

FY2019
City-to-City Collaboration Programme for
Low-Carbon Society

City-to-City Collaboration Project between
Ho Chi Minh City and Osaka City
(Promotion of Energy Efficient Equipment in Industrial
and Public Sectors)

Report

March 2020

Nippon Koei Co., Ltd.
Osaka City

FY2019 City-to-City Collaboration Programme for Low-Carbon Society

City-to-City Collaboration Project between Ho Chi Minh City and Osaka City (Promotion of Energy Efficient Equipment in Industrial and Public Sectors)

Report

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Abbreviations

Abbreviation	Description
AIM	Asia-Pacific Integrated Model
BaU	Business-as-Usual
CCAP	Climate Change Action Plan
COP21	21st Conference of the Parties
DONRE	Department of Natural Resources and Environment
DOT	Department of Tourism
FY	Fiscal Year
GHG	Greenhouse Gas
HEPZA	Ho Chi Minh City Export Processing and Industrial Zones Authority
IPLV	Integrated Part Load Value
JCH	Johnson Controls-Hitachi Air-Conditioning Vietnam LLC (Limited Liability Company)
KEPCO	Kansai Electric Power Company
MEC	Meteorological Engineering Center
MICE	Meetings, Incentives, Conference and Exhibitions
MOEJ	Ministry of the Environment Japan
MOFA	Ministry of Foreign Affairs (Vietnam)
MONRE	Ministry of Natural Resources and Environment (Vietnam)
MOU	Memorandum of Understanding
MRV	Measurement, Reporting and Verification
NAMA	Nationally Appropriate Mitigation Actions
NCCS	National Climate Change Strategy
NDC	Nationally Determined Contribution
NTP-RCC	National Target Programme to Respond to Climate Change
OWESA	Osaka Water & Environment Solutions Association
QTSC	Quang Trung Software City
SAWACO	Saigon Water Corporation
SHTP	Saigon Hi-Tech Park
SKER	Southern Key Economic Region
SPI-NAMA Project	Project to Support the Planning and Implementation of NAMAs in an MRV Manner
SRHMC	South Regional Hydrometrological Center
UNFCCC	United Nations Framework Convention on Climate Change
VRF	Variable Refrigeration Flow
WRF	Weather Research and Forecasting Model

CHAPTER 1 BACKGROUND AND OBJECTIVE

1.1 BACKGROUND OF THE STUDY

In December 2015, all countries participated in United Nations Framework Convention on Climate Change (UNFCCC)'s 21st Conference of the Parties (COP21) which was held in Paris, France. In the COP21, Paris Agreement was adopted as a legal framework of fair and practical countermeasure to climate change after 2020. The Agreement aims at keeping global warming below 2 degrees Celsius above pre-industrial level, and it requires efforts to keep it below 1.5 degrees Celsius by promoting activities for decarbonization. Furthermore, at the COP24 held in Katowice, Poland in December 2018, the Paris Agreement Work Programme was adopted for the full implementation of the Agreement for 2020 onwards.

In addition, it was decided that activities by non-state actors (including cities) and efforts by all non-governmental entities (cities and other local governments etc.) are acknowledged and encouraged to be scaled up in COP21. Cities are the places to support social and economic growth since a lot of people live there. Although the total of urban areas is only 2% of all land in the world, approximately half of world population live in urban areas and the percentage is predicted to increase to 70% by 2050. Also, it is estimated that more than 70% of global CO₂ emissions are emitted from cities as of 2006, that is, cities have important roles for mitigation of climate change. Thus, implementation of countermeasures to climate change and greenhouse gas (GHG) emission reduction in cities are important for achievement of the goal of Paris Agreement.

The Vietnamese government has been working on countermeasures to climate change such as development of National Target Programme to Respond to Climate Change (NTP-RCC) in 2008, National Climate Change Strategy (NCCS) in 2011 and National Green Growth Strategy in 2012. Also, the country set a target of 8% of greenhouse gas (GHG) emission reduction compared to Business-as-Usual (BaU) level as Nationally Determined Contribution (NDC) and 25% reduction by international support including Joint Crediting Mechanism (JCM) which was signed in 2014 by 2030. Then, Action Plan for the Paris Agreement was approved in the country in 2016.

1.2 CITIES OF THE STUDY

1.2.1 Osaka City

Osaka City is an ordinance-designated city in Japan, and the central area of administration, economy, and culture in western Japan. Osaka City is the second biggest city in Japan following Tokyo, and actively plays a role as the international city. In June 2016, the city has set up a platform called "Team Osaka Network" for private companies located in Osaka or Kansai area, which aims to formulate projects that can contribute developing a low-carbon society at each city in Asian countries.

