồi tệ
- Nâng cao sự tiện lợi của cuộc sống bằng cách mua hàng trên đường đi làm về
- Tăng khả năng tiếp cận với sản phẩm của Nhật Bản
- Cảm giác có lợi của Điểm thưởng Eco point

Hệ thống điểm thưởng Eco point được Aeon thực hiện trên khắp cả nước (Điểm tặng)

Hình ảnh mô phỏng Park and Bus Ride

Quá trình và mục đích

Đánh giá phương pháp luận MRV cho siêu thị Aeon số 1 (xem xét lại dựa trên việc điều tra thực địa theo đơn vị nguồn khí thải CO2), dự đoán nhu cầu giao thông dựa trên việc điều tra khảo sát và nắm bắt khả năng tiếp nhận của cư dân thành phố dựa trên kinh nghiệm và bằng chứng thực tế, hơn nữa cũng điều chỉnh và đàm phán giữa Aeon Mall Việt nam và DOT Thành phố Hồ Chí Minh, chuẩn bị môi trường để thực hiện dự án.

Tình trạng phát triển nhà ở khu vực lân cận (phụ cận)

Kết quả điều tra phương pháp luận JCM

Yêu cầu năng lực

① Đóng vai trò phương thức thanh toán phí xe bus, thẻ IC được đưa vào sử dụng.

Bằng việc triển khai thẻ IC làm phương thức thanh toán phí xe buýt, có thể thu thập các số liệu cần thiết dưới đây nhằm tính toán cắt giảm lượng GHG.

・Có thể nắm được tần suất sử dụng xe buýt và khoảng cách (khoảng cách giữa các điểm lên xuống) dựa trên P&BR.
・Có thể nắm được phương tiện lui tới bãi đỗ xe của Aeon (phân loại xe máy, đi chung phương tiện, đi bộ)

Yêu cầu dành cho thẻ IC
・Loại thẻ: typeA hoặc C
・Nội dung ghi trong thẻ: lịch sử thanh toán phí xe bus, ghi lại khoảng cách giữa các điểm lên xuống, lịch sử quá cảnh bãi đỗ xe, thông tin ID ràng buộc với Bản đề nghị sử dụng P&BR được mô tả sau đây

② Phải có cơ sở hạ tầng kinh doanh tư nhân nhằm phục vụ P&BR khu vực ngoại thành

・Phải đảm bảo cơ sở hạ tầng kinh doanh đủ cho bãi đỗ xe quy mô lớn khu vực ngoại thành, và phục vụ cho P&BR (tức là đảm bảo đủ lượng đỗ xe dự trữ).

Kết quả điều tra phương pháp luận JCM

Yêu cầu năng lực

③ Phải có tuyến đường xe buýt đầu tư cho P&BR

・Có thể áp dụng tuyến đường xe buýt từ bãi đỗ xe tới trung tâm thành phố.
・Khoảng cách giữa bãi đỗ xe buýt và bãi đỗ xe phải ngắn, không có cản trở khi di chuyển bằng cách đi bộ.

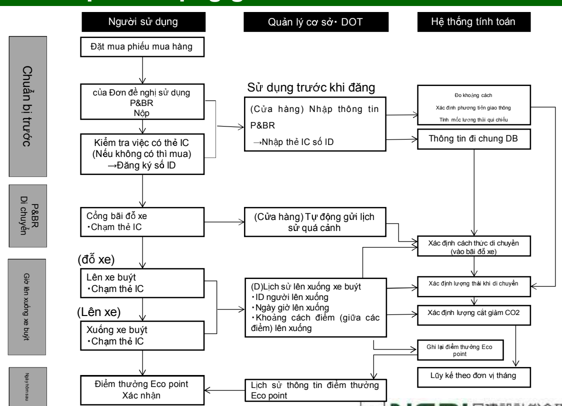
④ Bằng phương thức tạo thành bộ khi đặt mua phiếu mua hàng với Đơn đề nghị sử dụng P&BR nhằm gắn nghĩa vụ nộp đơn cho người sử dụng

・Để tính toán cắt giảm lượng thải khí GHG, cần phải xác định phương tiện giao thông trước khi chuyển sang P&BR (trước đây), nơi ở và nơi đến, phương tiện giao thông trước đây của người sử dụng P&BR. Do đó, người sử dụng sẽ ghi lại các thông tin này Cần phải nghĩa vụ hóa việc nộp「Đơn đề nghị sử dụng P&BR」.
・Tuy nhiên, việc sử dụng đơn đề nghị này cũng là điều bình thường ngay cả với P&BR trong nước, và với tư cách là người kinh doanh thì đây là thủ tục cần thiết, không thể thiếu đối với phía quản lý bãi đỗ xe.

⑤ Phát triển hệ thống có thể tính toán tự động cắt giảm lượng GHG

・Cần xây dựng/ phát triển hệ thống có thể tự động thu thập thông tin được ghi trong đơn đăng ký sử dụng P&BR (địa chỉ, nơi đến, người dự định cho đi cùng, phương tiện giao thông trước đây), thông tin lịch sử sử dụng xe buýt trong thẻ IC, thông tin ghi lại lịch sử quá cảnh bãi đỗ xe.
・Với hệ thống này, có thể tính toán lượng thải GHG một cách chính xác tại thời điểm hiện tại.

Toàn bộ đối tượng giám sát JCM



Kết quả điều tra phương pháp luận JCM

Tần suất và hạng mục giám sát

① Thông tin cần thiết để tính toán hiệu quả cắt giảm GHG: tần xuất sử dụng xe buýt và bãi đỗ xe
② Nguyên nhân biến đổi/ thay đổi theo thời gian
・Nắm bắt việc thay đổi nơi ở
・Lộ trình của xe buýt
・Cắt giảm lượng thải CO2 bằng cách nâng cao tính năng của phương tiện giao thông

Hạng mục giám sát	Phương pháp giám sát	Tần suất	Chủ thể
Địa chỉ nơi ở, nơi đến	Đơn đề nghị sử dụng P&BR	1 lần 1 năm	Quản lý cơ sở
Phương tiện giao thông tham chiếu	Đơn đề nghị sử dụng P&BR	1 lần 1 năm	Quản lý cơ sở
Thông tin người đi chung	Đơn đề nghị sử dụng P&BR	1 lần 1 năm	Quản lý cơ sở
Lịch sử quá cảnh cổng bãi đỗ xe	Hệ thống quản lý bãi đỗ xe	Mỗi lần	Quản lý cơ sở
Tần xuất sử dụng xe buýt・Khoảng cách các điểm lên xuống	Hệ thống thanh toán thẻ IC	Mỗi lần	DOT
Lộ trình xe buýt・loại xe	Điều tra thực tế	Đối soát	DOT
Đơn vị nguồn khí thải CO2 của xe buýt	Xác nhận bảo dưỡng xe	Khoảng 1 lần 1 năm	DOT

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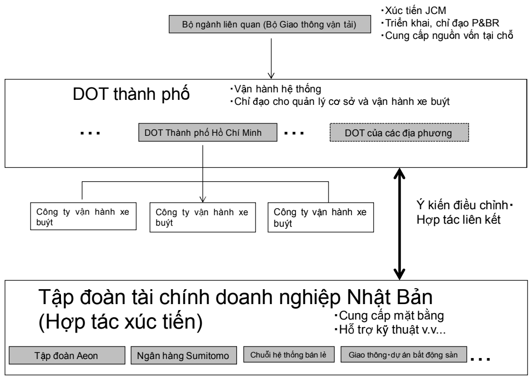
Cơ cấu quản lý kinh doanh của dự án



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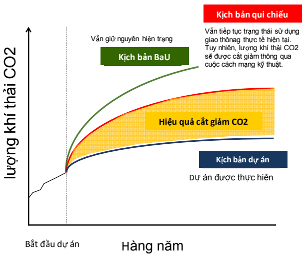
Phương pháp luậnJCM ~Xác định lượng cắt giảm GHG~

・Ước tính lượng thải khí CO2 trước đây・sau này một cách khoa học dựa vào kết quả điều tra khảo sát thực hiện tại Thành phố Hồ Chí Minh và điều tra hành vi con người tại địa phương (dựa trên kết quả ước tính của giáo sư Morikawa・Đại học Nagoya)

・Lượng khí thải của dự án được tính bằng cách nhân hệ số cải thiện cước phí (hệ số cải thiện chi phí nhiên liệu ＝1.4%/năm) với lượng thải mốc lượng thải qui chiếu.



Điều tra khảo sát với đối tượng là người dân thành phố HCMC
(Mục đích)
Thực hiện nhằm thu thập dữ liệu xu hướng thay đổi hành vi giao thông đi làm của người dân thành phố đối với dự án này

(Sử dụng dữ liệu ý thức)

Khu vực nội đô Thành phố Hồ Chí Minh
Điều tra hành vi con người

Xây dựng mô hình hành vi giao thông
・Xây dựng mô hình có thể dự đoán hiệu quả chính sách thực hiện dựa vào thời gian di chuyển tới bãi đỗ xe, giá đặt mua trước phiếu mua hàng, tỷ lệ hoàn trả điểm thưởng Eco point

Dự tính hiệu quả cắt giảm GHG
・Ước tính lượng giao thông theo từng phương tiện giao thông của người đi làm trước và sau khi thực hiện chính sách
・Nhân đơn vị nguồn thải theo từng hệ thống giao thông (CO2/km・người), dự báo sự thay đổi của lượng khí thải CO2

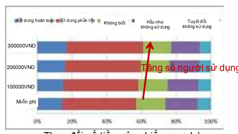
NSRI 日建設計総合研究所 NIKKEN SEKKEI Research Institute

Kết quả điều tra phương pháp luận JCM

Định lượng hóa lượng cắt giảm GHG

Thực hiện điều tra khảo sát tại HCMC để tính được hiệu quả cắt giảm GHG.
Xây dựng mô hình dự báo sử dụng, thực hiện mô phỏng (Giáo sư Morikawa・Đại học Nagoya)

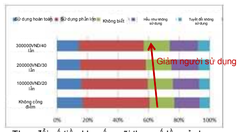
Dữ liệu sử dụng	Dữ liệu điều tra của JICA
Khu vực đối tượng	Thành phố Hồ Chí Minh
Năm điều tra	Năm 2013
Đối tượng	Người đi làm di chuyển trong Thành phố Hồ Chí Minh
Số người thống kê	1020 người
Phương pháp trả lời	Web & giấy



Thay đổi số tiền của phiếu mua hàng

Điều kiện ước tính mô hình xu hướng sử dụng
Thiết lập Thời gian di chuyển là 5 phút, phiếu mua hàng là 100000VND, Điểm thưởng Eco point là 10000VND/20 điểm
Xác xuất dự đoán trả lời là「Sẽ sử dụng」

	Mô hình xu hướng sử dụng
Tỷ lệ chuyển đổi từ xe máy	23.3%
Số người chuyển đổi	4164 người
Chỉ sử dụng xe máy làm tham chiếu()	1832tCO_2/年
Sau khi triển khai sử dụng P&BR	1705tCO_2/年
Lượng cắt giảm	127tCO_2/年
Tỷ lệ cắt giảm CO2	6.9%



Thay đổi số tiền khuyến mãi theo số lần sử dụng

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Lượng cắt giảm sau khi thực hiện dự án

Year	Lượng khí thải tham chiếu (tCO_{2e})	Lượng khí thải của dự án (tCO_{2e})	Lượng cắt giảm (tCO_{2e})
2015	4960.7	4375.94	584.8
2016	4901.2	4375.94	525.3
2017	4842.4	4375.94	466.4
2018	4784.3	4375.94	408.3
2019	4726.9	4375.94	350.9
2020	4670.1	4375.94	294.2
2021	4614.1	4375.94	238.2
2022	4558.7	4375.94	182.8
Tổng l (tCO_{2e})	38058.4	35007.5	3050.9

Tất cả lượng cắt giảm đều là năng lượng nguồn phát sinh CO2
(Dựa trên việc cắt giảm nhiên liệu cho xe ô tô)

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Xem xét khả năng tiếp nhận của cư dân thành phố dựa trên bằng chứng thực tế

Kiểm chứng khả năng tiếp nhận của cư dân thành phố dựa trên bằng chứng thực tế

Từ giữa tháng 1 năm 2014, vận hành tuyến xe buýt chạy thẳng chuyên dùng cho P&BR từ siêu thị Aeon Mall Tân Phú Celadon đến chợ Bến Thành trong 2 tuần để kiểm chứng khả năng tiếp nhận của cư dân thành phố đối với hệ thống này.

Kế hoạch vận hành
・Giờ cao điểm buổi sáng (7:30～8:00): vận hành 2 chiếc từ Aeon→chợ Bến Thành
・Giờ cao điểm buổi tối (17:30～18:30): vận hành 2 chiếc từ chợ Bến Thành→Aeon


Xe buýt của hãng Isuzu ×1chiếc


B40×1 chiếc

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Kế hoạch thương mại hóa trong năm sau

●Thẻ IC sẽ được triển khai sử dụng vào khoảng năm 2019 (câu trả lời của DOT)
●Do đó, ở thời điểm hiện tại sẽ thực hiện trước dự án P&BR.
●Do chưa đưa vào sử dụng thẻ IC nên sẽ triển khai xe buýt có phí nhiên liệu thấp theo lộ trình P&BR này để thực hiện MRV liên quan tới lượng cắt giảm đó.

Kỳ thứ I

Thực hiện P&BR (siêu thị Aeon Mall･Tân Phú Celado v.v...)

+

Triển khai xe buýt có chi phí nhiên liệu thấp cho lộ trình này
(Tính toán hiệu quả cắt giảm bằng việc hạ chi phí nhiên liệu của xe buýt)

↓

Triển khai thẻ IC

↓

Kỳ thứ II

Triển khai MRV sau khi đã áp dụng thẻ IC
(Tính thêm cả hiệu quả cắt giảm chuyển đổi nhu cầu từ xe máy + xe ô tô)

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Hitz
Hitachi Zosen

Dự án xác định hiệu quả của việc giảm phát thải khí CO2 nhằm mở rộng ngành công nghiệp tái chế của Nhật Bản ra thị trường quốc tế năm 2014

Xây dựng chu trình tái chế rác thực phẩm tại thành phố Hồ Chí Minh, Việt Nam

16. 01. 2015
Công ty TNHH Hitachi Zosen

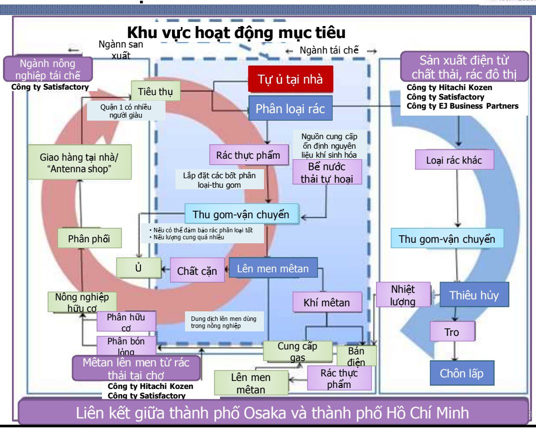
Tóm tắt dự án

Dự án này là một dự án thẩm định nhằm kiểm tra, đánh giá để phát triển một chu trình tái chế rác thải thực phẩm tại thành phố Hồ Chí Minh, bao gồm dự án phân loại rác thải tại hộ gia đình, sản xuất điện từ quá trình tiêu hóa kị khí sử dụng rác thải đã được phân loại và sản xuất phân bón hữu cơ từ bã thải của quá trình tiêu hóa kị khí. Quá trình thực hiện dự án kết thúc vào tháng 3 năm 2017.

Trong dự án này chúng tôi lắp đặt một bồn yếm khí công suất 500 kg/ngày để tiến hành chu trình tái chế và nghiên cứu các khả năng nhân rộng chu trình tại thành phố Hồ Chí Minh.

2

Tóm tắt dự án



Tiền đề của việc tiến hành dự án

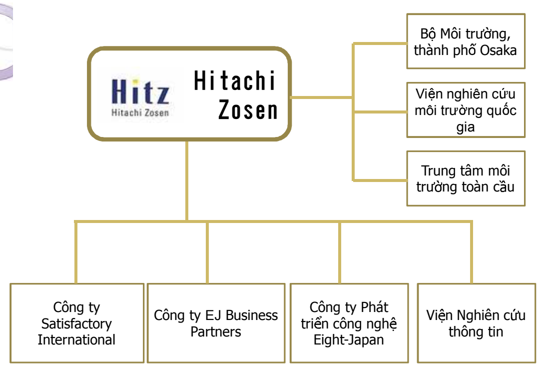
Dự án này được lên kế hoạch dựa trên những yêu cầu đưa ra bởi Ban lãnh đạo bộ Tài nguyên và Môi trường trong dịp đến Nhật Bản vào tháng 4 năm 2014.

Những yêu cầu từ thành phố Hồ Chí Minh:

1. Mở rộng các dự án phân loại-thu gom rác trên khắp quận 1
   → xây dựng pháp lệnh, quy định phân loại, v.v...
2. Tái sinh năng lượng từ rác thực phẩm
   → lắp đặt nhà máy thử nghiệm tạo khí sinh học
3. Đào tạo nhân lực thế hệ trẻ

4

Kết cấu triển khai dự án



5

Tiến độ I

Năm thứ 1 : tháng 11 năm 2014 ～ tháng 03 năm 2015

（1）Phân loại và thu gom rác thực phẩm tại nguồn
Nghiên cứu cơ bản, nghiên cứu đưa ra các nguyên tắc phân loại, chuẩn bị các trang thiết bị cần thiết, hoạt động giáo dục, thu thập dữ liệu về mô hình thử nghiệm thứ 1

（2）Thiết bị thử nghiệm tạo khí sinh học
Xác nhận địa điểm lắp đặt, chuẩn bị vận chuyển thiết bị, đào tạo kỹ thuật viên vận hành thiết bị (tại Nhật Bản)

（3）Kiểm tra tính khả thi, nghiên cứu về lượng giảm phát thải khí CO2, v.v...
Thu thập các thông tin cơ bản, tạo ra các công cụ để xác định tính hiệu quả của việc giảm phát thải khí CO2.

6

Tiến độ II

Năm thứ 2： tháng 04 năm 2015 ～ tháng 03 năm 2016

（1） Phân loại và thu gom rác thực phẩm tại nguồn
Tiến hành thử nghiệm phân loại và thu gom rác, phân tích các kết quả về phân loại rác tại nguồn, sau đó tiếp tục phân loại và thu gom thử nghiệm theo hướng cải tiến.

（2） Thiết bị thử nghiệm tạo khí sinh học
Vận chuyển trang thiết bị, xây dựng cơ sở hạ tầng, vận hành thử nghiệm, vận hành chính thức.

（3） Kiểm tra tính khả thi, nghiên cứu về lượng giảm phát thải khí CO2, v.v...
Thu thập thông tin cơ bản, đánh giá tính hiệu quả của việc giảm thiểu khí thải CO2

Tiến độ III

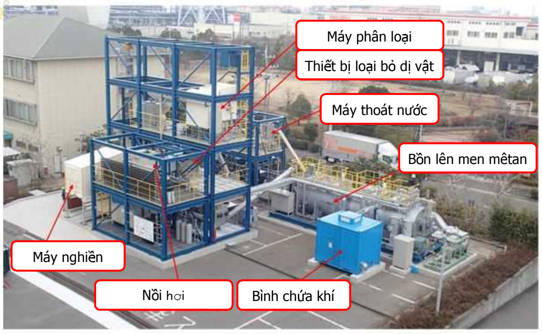
Năm thứ 3： tháng 04 năm 2016 ～ tháng 03 năm 2017

（1） Phân loại và thu gom rác thực phẩm tại nguồn
Tiến hành thử nghiệm phân loại và thu gom rác, phân tích các kết quả về phân loại rác tại nguồn, sau đó tiếp tục phân loại và thu gom thử nghiệm theo hướng cải tiến, xem xét việc mở rộng phân loại rác tại nguồn.

（2） Thiết bị thử nghiệm tạo khí sinh học
Vận hành các trang thiết bị thử nghiệm với rác thải đã được phân loại, thiết kế máy móc thiết bị chính thức.

（3） Kiểm tra tính khả thi, nghiên cứu về lượng giảm phát thải khí CO2, v.v...
Dự toán tính khả thi về mặt thương mại, xác định hiệu quả của việc giảm thiểu khí thải CO2.

Kiểm tra trang thiết bị



Đánh giá thực trạng đến thời điểm hiện tại

＜Phân loại rác thực phẩm tại nguồn＞

- Từ tháng 9 năm ngoái, chúng tôi đã thảo luận với Sở tài nguyên môi trường và Quận 1 thành phố Hồ Chí Minh và đã xác định được vị trí tiến hành tại phường Bến Nghé.
- Tại Nhật Bản, thành phố Osaka, Viện nghiên cứu Môi trường quốc gia và công ty Satisfactory đã thảo luận về các phương thức tập huấn cho người dân và liệt kê các nội dung cần thực hiện.
- Tháng 12 năm ngoái, tại thành phố Hồ Chí Minh, chúng tôi đã trình bày về các hoạt động tập huấn được thực hiện tại thành phố Osaka và thảo luận về kế hoạch trong tương lai ở thành phố Hồ Chí Minh.