In addition, Team Osaka Network promotes an effective industry-government-academia collaboration, activation of business and economy in Osaka/Kansai area, and contribution to solving environment issues as Japanese city.

The basic statistic data of Osaka City is as follows.

Table 1.1 Outline of Osaka City

#	Item	Outline
1	Population	2,743,735 (as of January 2020)
2	Area	225.30 km ² (as of October 2018)
3	Regional GDP	19 trillion 493 billion JPY (FY 2016)

Source: Prepared by Nippon Koei based on Osaka City's website and other relevant documents

1.2.2 Ho Chi Minh City

Ho Chi Minh City (hereinafter called "HCMC") located in south of the country is the biggest commercial city in Vietnam with population of 850 million. Because of recent economic growth, population concentration and urban sprawl have been occurring, which has been leading to environmental issues such as air pollution and water pollution, as well as the need for waste management and forest management. In addition to being geographically influenced by climate change, the amount of GHGs emission in HCMC is also increasing rapidly.

The basic statistic data of HCMC is as follows.

Table 1.2 Outline of HCMC

#	Item	Outline
1	Population	8,993,082 (as of 2019)
2	Area	2,095 km ²
3	Regional GDP	US\$5,428 (as of 2016)

Source: Prepared by Nippon Koei based on the relevant documents

1.3 OBJECTIVE OF THE STUDY

"City-to-City Collaboration Project between HCMC and Osaka City (hereinafter called "the Study")" implements studies to effectively and efficiently support activities for formulation of low-carbon city in HCMC by taking advantage of experience and know-how of Osaka City for promotion of environmental policies and low-carbon technologies of Japanese companies.

1.4 IMPLEMENTATION STRUCTURE

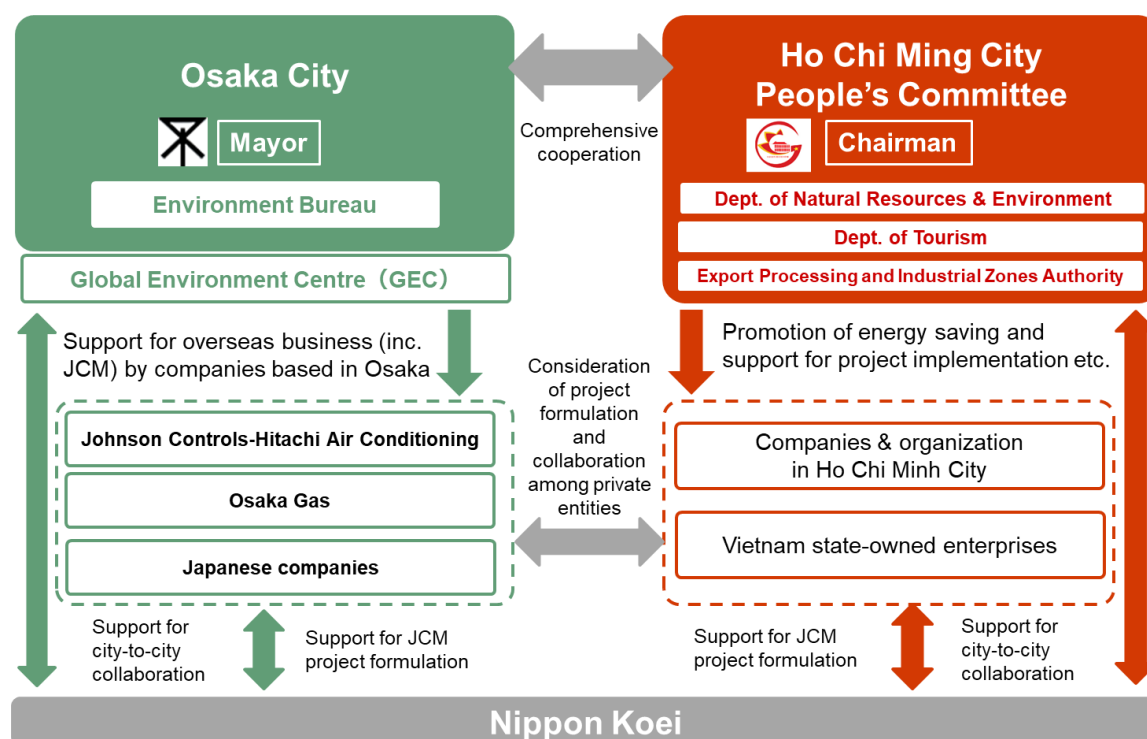
Figure 1.1 shows implementation structure of this project. Department of Natural Resources and Environment (DONRE) of HCMC People's Committee and Environmental Bureau of

Osaka City participate in this project as representative department of each city and collaborate for solution of urban issues and formulation of low-carbon city in HCMC. In addition, in order to formulate a JCM model project, the meetings with Department of Tourism (DOT) and HCMC Export Processing and Industrial Zones Authority (HEPZA) were conducted.