Đánh giá thực trạng đến thời điểm hiện tại

＜Hiệu quả của việc giảm khí thải CO2＞

Hiện nay, tính toán hiệu quả của việc giảm phát thải khí CO2 được trình bày dưới đây:

- Kịch bản tham chiếu

Do phần lớn rác thải được chôn lấp tại các bãi rác ở thành phố Hồ Chí Minh nên toàn bộ lượng rác thải mục tiêu (tức 100 tấn/ngày rác thải hữu cơ đã được phân loại) được giả định chôn lấp tại bãi rác. Trong trường hợp này, lượng khí CO2 phát thải được tính toán theo mô hình FOD là 29.512 tấn CO2/năm.

- Kịch bản dự án
- Lượng khí CO2 phát thải trong kịch bản này sẽ là -4.967 tấn –CO2/năm với giả định:

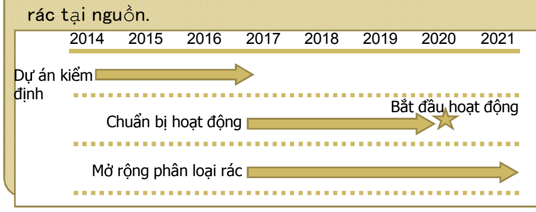
- Lượng khí metan: 100 m3 khí CH4/tấn rác
- Hiệu suất phát điện của động cơ gas: 35%
- Bán điện năng dư thừa thông qua kết nối lưới điện.

- Lượng giảm khí CO2

Như đã tính toán từ kịch bản trên, tổng lượng giảm phát thải khí CO2 sẽ là 34.479 tấn CO2/năm.

Tiến độ dự án

- Dựa trên kết quả dự án kiểm định trong 3 năm này (đánh giá tính khả thi), chúng ta sẽ tiến hành các hoạt động chuẩn bị (xin giấy phép, thi công công trình) từ năm 2017.
- Chúng ta phải tiếp tục duy trì chất lượng của rác đã được phân loại và mở rộng khu vực tiến hành phân loại rác tại nguồn.



Chương trình

Kiểm kê Khí nhà kính
cho Thành phố Hồ Chí Minh

Văn phòng Biến đổi khí hậu Thành phố Hồ Chí Minh
16 tháng 01 năm 2015

Nội dung

I. Giới thiệu chung
II. Phương pháp và tiến độ
III. Nhận xét
IV. Kế hoạch giai đoạn tiếp theo

2

I. Giới thiệu chung

- **Sự cần thiết:**
  - Đáp ứng yêu cầu của hệ thống pháp lý về ứng phó với biến đổi khí hậu từ cấp độ quốc tế, quốc gia đến địa phương.
  - Hỗ trợ triển khai các dự án trong khuôn khổ **Biên bản ghi nhớ hợp tác về Cơ chế Tín dụng chung (JCM)** giữa Việt Nam và Nhật Bản và **Biên bản ghi nhớ hợp tác Phát triển Thành phố cacbon thấp** giữa Osaka và TP.HCM.

3

I. Giới thiệu chung

- **Sự cần thiết:**

QUAN TRẮC (Measurement/Monitoring)
- Thu thập số liệu liên quan đến các nguồn phát thải/hấp phụ KNK.

→ **BÁO CÁO** (Reporting)
- Tính toán (lượng phát thải hoặc giảm phát thải KNK).

→ **THẨM ĐỊNH** (Verification)
- Kiểm tra số liệu và kết quả tính toán.

MRV là công cụ hỗ trợ:
- ➢ Xác định mục tiêu và xây dựng chính sách/dự án
- ➢ Xác nhận độ tin cậy về hiệu quả của các giải pháp
- ➢ Kêu gọi hỗ trợ kỹ thuật và tài chính

4

I. Giới thiệu chung

- **Sự cần thiết:**
  - Thúc đẩy các giải pháp nâng cao hiệu quả sử dụng năng lượng.
  - Tăng cường hiệu quả sử dụng và bảo vệ tài nguyên thiên nhiên.
  - Góp phần xây dựng một **thành phố bền vững và ít phát thải cac-bon**.

5

I. Giới thiệu chung

- **Mục tiêu:**

Xác định tổng lượng khí nhà kính phát thải trên địa bàn TP.HCM.

Xác định các lĩnh vực phát thải khí nhà kính trọng điểm.

Đề xuất giải pháp và tính toán lượng giảm phát thải khí nhà kính cho các lĩnh vực phát triển đô thị trên địa bàn TP.HCM.

6

I. Giới thiệu chung

- **Phạm vi:**
  - **Địa lý:** toàn thành phố, nhưng tập trung vào các khu vực và nhóm đối tượng trọng điểm của từng lĩnh vực.
  - **Thời gian:** 2014-2015.
  - **Lĩnh vực:**
    - **Năm 2014:** Năng lượng; Chất thải rắn; Nước thải; Nông nghiệp; Cấp nước.
    - **Năm 2015:** Thu thập số liệu chi tiết hơn cho các lĩnh vực trên; Mở rộng thêm lĩnh vực Công nghiệp, Xây dựng, Y tế và Du lịch.

7

Nội dung

I. Giới thiệu chung

II. Phương pháp và tiến độ

III. Nhận xét

IV. Kế hoạch giai đoạn tiếp theo

8

II. Phương pháp và tiến độ

1. Liệt kê và phân loại:

- Các lĩnh vực liên quan cần thu thập số liệu theo thứ tự ưu tiên;
- Các nhóm lĩnh vực và thành phần chi tiết nhất có thể;
- Các nguồn phát thải hoặc hấp phụ khí nhà kính;
- Các loại thông tin và số liệu cần thu thập;
- Các cơ quan, đơn vị, nhóm đối tượng cần thu thập số liệu.

9

II. Phương pháp và tiến độ

2. Thu thập số liệu được áp dụng với cả 2 hướng tiếp cận:

- Thu thập **số liệu tổng thể** từ các cơ quan quản lý đầu mối để kiểm kê toàn bộ **hiện trạng** phát thải/hấp phụ KNK ở TP.HCM.
- **Khảo sát các nhóm đối tượng.**

10

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **ĐIỆN:** số liệu chi tiết đến từng nhóm thành phần phụ tải và theo từng khu vực cấp điện. *(Nguồn: EVNHCMC)*

Lượng điện tiêu thụ phân chia theo lĩnh vực (MWh)

TT	Lĩnh vực	2010	2011	2012	2013
1	Nông lâm, thủy, hải sản	22.239	33.148,436	42.022,050	48.520,254
2	Công nghiệp, Xây dựng	6.065.271	6.451.038,623	6.913.039,715	7.186.161,416
3	Thương mại, Khách sạn	1.781.517	1.919.345,775	2.136.793,864	2.254.535,866
4	Quản lý, tiêu dùng dân cư	5.871.300	6.005.173,336	6.625.178,871	7.073.622,593
5	Khác	823.097	905.090,260	1.007.854,162	1.088.506,184
Tổng		**14.563.424**	**15.313.796,43**	**16.724.888,662**	**17.651.346,313**

11

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **NHIÊN LIỆU:**
  - Số liệu về lượng nhiên liệu tiêu thụ ở TP.HCM từ Sở Công thương và các công ty kinh doanh xăng, dầu đầu mối lớn (Petrolimex, SaigonPetro, Thai Son Petrol, Công ty lọc hóa dầu Nam Việt).
  - Số liệu từ các hãng taxi lớn (Vinasun, Mai Linh, Vinataxi).
  - Số liệu về xe buýt CNG.

Tổng lượng xăng dầu nhập khẩu và xuất khẩu trên địa bàn TP.HCM giai đoạn 2006-2011.
(Nguồn: Sở Công thương)

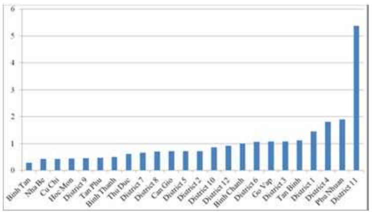
Năm	2006	2007	2008	2009	2010	2011
Nhập khẩu (1000 tấn)	11,472	12,721	12,964	12,705	9,853	10,652
Xuất khẩu (1000 tấn)	1,097	1,211	1,198	1,924	1,346	2,199

12

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **CHẤT THẢI RẮN:** thông tin, số liệu về toàn bộ hệ thống quản lý chất thải rắn của TP.HCM.



Biểu đồ tỷ lệ khối lượng chất thải rắn phát sinh tính theo đầu người của từng quận
(Nguồn: Sở Tài nguyên và Môi trường)

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **NƯỚC THẢI:** thông tin, số liệu về toàn bộ hệ thống xử lý nước thải sinh hoạt, y tế và công nghiệp của TP.HCM.

II. Phương pháp và tiến độ

2. Thu thập số liệu:

Các số liệu thu thập để tính toán lượng phát thải	Nhà máy nước thải		
	Bình Hưng	Bình Hưng Hòa	Tân Quy Đông
Lượng nước xử lý (m^3/ năm)	48.408.617	9.389.036	185.999
Điện năng (kWh/năm)	8.826.475	2.759.708	126.552
Điện năng (kWh/m^3)	0,182	0,294	0,68
Hóa chất sử dụng (tấn/năm)	- NaOCl 12%: 1440 - Polymer: 22,8	-	- Chlorine: 0,348
Lượng bùn thải phát sinh (tấn/năm)	12.410	600	-
Phương pháp xử lý bùn	Bể cô đặc trọng lực. Máy cô đặc ly tâm. Máy tách nước ly tâm -> bùn -> nhà lên men và trộn trấu -> bánh bùn	Sân phơi bùn	-

II. Phương pháp và tiến độ

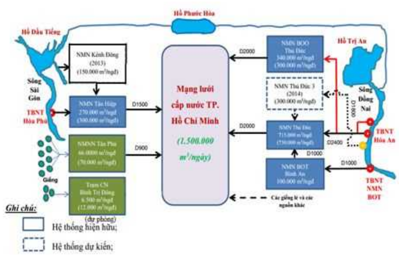
2. Thu thập số liệu:

- **CẤP NƯỚC:**
  - **Nguồn thông tin:** SAWACO và các nhà máy xử lý nước : Thủ Đức, BOO Thủ Đức, BOT Bình An, Tân Hiệp, Kênh Đông, Tân Phú.
  - **Số liệu:**
    - Quy trình công nghệ
    - Điện năng và hóa chất tiêu thụ
    - Lượng bùn phát sinh và phương pháp xử lý

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **CẤP NƯỚC:**



Sơ đồ hệ thống cấp nước của TP.HCM
(Nguồn: SAWACO)

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **NÔNG NGHIỆP:**
  - Trồng trọt
  - Chăn nuôi
  - Thủy sản
  - Lâm nghiệp
  - Thủy lợi
  - Phát triển nông thôn

II. Phương pháp và tiến độ

2. Thu thập số liệu:

- **KHẢO SÁT NHÓM ĐỐI TƯỢNG:** tập trung khảo sát **thói quen** tiêu thụ năng lượng, tài nguyên và thải bỏ chất thải rắn → tạo cơ sở ban đầu để định hướng giải pháp và mở rộng khảo sát.
  - 1000 hộ gia đình, phân bổ ở 5 quận.
  - 40 đơn vị kinh doanh – dịch vụ (khách sạn, nhà hàng, siêu thị, chợ).
  - Các nhà máy xử lý nước và chất thải.
  - Khảo sát thí điểm về thói quen sử dụng phương tiện giao thông cá nhân.

19

II. Phương pháp và tiến độ

3. Tính phát thải KNK:

– **Phương pháp trực tiếp:** Tính trực tiếp lượng phát thải / hấp phụ KNK từ dữ liệu thu thập được (chủ yếu theo bộ Hướng dẫn của IPCC và các công thức sẵn có).

Lượng phát thải KNK = AD x EF

- **AD (activity data):** Dữ liệu định lượng về mức độ của mỗi hoạt động.
- **EF (emission factor):** Hệ số phát thải hoặc hấp phụ KNK tương ứng với mỗi đơn vị hoạt động.

20

II. Phương pháp và tiến độ

3. Tính phát thải KNK:

– **Phương pháp gián tiếp:** Xây dựng công thức cho các phép tính chưa có hướng dẫn và các trường hợp thiếu số liệu.

– **Phương pháp kiểm tra chéo:**

- So sánh dữ liệu và kết quả giữa phương pháp tính trực tiếp và gián tiếp;
- So sánh kết quả tính toán với các quy hoạch, kế hoạch hiện hữu trong từng lĩnh vực.

21

II. Phương pháp và tiến độ

4. Báo cáo và thẩm định:

BÁO CÁO (Reporting)
- Tính toán và báo cáo kết quả kiểm kê KNK

→

THẨM ĐỊNH (Verification)
- Thẩm định báo cáo và đánh giá kết quả kiểm kê KNK

22

II. Phương pháp và tiến độ

Phát thải KNK ở TP.HCM (2013) [Kết quả ban đầu]

Lĩnh vực Theo hướng dẫn của IPCC & báo cáo của TP.HCM	Phát thải KNK [Gg CO_2 eq.]	Lưu ý
Năng lượng	16.716,47	21% lượng tổng của VN năm 2005
Nhiên liệu	5.191,83	
Điện	11.524.65	
Cấp nước	116,18	Chủ yếu là tiêu thụ điện năng
Quá trình sản xuất công nghiệp	NE	
Nông nghiệp	630,79	0.8% lượng tổng của VN năm 2005
Sử dụng đất và Lâm nghiệp	NE	
Chất thải	822,91	10% lượng tổng của VN năm 2005
Chất thải rắn và bãi chôn lấp	772,91	
Nước thải	NE	Sinh hoạt, công nghiệp, y tế
Các lĩnh vực khác	50,00	Lò đốt, sản xuất compost
Tổng lượng phát thải khí nhà kính	**18.170,17**	Tổng của "Năng lượng", "Nông nghiệp" & "Chất thải" 8.9% lượng tổng của VN năm 2005

Lưu ý: Tính toán bởi IGES từ dữ liệu do VPBĐKH TP.HCM thu thập. Vận dụng Bộ hướng dẫn IPCC 2006.
Kết quả có thể được rà soát lại sau khi có thêm dữ liệu và sửalỗi.
Lĩnh vực "Sản xuất công nghiệp" và "Sử dụng đất & Lâm nghiệp" chưa được tính toán ("NE").

23

Nội dung

I. Giới thiệu chung
II. Phương pháp và tiến độ
III. Nhận xét
IV. Kế hoạch giai đoạn tiếp theo

24

III. Nhận xét

- **Đánh giá sơ bộ:**
  - Nguồn số liệu chủ yếu được thu thập từ các cơ quan quản lý đầu mối → **Tính xác thực và độ tin cậy cao.**
  - Bộ số liệu bao phủ gần hết các lĩnh vực trọng điểm → Có thể phục vụ việc kiểm kê KNK cho các năm 2011, 2012 và 2013 → **chọn năm cơ sở là 2013**.
  - Cần bổ sung thêm số liệu trong giai đoạn tiếp theo.

25

IV. Nhận xét

- **Hạn chế:**
  - Hạn chế về kinh phí và nhân lực cho việc khảo sát chi tiết các nhóm đối tượng → Giai đoạn đầu chỉ tập trung vào khảo sát thí điểm một số đối tượng.
  - Nguồn dữ liệu rất lớn nhưng lại thiếu đồng bộ → Khó khăn trong việc tổng hợp thông tin và tính toán chi tiết. Ví dụ: lĩnh vực nhiên liệu, công nghiệp.

  → Cần có cơ chế cập nhật số liệu theo hệ thống.

26

Nội dung

I. Giới thiệu chung
II. Phương pháp và tiến độ
III. Nhận xét
IV. Kế hoạch giai đoạn tiếp theo

27

IV. Kế hoạch giai đoạn tiếp theo

Tháng	1	2	3	4	5	6	7	8	9	10	11	12
Xử lý, phân tích số liệu	■	■	■									
Thu thập số liệu bổ sung	■	■	■									
Tính toán kiểm kê KNK		■	■									
Xác định mục tiêu giảm phát thải KNK cho từng lĩnh vực			■									
Xây dựng đề cương cơ chế cập nhật số liệu hàng năm				■	■	■						
Xây dựng bộ cơ sở dữ liệu						■	■	■	■	■	■	■
Xây dựng hệ thống cập nhật và chia sẻ số liệu						■	■	■	■	■	■	■

28

Chân thành cảm ơn.

Ⅳ. JCM Proposed Methodology・
Project Design Document

—Table of Contents—

1. Introduction of the energy efficiency technologies in the existing building

JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	The Socialist Republic of Viet Nam
Name of the methodology proponents submitting this form	Shimizu Corporation
Sectoral scope(s) to which the Proposed Methodology applies	3. Energy demand
Title of the proposed methodology, and version number	Title: Introduction of the energy efficiency technologies in the existing building Version number: 01.0
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☐Additional information
Date of completion	26/01/2015

History of the proposed methodology

Version	Date	Contents revised
01.0	26/01/2015	First edition

A. Title of the methodology

Introduction of the energy efficiency technologies in the existing building, Version 01.0

B. Terms and definitions

Terms	Definitions
Reference equipment	Chosen from the following: - The existing equipment, if the existing equipment before replacement is capable of continuous use without exceeding the remaining lifetime. - The standard equipment, if continuous use of the existing equipment is impossible.
Standard equipment	A product with a high market share at the time before project initiation.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Electricity consumption is reduced by replacing the air-conditioning equipment, lighting equipment and ventilation equipment in the existing building with new energy-efficiency equipments.
Calculation of reference emissions	Reference emissions by air-conditioning equipment are calculated from the quantity of heat generated by project air-conditioning equipment and Coefficient of Performance (COP) of the reference air-conditioning equipment. Reference emissions by lighting equipment are calculated from the rated electricity consumption, operating hour of reference lighting equipment. Reference emissions by ventilation equipment are calculated from the electricity consumption, operating hour of reference ventilation equipment.
Calculation of project emissions	Project emissions are calculated from the electricity consumption of each of air-conditioning equipment, lighting equipment and ventilation equipment.
Monitoring parameters	・ Electricity consumption by project air-conditioning equipment ・ Electricity consumption by project lighting equipment ・ Electricity consumption by project ventilation equipment

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	This project is operated in the existing building.
Criterion 2	At least one of the existing air-conditioning equipment, lighting equipment and ventilation equipment is replaced.
Criterion 3	The existing equipment before replacement is capable of continuous use without exceeding the remaining lifetime. If continuous use of the existing equipment is impossible, it is assumed that new equipment will be introduced and the reference equipment is the standard equipment at the time.

Criterion 4	The equipment before replacement uses the grid electricity.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Electricity consumption by air-conditioning equipment	CO_2
Electricity consumption by lighting equipment	CO_2
Electricity consumption by ventilation equipment	CO_2
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
Project emissions	
Emission sources	GHG types
Electricity consumption by air-conditioning equipment	CO_2
Electricity consumption by lighting equipment	CO_2
Electricity consumption by ventilation equipment	CO_2
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

BaU indicates continuous use of the existing air-conditioning equipment, lighting equipment and ventilation equipment.
Reference emissions are calculated with the energy efficiency or the rated electricity consumption. The value indicated in the manual of each equipment is used for these values. Actual value of each equipment is worsening compared to the value indicated in the manual by aged deterioration and operating condition. Reference emissions are calculated to be below BaU emissions, and are conservative.