Under the City-to-City Collaboration, for JCM Model Project formulation in HCMC, a feasibility study was implemented with the several private companies such as Johnson Controls- Hitachi Air Conditioning Vietnam LLC and Osaka Gas Co., Ltd. The former company is an air-conditioning manufacturer, and the latter is a gas supplier.

Global Environment Centre (GEC), an executive body of JCM Model Project appointed by Ministry of the Environment Japan (MOEJ), have also joined the Study. GEC is knowledgeable about JCM and other relevant things, so they gave some advices to the above private companies.

The implementation structure of the Study is as follows.



Source: Prepared by Nippon Koei

Figure 1.1 Implementation Structure of the Study

1.5 STUDY SCHEDULE

The Study period is from 24 July 2019 to 2 March 2020. The schedule is presented as follows.

Survey Item	2019						2020	
	Jul	Aug	Sept	Oct	Nov	Dec	Jan	Feb
1. JCM Model Project Formulation								
1) High efficiency equipment installation project								
a) Specification examination of equipment installation								
b) Formulation of project plan & project evaluation								
c) Examination and finalization of the international consortium system								
d) Formulation of MRV plan								
2) Preparatory Survey for Large-scale JCM Model Project								
a) Understanding promotion of the JCM system								
b) Specification examination of equipment installation								
c) Formulation of project plan & project evaluation								
2. Formulation Support for CCAP (2021-2025)								
a) Overall schedule of CCAP (2021-2025) formulation								
b) Review method of CCAP (2016-2020)								
c) Conduct of CCAP (2016-2020) review								
3. Other								
a) Domestic meetings with Osaka and related companies								
b) MOEJ progress report meeting								
c) Field survey								
d) Implementation of policy dialogue								
e) Final report								

▲ : Conducted locally △ : Conducted in Japan

Source: Prepared by Nippon Koei

Figure 1.2 Schedule of the Study in FY2019

CHAPTER 2 CITY-TO-CITY COLLABORATION FOR LOW-CARBON SOCIETY

2.1 BACKGROUND AND OBJECTIVE

2.1.1 Background of the City-to-City Collaboration

Osaka City and HCMC have been carrying out JCM City-to-City Collaboration Project regarding environment sector since 2011 and developed the Action Plan for Formulation of Low-carbon Society in HCMC in October 2013. Furthermore, in accordance with Memorandum of Understanding (MOU) which was concluded for comprehensive cooperation aiming at realization of steady urban growth, Osaka City supported the development of “HCMC Climate Change Action Plan (hereinafter called “CCAP”, 2017-2020 and Prospects until 2030”. The MOU was updated as MOU on Cooperation between HCMC and Osaka City for Realization of Low-carbon City in HCMC in 2016 and the two cities are continuing their good cooperative relationship.

Table 2.1 Contribution of Osaka City to HCMC

#	Month/Year	Overview
1	December 2009	Conclusion of MOU on technology exchange with Saigon Water Corporation (SAWACO)
2	April 2011	Launched JCM City-to-City Collaboration Project (Ongoing)
3	October 2013	Conclusion of MOU on Formulation of Low-carbon City in HCMC
4	December 2015	Update of MOU on technology exchange with SAWACO
5	September 2016	Update of MOU on Formulation of Low-carbon City in HCMC
6	September 2016	HCMC Climate Change Action Plan 2017-2020 and Prospects until 2030
7	December 2018	Update of MOU on technology exchange with SAWACO