F.2. Calculation of reference emissions

Reference emissions are calculated by following formulae.

$$RE_p = RE_{AC,p} + RE_{L,p} + RE_{V,p} \tag{1}$$

RE_p	Reference emissions during the period p [tCO_2/p]
$RE_{AC,p}$	Reference emissions by air-conditioning equipment during the period p [tCO_2/p]
$RE_{L,p}$	Reference emissions by lighting equipment during the period p [tCO_2/p]
$RE_{V,p}$	Reference emissions by ventilation equipment during the period p [tCO_2/p]

i Air-conditioning equipment

$$RE_{AC,p} = RQ_{AC,p} \times \frac{1}{R\varepsilon_{AC}} \times \frac{1}{3.6} \times EF_{grid} \tag{2}$$

$RE_{AC,p}$	Reference emissions by air-conditioning equipment during the period p [tCO_2/p]

$RQ_{AC,p}$	Quantity of heat generated by reference air-conditioning equipment during the period p [GJ/p]
$R\varepsilon_{AC}$	COP of reference air-conditioning equipment [-]
EF_{grid}	CO_2 emission factor of Grid electricity [tCO_2/MWh]

$$RQ_{AC,p} = PQ_{AC,p} = PEC_{AC,p} \times P\varepsilon_{AC} \times 3.6 \tag{3}$$

$RQ_{AC,p}$	Quantity of heat generated by reference air-conditioning equipment during the period p [GJ/p]
$PQ_{AC,p}$	Quantity of heat generated by project air-conditioning equipment during the period p [GJ/p]
$PEC_{AC,p}$	Electricity consumption of project air-conditioning equipment during the period p [MWh/p]
$P\varepsilon_{AC}$	COP of project air-conditioning equipment [-]

ii Lighting equipment

$$RE_{L,p} = \sum_i RRE_{L,i} \times ROH_{L,i,p} \times EF_{grid} \tag{4}$$

$RE_{L,p}$	Reference emissions by lighting equipment during the period p [tCO_2/p]
$RRE_{L,i}$	Rated electricity consumption of reference lighting equipment in the area *i* [MW]
$ROH_{L,i,p}$	Operating hour of reference lighting equipment in the area *i* during the period p [hour/p]
EF_{grid}	CO_2 emission factor of grid electricity [tCO_2/MWh]
i	Area in the building (*i* = office, common)

iii Ventilation equipment

$$RE_{V,p} = RRE_V \times ROH_{V,p} \times EF_{grid} \tag{5}$$

$RE_{V,p}$	Reference emissions by ventilation equipment during the period p [tCO_2/p]
RRE_V	Rated electricity consumption of reference ventilation equipment [MW]
$ROH_{V,p}$	Operating hour of reference ventilation equipment during the period p [hour/p]
EF_{grid}	CO_2 emission factor of grid electricity [tCO_2/MWh]

G. Calculation of project emissions

Project emissions are calculated by following formulae.

$$PE_p = PE_{AC,p} + PE_{L,p} + PE_{V,p} \tag{6}$$

PE_p	Project emissions during the period p [tCO_2/p]
$PE_{AC,p}$	Project emissions by air-conditioning equipment during the period p [tCO_2/p]
$PE_{L,p}$	Project emissions by lighting equipment during the period p [tCO_2/p]
$PE_{V,p}$	Project emissions by ventilation equipment during the period p [tCO_2/p]

i Air-conditioning equipment

$$PE_{AC,p} = PEC_{AC,p} \times EF_{grid} \tag{7}$$

$PE_{AC,p}$	Project emissions by air-conditioning equipment during the period p [tCO_2/p]
$PEC_{AC,p}$	Electricity consumption of project air-conditioning equipment during the period p [MWh/p]
EF_{grid}	CO_2 emission factor of grid electricity [tCO_2/MWh]

ii Lighting equipment

$$PE_{L,p} = PEC_{L,p} \times EF_{grid} \quad (8)$$

$PE_{L,p}$	Project emissions by lighting equipment during the period p [tCO_2/p]
$PEC_{L,p}$	Electricity consumption of project lighting equipment during the period p [MWh/p]
EF_{grid}	CO_2 emission factor of grid electricity [tCO_2/MWh]

iii Ventilation equipment

$$PE_{V,p} = PEC_{V,p} \times EF_{grid} \quad (9)$$

$PE_{V,p}$	Project emissions by ventilation equipment during the period p [tCO_2/p]
$PEC_{V,p}$	Electricity consumption of project ventilation equipment during the period p [MWh/p]
EF_{grid}	CO_2 emission factor of grid electricity [tCO_2/MWh]

H. Calculation of emissions reductions

Emissions reductions are calculated by the following formula.

$$ER_p = RE_p - PE_p \quad (10)$$

ER_p	Emission reductions during the period p [tCO_2/p]
RE_p	Reference emissions during the period p [tCO_2/p]
PE_p	Project emissions during the period p [tCO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
EF_{grid}	CO_2 emission factor of grid electricity [tCO_2/MWh]	Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee.
$R\varepsilon_{AC}$	COP of reference air-conditioning equipment [-]	Information from manufacturer, such as value indicated in the manual of equipment
$P\varepsilon_{AC}$	COP of project air-conditioning equipment [-]	COP is changed to a value close to the actual value from a value indicated in the manual of equipment by using the monthly normal

		value of the climate in Ho Chi Minh City. When there are few changes of the calculated monthly COP, the minimum value is used through the year to ensure conservativeness.
$RRE_{L,i}$	Rated electricity consumption of reference lighting equipment in the area *i* [MW]	Information from manufacturer, such as value indicated in the manual of equipment
$ROH_{L,i,p}$	Operating hour of reference lighting equipment in the area *i* during the period p [hour/p]	Information from the owner and tenants of the building
RRE_{V}	Rated electricity consumption of reference ventilation equipment [MW]	Information from manufacturer, such as value indicated in the manual of equipment
$ROH_{V,p}$	Operating hour of reference ventilation equipment during the period p [hour/p]	Information from the owner of the building

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (input sheet) [Attachment to Proposed Methodology Form]

Table 1: Parameters to be monitored *ex post*

(a) Monitoring point No.	(b) Parameters	(c) Description of data	(d) Estimated Values	(e) Units	(f) Monitoring option	(g) Source of data	(h) Measurement methods and procedures	(i) Monitoring frequency	(j) Other comments
(1)	$PEC_{AC,p}$	Electricity consumption of project air-conditioning equipment during the period p		MWh/p	Option C	monitored data	Measured by watt hour meter. Measured data is recorded and stored electrically. Recorded data is input to a spreadsheet electrically. Verified monitoring devices are installed and they are calibrated in line with international standards or manufacurers' specification.	continuous	N/A
(2)	$PEC_{L,p}$	Electricity consumption of project lighting equipment during the period p		MWh/p	Option C	monitored data	Measured by watt hour meter. Measured data is recorded and stored electrically. Recorded data is input to a spreadsheet electrically. Verified monitoring devices are installed and they are calibrated in line with international standards or manufacurers' specification.	continuous	N/A
(3)	$PEC_{V,p}$	Electricity consumption of project ventilation equipment during the period p		MWh/p	Option C	monitored data	Measured by watt hour meter. Measured data is recorded and stored electrically. Recorded data is input to a spreadsheet electrically. Verified monitoring devices are installed and they are calibrated in line with international standards or manufacurers' specification.	continuous	N/A

Table 2: Project-specific parameters to be fixed *ex ante*

(a) Parameters	(b) Description of data	(c) Estimated Values	(d) Units	(e) Source of data	(f) Other comments
EF_{grid}	CO_2 emission factor of grid electricity		tCO_2/MWh	Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee.	N/A
$R\varepsilon_{AC}$	COP of reference air-conditioning equipment		-	Information from manufacturer, such as value indicated in the manual of equipment	N/A
$P\varepsilon_{AC}$	COP of project air-conditioning equipment		-	COP is changed to a value close to the actual value from a value indicated in the manual of equipment by using the monthly normal value of the climate in Ho Chi Minh City. When there are few changes of the calculated monthly COP, the minimum value is used through the year to ensure conservativeness.	N/A

$RRE_{L,office}$	Rated electricity consumption of reference lighting equipment in the office area		MW	Information from manufacturer, such as value indicated in the manual of equipment	N/A
$RRE_{L,common}$	Rated electricity consumption of reference lighting equipment in the common area		MW	Information from manufacturer, such as value indicated in the manual of equipment	N/A
$ROH_{L,office}$	Operating hour of reference lighting equipment in the office area during the period p		hour/p	Information from the owner and tenants of the building	N/A
$ROH_{L,common}$	Operating hour of reference lighting equipment in the common area during the period p		hour/p	Information from the owner and tenants of the building	N/A
RRE_V	Rated electricity consumption of reference ventilation equipment		MW	Information from manufacturer, such as value indicated in the manual of equipment	N/A
ROH_V	Operating hour of reference ventilation equipment during the period p		hour/p	Information from the owner of the building	N/A

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
#DIV/0!	tCO_2/y

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Joint Crediting Mechanism Proposed Methodology Spreadsheet Form (Calculation Process Sheet)

[Attachment to Proposed Methodology Form]

1. Calculations for emission reductions	Fuel type	Value	Units	Parameter
Emission reductions during the period of year y		#DIV/0!	tCO_2/p	ER_p
2. Selected default values, etc.				
N/A				
3. Calculations for reference emissions				
Reference emissions during the period of year y		#DIV/0!	tCO_2/p	RE_p
Reference emissions by air-conditioning equipment		#DIV/0!	tCO_2/p	$RE_{AC,p}$
Quantity of heat generated by reference air-conditioning equipment		0	GJ/p	$RQ_{AC,p}$
Quantity of heat generated by project air-conditioning equipment		0	GJ/p	$PQ_{AC,p}$
Electricity consumption of project air-conditioning equipment		0.000	MWh/p	$PEC_{AC,p}$
COP of project air-conditioning equipment		0.00	-	$P\varepsilon_{AC}$
COP of reference air-conditioning equipment		0.00	-	$R\varepsilon_{AC}$
CO_2 emission factor of grid electricity		0.000	tCO_2/MWh	EF_{grid}
Reference emissions by lighting equipment		0	tCO_2/p	$RE_{L,p}$
Rated electricity consumption of reference lighting equipment in the office are		0.000	MW	$RRE_{L,office}$
Operating hour of reference lighting equipment in the office area		0	hour/p	$ROH_{L,office}$
Rated electricity consumption of reference lighting equipment in the commor		0.000	MW	$RRE_{L,common}$
Operating hour of reference lighting equipment in the common area		0	hour/p	$ROH_{L,common}$
CO_2 emission factor of grid electricity		0.000	tCO_2/MWh	EF_{grid}
Reference emissions by ventilation equipment		0	tCO_2/p	$RE_{V,p}$
Rated electricity consumption of reference ventilation equipment		0.000	MW	RRE_V
Operating hour of reference ventilation equipment		0	hour/p	ROH_V
CO_2 emission factor of grid electricity		0.000	tCO_2/MWh	EF_{grid}
4. Calculations of the project emissions				
Project emissions during the period of year y		0	tCO_2/p	PE_p
Project emissions by air-conditioning equipment		0	tCO_2/p	$PE_{AC,p}$
Electiricity consumption by air-conditioning equipment		0.000	MWh/p	$PEC_{AC,p}$
CO_2 emission factor of grid electricity		0.000	tCO_2/MWh	EF_{grid}
Project emissions by lighting equipment		0	tCO_2/p	$PE_{L,p}$
Electricity consumption of project lighting equipment		0.000	MWh/p	$PEC_{L,p}$
CO_2 emission factor of grid electricity		0.000	tCO_2/MWh	EF_{grid}
Project eimissions by ventilation equipment		0	tCO_2/p	$PE_{V,p}$
Electricity consumption of project ventilation equipment		0.000	MWh/p	$PEC_{V,p}$
CO_2 emission factor of grid electricity		0.000	tCO_2/MWh	EF_{grid}

[List of Default Values]

N/A		

N/A		

JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

Introduction of the energy efficiency technologies in the existing building in Ho Chi Minh City

A.2. General description of project and applied technologies and/or measures

The proposed project intends to introduce advanced equipment and technologies into an existing office building (total floor area of this building is about 20,000 m2) in Ho Chi Minh City with the aim of promoting energy saving and reducing GHG emissions.
The project technologies comprise desiccant air treatment, high temperature of chilled water, and floor-separate control of cold water flow for air conditioning equipment; adoption of LED lights for lighting equipment; and adoption of inverter fans for ventilation equipment.
Desiccant air treatment, which is conducted when incorporating hot moist air, entails adsorbing the humidity (moisture content) of outside air to rotor adsorbent so that drier air can be cooled and conveyed indoors. At this time, because the outside air cooled by the chiller is already dehumidified, the temperature of chilled water for cooling (chiller outlet temperature) can be increased. Therefore, the high efficiency of the chiller can be expected. Moreover, when exhausting the indoor air, the rotor is regenerated by the air containing the adsorbed water on the rotor, and waste heat can be utilized to heat the air. Also, through installing air conditioning cold water pumps on each floor, cold water flow can be kept to a minimum. The energy consumption for air conditioning is reduced by introducing a combination of these techniques.
The energy consumption for lighting is reduced to turn off the lights of a staff absent point by a person sense sensor as well as adoption of high-efficient LED illumination.
The large capacity fans used for building ventilation usually operate at all times. However, the energy consumption for ventilation is reduced while maintaining the function by inverter control based on a CO sensor in this project.
In addition, smart BEMS (Building Energy Management System) will be introduced in order to control the environment that includes equipment control, energy control, and comfort.

A.3. Location of project, including coordinates

Country	The Socialist Republic of Viet Nam
Region/State/Province etc.:	N/A
City/Town/Community etc:	Ho Chi Minh City
Latitude, longitude	N 10° 46’ 10” and E 106° 40’ 55”

A.4. Name of project participants

The Socialist Republic of Vies Nam	Sun Wah Properties
Japan	Shimizu Corporation

A.5. Duration

Starting date of project operation	01/09/2015
Expected operational lifetime of project	20 years

A.6. Contribution from developed countries

The proposed project is financially supported by the Ministry of the Environment Japan since this project is recognized as a JCM model project.
Because Japan is located in a hot and humid climate among the developed countries, Japanese technology on dehumidifying air-conditioning is superior to the developed countries as well as developing countries.
Since many countries and cities of South-eastern Asia including Ho Chi Minh City are located in a hot and humid climate, the demand for cooling is expected to skyrocket from now on. Moreover, if solar-powered water heaters and so on are used, it will be relatively easy to obtain heat sources and the potential of energy saving based on dehumidifying air-conditioning will be extremely large. Japanese companies are working on developing products in the field of dehumidifying air-conditioning, and it will be meaningful to deploy

Japanese technologies through this project. In Ho Chi Minh City, many buildings that were built in the middle of the 1990s are due for equipment replacement. To introduce advanced energy-saving technologies into such buildings leads to extend the life of the building and contributes to environmental preservation as well as promotion of energy saving and reduction of GHG emissions.

B. Application of an approved methodology(ies)

B.1. Selection of methodology(ies)

Selected approved methodology No.	VN_AMxxx
Version number	1.0
Selected approved methodology No.	N/A
Version number	N/A
Selected approved methodology No.	N/A
Version number	N/A
Selected approved methodology No.	N/A
Version number	N/A
Selected approved methodology No.	N/A
Version number	N/A

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	This project is operated in the existing building.	The project will be implemented in Sun Wah Tower, which was completed in 1997 in Ho Chi Minh City. Therefore, this project is applicable to this criterion.
Criterion 2	At least one of the existing air-conditioning equipment, lighting equipment and ventilation equipment is replaced.	Air-conditioning equipment, lighting equipment, and ventilation equipment are replaced in this project. For air-conditioning equipment, the equipment with all of desiccant air treatment, high temperature of chilled water and floor-separate control of cold water flow is introduced. For lighting equipment, high-efficiency LED and a human sensors is introduced. For ventilation equipment, ventilation fans that entail inverter control based on CO sensors is introduced. Therefore, this project is applicable to this criterion.
Criterion 3	The existing equipment before replacement is capable of continuous use without exceeding the remaining lifetime. If continuous use of the existing equipment is impossible, it is assumed that new equipment will be introduced and the reference equipment is the standard	Since all of the air-conditioning equipment, lighting equipment, and ventilation equipment of the project building are fully capable of continuous use, the reference equipment is the equipments before replacement. Therefore, this project is applicable to this criterion.

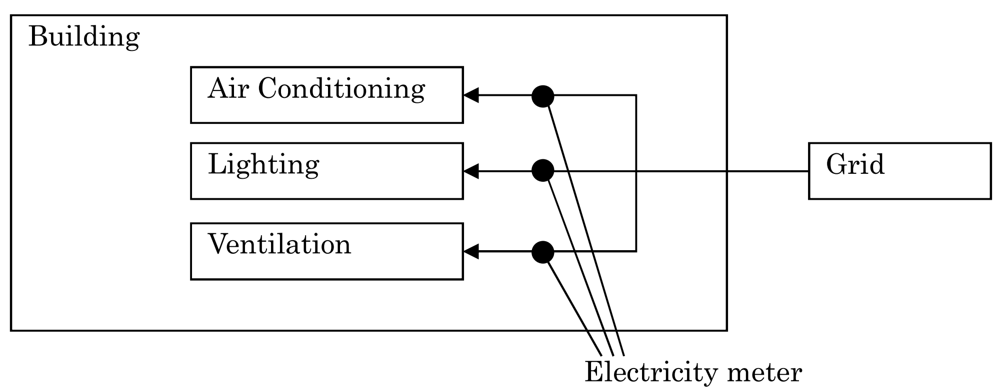
	equipment at the time.	
Criterion 4	The equipment before replacement uses the grid electricity.	The electricity used in the project building is purchased from Vietnam Electricity (EVN). Therefore, this project is applicable to this criterion.
Criterion 5	N/A	N/A
Criterion 6	N/A	N/A
Criterion 7	N/A	N/A
Criterion 8	N/A	N/A
Criterion 9	N/A	N/A
Criterion 10	N/A	N/A

C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
Electricity consumption by air-conditioning equipment	CO_2
Electricity consumption by lighting equipment	CO_2
Electricity consumption by ventilation equipment	CO_2
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A
Project emissions	
Emission sources	GHG type
Electricity consumption by air-conditioning equipment	CO_2
Electricity consumption by lighting equipment	CO_2
Electricity consumption by ventilation equipment	CO_2
N/A	N/A
N/A	N/A
N/A	N/A
N/A	N/A

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2013	0	0	0
2014	0	0	0
2015	0	0	0
2016	0	0	0
2017	3,300	1,874	1,426
2018	3,300	1,874	1,426
2019	3,300	1,874	1,426
2020	3,300	1,874	1,426
Total (tCO_{2e})	13,200	7,496	5,704

D. Environmental impact assessment

Legal requirement of environmental impact assessment for the proposed project	No

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

In this project, since the equipments in a specific building are replaced, the project participants identified the tenants of the building to the stakeholders of this project. The project participants are planning to conduct a face-to face interview with the stakeholders.
Some comments will be received from the stakeholders concerning the replacement of equipments.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A
N/A	N/A	N/A

F. References

N/A

Reference lists to support descriptions in the PDD, if any.

Annex

N/A

Revision history of PDD

Version	Date	Contents revised
1.0	16/02/2015	First edition

Monitoring Plan Sheet (input sheet) [Attachment to Project Design Document]

Table 1: Parameters to be monitored *ex post*

(a) Monitoring point No.	(b) Parameters	(c) Description of data	(d) Estimated Values	(e) Units	(f) Monitoring option	(g) Source of data	(h) Measurement methods and procedures	(i) Monitoring frequency	(j) Other comments
(1)	$PEC_{AC,p}$	Electricity consumption of project air-conditioning equipment during the period p	2,469.863	MWh/p	Option C	monitored data	Measured by watt hour meter. Measured data is recorded and stored electrically. Recorded data is input to a spreadsheet electrically. Verified monitoring devices are installed and they are calibrated in line with international standards or manufacurers' specification.	continuous	N/A
(2)	$PEC_{L,p}$	Electricity consumption of project lighting equipment during the period p	400.476	MWh/p	Option C	monitored data	Measured by watt hour meter. Measured data is recorded and stored electrically. Recorded data is input to a spreadsheet electrically. Verified monitoring devices are installed and they are calibrated in line with international standards or manufacurers' specification.	continuous	N/A
(3)	$PEC_{V,p}$	Electricity consumption of project ventilation equipment during the period p	131.089	MWh/p	Option C	monitored data	Measured by watt hour meter. Measured data is recorded and stored electrically. Recorded data is input to a spreadsheet electrically. Verified monitoring devices are installed and they are calibrated in line with international standards or manufacurers' specification.	continuous	N/A

Table 2: Project-specific parameters to be fixed *ex ante*

(a) Parameters	(b) Description of data	(c) Estimated Values	(d) Units	(e) Source of data	(f) Other comments
EF_{grid}	CO_2 emission factor of grid electricity	0.6244	tCO_2/MWh	Ministry of Natural Resources and Environment (MONRE), Vietnamese DNA for CDM unless otherwise instructed by the Joint Committee.	N/A
$R\varepsilon_{AC}$	COP of reference air-conditioning equipment	3.01	-	Information from manufacturer, such as value indicated in the manual of equipment	N/A
$P\varepsilon_{AC}$	COP of project air-conditioning equipment	4.56	-	COP is changed to a value close to the actual value from a value indicated in the manual of equipment by using the monthly normal value of the climate in Ho Chi Minh City. When there are few changes of the calculated monthly COP, the minimum value is used through the year to ensure conservativeness.	N/A

$RRE_{L,office}$	Rated electricity consumption of reference lighting equipment in the office area	0.36560	MW	Information from manufacturer, such as value indicated in the manual of equipment	N/A
$RRE_{L,common}$	Rated electricity consumption of reference lighting equipment in the common area	0.01074	MW	Information from manufacturer, such as value indicated in the manual of equipment	N/A
$ROH_{L,office}$	Operating hour of reference lighting equipment in the office area during the period p	3,510	hour/p	Information from the owner and tenants of the building	N/A
$ROH_{L,common}$	Operating hour of reference lighting equipment in the common area during the period p	7,200	hour/p	Information from the owner and tenants of the building	N/A
RRE_V	Rated electricity consumption of reference ventilation equipment	0.0210	MW	Information from manufacturer, such as value indicated in the manual of equipment	N/A
ROH_V	Operating hour of reference ventilation equipment during the period p	8,760	hour/p	Information from the owner of the building	N/A

Table3: *Ex-ante* estimation of CO_2 emission reductions

CO_2 emission reductions	Units
1,426	tCO_2/y

[Monitoring option]

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Monitoring Structure Sheet [Attachment to Project Design Document]

Responsible personnel	Role
Project Manager	Responsible for project planning, implementation, monitoring results and reporting.
Supervisor	Appointed to be in charge of approving the archived data after being checked and corrected when necessary. Appointed to be in charge of monitoring procedure (data collection and storage), including monitoring equipments and calibrations, and training of monitoring.
Operator	Appointed to be in charge of checking the archived data for irregulatity and lack.
N/A	N/A
N/A	N/A
N/A	N/A

2. Promotion to Convert to Eco-Friendly and Park-and-Ride Buses

JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form	

Form for submitting the proposed methodology

Host Country	Vietnam
Name of the methodology proponents submitting this form	NIKKEN SEKKEI Research Institute, Inc.
Sectoral scope(s) to which the Proposed Methodology applies	7.Transport
Title of the proposed methodology, and version number	JCM Feasibility Study: Promotion of public transportation usage through Park-and-Drive and Eco Point systems in collaboration with private commercial facilities
List of documents to be attached to this form (please check):	■The attached draft JCM-PDD: □Additional information
Date of completion	

History of the proposed methodology

Version	Date	Contents revised
1.0	16/02/2015	First edition

A. Title of the methodology

JCM Feasibility Study: Promotion of public transportation usage through Park-and-Drive and Eco Point systems in collaboration with private commercial facilities

B. Terms and definitions

Terms	Definitions
P&BR	Abbreviation for "Park and bus ride". Method in which users travel by motorcycle or car to the nearest bus stop, and then transfer to a bus that takes them to their destination. One measure for encouraging switching from personal transportation modes to public transportation.
Traffic eco-point	A service in which points are allotted for every use of public transportation, and such points can be exchanged for gifts, etc. One measure for encouraging the use of public transportation.
IC card	Card with built-in IC (integrated circuit) chip used as a medium for transportation account settlement. It can be utilized not only for transportation account settlement, but also for Traffic Eco-Points and prepaid electronic purse for shopping.
Access	Term used to indicate the section of travel to the nearest public transportation station or bus stop

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	Differential between reference emissions and projected emissions
Calculation of reference emissions	Emissions where the traffic is as it currently is, except that annual 1.2% reduction of CO2 emissions as a result of technological innovation is taken into account. $CE_r = \sum_D\{\sum_i(IDE_{mi} \times Ld)\}$ - CE_r : Reference emission - IDE_{mi} : Per-unit CO2 emissions, Default value (1.2% / year improvement in fuel consumption) - Ld : Road distance, Spatial distance between the address of individual i and his destination is measured (by using map information system). Ld(Road distance)= 1.25*L_{sp}(spatial distance - D: Number of days of bus use recorded by IC card of i : individual
Calculation of project emissions	CO2 emissions to be caused by conducting the planned project. $CE_p = CE_a + CE_b$ CE_p : Project emission $CE_a = \sum_D\{\sum_i(IDE_{mi} \times L_d)\}$ - CE_a : Emissions in access

	- IDE_{mi} : Per-unit CO2 emissions: Default value: (1.2% / year improvement in fuel consumption) - L_d : Road distance: Spatial distance between the address of individual i and commercial facilities is measured (by using map information system). L_{sp} : Spatial Distance $L_d = 1.25 * L_{sp}$ - D : Number of days of bus use recorded by IC card of - i : individual $CE_b = \sum_D \{\sum_i (IDE_b \times L_b)\}$ - CE_b : Emissions in line haul - IDE_b : Bus per-unit CO2 emissions Per-unit - L_b : Bus route distance: Actual measured value - D : Number of days use: Value recorded in IC card i : individual
Monitoring parameters	Per-unit CO2 emissions is given by results of existing survey by Ho Chi Minh. Other parameters are produced utilizing the following management data: ● Data managed by commercial facility: Information filled in on P&BR application form, parking use record. Data managed by Ho Chi Minh DOT: Bus usage recorded on IC card

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

Criterion 1	Existence of private commercial facility in suburbs for P&BR use.
Criterion 2	Existence of bus routes conducive to P&BR which can be transferred to from the parking lot.
Criterion 3	Completion of introduction of IC card as a bus fare payment method.
Criterion 4	Mandatory submission of P&BR usage application form by users.
Criterion 5	Development of a system for automatically calculating GHG reduction amounts.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
GHG emissions due to consumption of fossil fuels used for motorcycle transportation	CO2
GHG emissions due to consumption of fossil fuels used for car transportation	CO2
N/A	
Project emissions	
Emission sources	GHG types
GHG emissions due to consumption of fossil fuels used for motorcycle transportation	CO2
GHG emissions due to consumption of fossil fuels used for car transportation	CO2

GHG emissions due to consumption of fossil fuels or natural gas used for buses (Diesel / CNG type respectively)	CO_2
N/A	

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

As a general rule, the reference scenario will be set up such that the present traffic is kept with neither P&BR nor traffic eco-point (BaU scenario), and the following conservative calculation process will be applied.

F.2. Calculation of reference emissions

The reference scenario is itemized as follows:

- The conservativeness will be ensured by assuming fuel consumption of existing transportation mode will be improved by 1.2% every year.
- Presently used transportation mode will be determined from information on P&BR application forms.
- As for travel distance which is necessary for calculating CO_2 BaU emissions of a person, it can be estimated by using estimation model which can estimate from the spatial distance between home address and working place.

L_d(Road distance)= 1.25*L_{sp}(spatial distance)

$$CE_r = \sum_D \{ \sum_i (IDE_{mi} \times L_d) \}$$

- CE_r : Reference emission
- IDE_{mi} : Per-unit CO_2 emissions, Default value (1.2% / year improvement in fuel consumption)
- L_d : Road distance, Spatial distance between the address of individual *i* and his destination is measured (by using map information system).

L_d(Road distance)= 1.25*L_{sp}(spatial distance)

- D: Number of days of bus use recorded by IC card of

i : individual

G. Calculation of project emissions

Project emissions will be calculated for access from home to the commercial facility (bus stop) and line haul from that facility to destination bus stop. Calculations will be performed as follows:

1. CO_2 emissions of access
   - Calculation from home address and transportation mode filled in on the application form and rates available in existing studies
   - Road distance is calculated from the spatial distance in a similar way as for reference emission
   - Calculation of frequencies from IC card records (For example, for a date when no IC card record is found irrespective of "Commuting" written down in the application form, it is regarded as use of a motorcycle or car.)
2. CO_2 emission of line haul
   - Determination of bus-riding section from IC card record, and supplementary use of information (e.g., destination bus stop) of the P&BR application form. Since bus travel can be grasped from actual distance, calculation of CO_2 emissions will be made by the use of rates available in existing studies.
   - The travel distance of bus can be easily estimated by checking travel records

- Per-unit CO2 emissions of bus are prepared separately on the basis of CNG or Diesel bus.

$CE_p = CE_a + CE_b$
CE_p : Project emission

$CE_a = \sum_D \{\sum_i (IDE_{mi} \times L_d)\}$

- IDE_{mi} : Default value: (1.2% / year improvement in fuel consumption)
- L_d : Calculated from the spatial distance between the home address and the commercial facility written on application form
  $L_d = 1.25 \times L_{sp}$(Spatial distance)
- D : Number of days of bus use recorded by IC card of individual i.

$CE_b = \sum_D \{\sum_i (IDE_b \times L_b)\}$

- IDE_b : Default value
- L_b : Actual measured value for individual i.

D : Number of days of bus use recorded by IC card of individual i.

H. Calculation of emissions reductions

Projected emissions subtracted from reference emissions

$CE_r = \sum_D \{\sum_i (IDE_{mi} \times L_d)\}$

- IDE_{mi} : Default value (1.2% / year improvement in fuel consumption)
- Road distance: Calculated from the spatial distance between the home address and the destination written in application form
  $L_d = 1.25 \times L_{sp}$ (Spatial distance)
- D : Number of days of bus use recorded by IC card of individual i.

$CE_p = CE_a + CE_b$

$CE_a = \sum_D \{\sum_i (IDE_{mi} \times L_d)\}$

- IDE_{mi} : Default value: (1.2% / year improvement in fuel consumption)
- L_d : Calculated from the spatial distance between the home address and the commercial facility written in application form
  $L_d = 1.25 \times L_{sp}$(Spatial distance)
- Number of days use (D): Number of days of bus use recorded by IC card of individual i.

$CE_b = \sum_D \{\sum_i (IDE_b \times L_b)\}$

- IDE_b : Default value
- L_b : Actual measured value for individual i

D : Number of days of bus use recorded by IC card of individual i.

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
Rate of CO2 emissions	Rate of CO2 emissions from transportation modes involved in the	MRV Methodology Title: “A modal shift in Vietnam from

	study CO_2 emissions can be calculated by using the results of questionnaires on 5000 residents along MRT in Hanoi, 460 taxi-drivers, and 10 bus companies in 2012. CO_2 emissions = Σ(Travel distance of transportation mode i) ÷ (Fuel consumption of transportation mode i that uses fuel j)÷(num. of passengers of transportation mode i) ×(CO_2 emission factor of fuel j)) ÷Σ(Travel distance of transportation mode i) In the above formula, "CO_2 emission factor of fuel j" refers to the published values of 2006 IPCC Guidelines (0.00240tCO_2 / l). Other variables refer to the results of the questionnaires. Furthermore, to ensure conservativeness, the lower limit of the 95% confidence interval for the mean value is used.	a transport mode with a high greenhouse gas emission factor to a mass passenger transport system with a low greenhouse gas emission factor”
CO_2 emission per units of CNG bus	Per-unit CO_2 emissions of CNG bus are estimated in this survey by using the existing survey held by HCMC DOT for the purpose of their bus performance. This survey provided information in which CO_2 emission of CNG bus is 8% less than that of diesel bus.	The results of survey by DOT of HCMC.
Coefficient of fuel consumption improvement	Taken from report of The Institute of Energy Economics, Japan. Since for non-OECD member countries the improvement ratio for 2010 to 2020 is forecast to be 12%, for this project it was set at 1.2% per year.	The Institute of Energy Economics, Japan report: "Outlook for CO_2 reductions and improved automobile fuel consumption" (October 2009)

JCM Project Design Document Form

A. Project description

A.1. Title of the JCM project

JCM Feasibility Study: Promotion of public transportation usage through Park-and-Drive and Eco Point systems in collaboration with private commercial facilities

A.2. General description of project and applied technologies and/or measures

From experiences of transportation policies in Japan, the construction of roads and public transportation are not the only countermeasures to solve traffic congestion. When thinking about solutions to traffic congestion, TDM (Traffic Demand Management) is thought to be a very useful countermeasure in addition to the construction of infrastructure. This project aims to apply the following transportation demand management (hereinafter called TDM), which has achieved the effective impact of realizing a low carbon transportation system in Japan, to Ho Chi Minh city in Vietnam. a) Promoting Park and Bus Ride system by using large-scale commercial facilities in the suburbs. b) Transportation Eco-Point system to increase the public transportation usage frequency.

A.3. Location of project, including coordinates

Country	Vietnam
Region/State/Province etc.:	-
City/Town/Community etc:	Ho Chi Minh City
Latitude, longitude	*Latitude*: 10.75 *Longitude*: 106.67

A.4. Name of project participants

The Socialist Republic of Viet Nam	DOT (Department of Transportation)
Japan	AEON Mall Vietnam, NIKKEN SEKKEI Research Institute

A.5. Duration

Starting date of project operation	2017
Expected operational lifetime of project	20-30 years

A.6. Contribution from developed countries

- Park-and-bus-ride system using the private commercial facilities

There are many kinds of park-and-ride systems in EU or USA. Meanwhile, our proposed P&BR is realized through collaboration between the private and public sectors. In other words, our P&BR system can be achieved under the circumstances of a win-win relationship among AEON, Ho Chi Minh, and citizens. Ho Chi Minh doesn't have to invest large sums for P&BR parking, and AEON can get the ability to pull in more customers by selling tickets for P&BR parking usage. Citizens can use P&BR parking place in AEON by just purchasing the ticket which can be used in AEON. This P&BR system is a very unique system.

- Transportation Eco Point System

Transportation Eco Point System is also a unique Japanese method. Although in Japan there are various kinds of transportation eco point systems, AEON has developed and operated their own original transportation eco point system, called "GREEN SCORE SYSTEM". Consumers visiting via public transportation can get eco points which can be exchanged for gifts by saving up a certain amount of points.

Considering the above features, this P&BR system is thought to be TDM with an original Japanese style.

B. Application of an approved methodology(ies)	

B.1. Selection of methodology(ies)

Selected approved methodology No.	JCM_JP_MN_07
Version number	Ver01.
Selected approved methodology No.	N/A
Version number	N/A
Selected approved methodology No.	N/A
Version number	N/A

B.2. Explanation of how the project meets eligibility criteria of the approved methodology

Eligibility criteria	Descriptions specified in the methodology	Project information
Criterion 1	Existence of private commercial facility in suburbs for P&BR use.	In order to realize P&BR in a large-scale commercial facility in the suburbs, the commercial facility must be located in the suburbs and in addition, it must be possible to secure sufficient parking spaces for P&BR (there must be a surplus of parking spaces).
Criterion 2	Existence of bus routes conducive to P&BR which can be transferred to from the parking lot.	In order to realize P&BR, after parking the commercial facility's parking lot, there must be bus routes from the parking lot to destinations such as the city center, etc. In addition, the distance between the parking lot and the bus stop for getting on and off the bus must be short, and there must be no obstacles to walking between the two.
Criterion 3	Completion of introduction of IC card as a bus fare payment method.	By implementing IC cards as a bus fare payment method, the following records required for calculating GHG reduction amounts can be collected: ・Capturing of bus usage frequency and distance (section between getting on and off) due to P&BR ・Capturing of method of access to Aeon parking lot (driving own motorcycle/car, carpooling, walking) is possible. Furthermore, the requirements for the IC card are as follows: ・Card type: Type A or Type C ・Information stored on card: Section between getting on and off (Date and time of riding will also be stored); Record of passing through parking lot gate; ID information correlating with P&BR usage application form.
Criterion 4	Mandatory submission of P&BR usage application form by users.	For calculating GHG emission reduction amounts, it is necessary to identify the transportation method before switching to P&BR (previous method), the user's home address and destination, and the transportation method used to get to the parking lot when using P&BR. For that purpose, users will be required to submit a P&BR usage application form

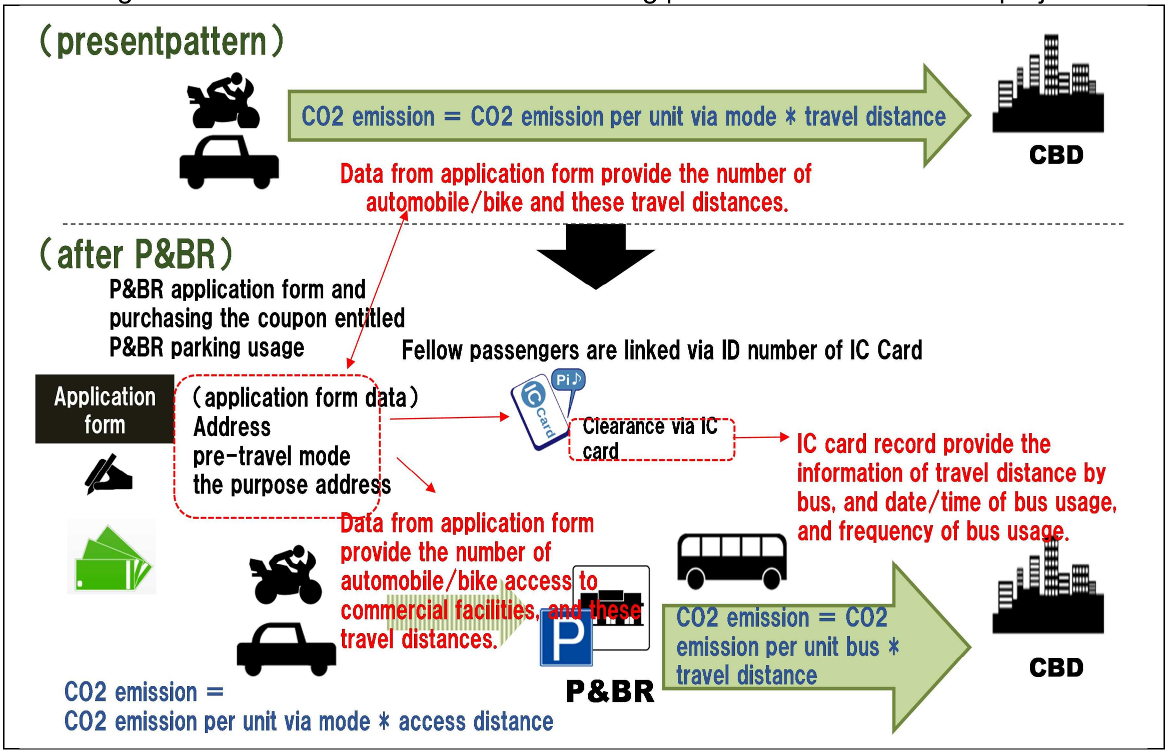
		filled out with such information. Submission of this application is common even for P&BR examples in Japan, and is also essential information and procedures for the commercial facility operator from the aspect of parking lot management.
Criterion 5	Development of a system for automatically calculating GHG reduction amounts.	For calculating GHG reduction amounts, the information on the P&BR usage application form (home address, destination, previous transportation method), bus usage history information from IC card, and record information on passing through the parking lot gate, but such data are large volumes of data day by day and moment by moment, and in addition they are managed by different organizations (parking-lot-related information is managed by the store operators, and bus-related information is managed by DOT). Because of this, a system that can span management classifications and automatically aggregate such data is necessary. By using such a system, GHG emission amounts can be accurately calculated in real time without any workload on operators, etc.

C. Calculation of emission reductions

C.1. All emission sources and their associated greenhouse gases relevant to the JCM project

Reference emissions	
Emission sources	GHG type
GHG emissions due to consumption of fossil fuels used for motorcycle transportation	CO2
GHG emissions due to consumption of fossil fuels used for car transportation	CO2
N/A	
N/A	
GHG emissions due to consumption of fossil fuels used for motorcycle transportation	CO2
Project emissions	
Emission sources	GHG type
GHG emissions due to consumption of fossil fuels used for motorcycle transportation	CO2
GHG emissions due to consumption of fossil fuels used for car transportation	CO2
GHG emissions due to consumption of fossil fuels or natural gas used for buses (Diesel / CNG type respectively)	CO2
N/A	
N/A	

C.2. Figure of all emission sources and monitoring points relevant to the JCM project



C.3. Estimated emissions reductions in each year

Year	Estimated Reference emissions (tCO_{2e})	Estimated Project Emissions (tCO_{2e})	Estimated Emission Reductions (tCO_{2e})
2013	4960.7	4375.94	584.8
2014	4901.2	4375.94	525.3
2015	4842.4	4375.94	466.4
2016	4784.3	4375.94	408.3
2017	4726.9	4375.94	350.9
2018	4670.1	4375.94	294.2
2019	4614.1	4375.94	238.2
2020	4558.7	4375.94	182.8
Total (tCO_{2e})	38058.4	35007.5	3050.9

D. Environmental impact assessment	
Legal requirement of environmental impact assessment for the proposed project	NO

E. Local stakeholder consultation

E.1. Solicitation of comments from local stakeholders

This project held three meetings with DOT of Ho Chi Minh (25th October, 18th December, 25th February).
DOT showed a collaborative stance, and DOT has proposed to us three new bus networks via AEON store.
AEON has prepared the bus stop in shopping center so that new bus lines will be implemented if DOT can determine operation plans for these new lines. Now DOT is studying these plans. DOT has also promised us to show the IC card introduction program in early part of 2014.

E.2. Summary of comments received and their consideration

Stakeholders	Comments received	Consideration of comments received
DOT	New bus network via AEON mall.	If AEON prepares a bus stop in the shopping center, DOT can propose and operate three new bus lines.
	IC card introduction program	This program can be shown in the early part of 2014. Type A (Mifare card) is thought to be a realistic type.

F. References

N/A

Reference lists to support descriptions in the PDD, if any.

Annex

N/A

Revision history of PDD

Version	Date	Contents revised
1.0	16/02/2016	First edition