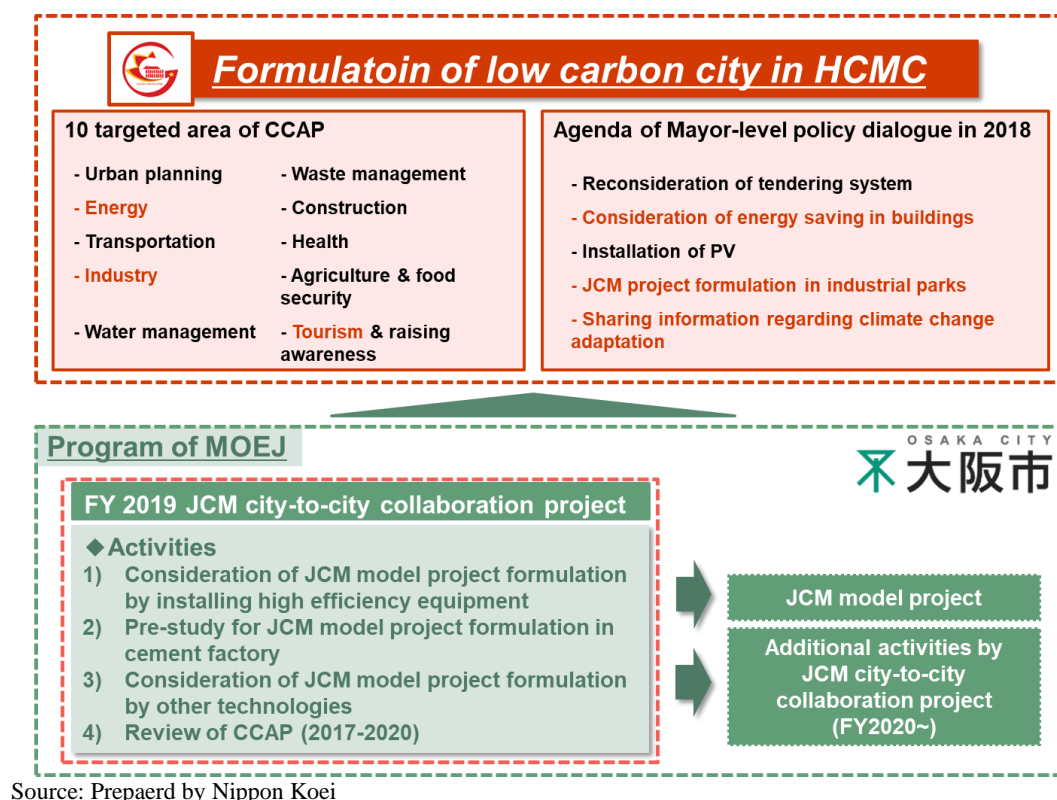
Source: prepared by Nippon Koei

2.1.2 Objective of the City-to-City Collaboration

Based on the City-to-City Collaboration in past years, JCM Model Project was investigated to introduce energy-saving technology such as high-efficiency air-conditioning system or boiler for industrial and public sectors in HCMC this year. In addition, CCAP (2017-2020) was further promoted. Also, support for the formulation of the next CCAP 2021-2025 was carried out.

2.2 CITY-TO-CITY COLLABORATION IMPLEMENTATION POLICY

The image of City-to-City Collaboration activities is shown below.



Source: Prepared by Nippon Koei

Figure 2.1 Image of Implementation Policy

2.3 STUDY RESULTS FOR CITY-TO-CITY COLLABORATION

2.3.1 Overview of the City-to-City Collaboration

Results of the City-to-City Collaboration activities conducted during the Study are presented in the following table.

Table 2.2 Overview of the City-to-City Collaboration

Content	Schedule	Description
Kick-off Meeting (Osaka City)	May - June 2018	Kick-off meetings with related entities were implemented multiple times
The 1 st Field Survey (HCMC)	28 July - 3 August 2019	Based on contents of the project proposal, concrete purpose, activities and schedule of this project were explained
1 st Progress Reporting to Ministry of the Environment Japan (Tokyo)	23 August 2019	Based on contents of the project proposal, concrete purpose, activities and schedule of this project were explained to MOEJ.
FY2019 JCM Model Project Application	30 August 2019	Based on the result of a feasibility study for JCM Model Project, introduction of high-efficiency air-conditioning made by Johnson Controls-Hitachi Air-Conditioning Vietnam LLC was applied in August 2019. The proposed project was formally adopted in November 2019. The details are described in Section

		3.1.7.
The 2 nd Field Survey (HCMC)	8 - 13 September 2019	Meetings with HCMC (DONRE, MOFA, DOT), preparation for “Policy Dialogue”, confirmation of MOU updating procedures, as well as meetings for the formulation of JCM Model Project were conducted. In order to expand the scope of JCM Model Project formation in HCMC, hotels and other tourist facilities were discussed for cooperation in the new meeting with DOT. Besides, information was collected by attending Interim Report Seminar sponsored by JICA on SPI-NAMA and the next CCAP formulation. Furthermore, information of existing equipment and energy-saving plans was collected in the meetings with private companies in HCMC for JCM project formulation regarding introduction of high-efficiency air-conditioning and gas boiler.
The 3 rd Field Survey (HCMC)	8 - 14 October 2019	Meetings with HCMC (DONRE, DOT) were conducted. Final coordination for “Policy Dialogue” and discussions on JCM Model Project formulation were confirmed.
Policy Dialogue	1 November 2019	Mayor-level Policy Dialogue Meeting between Osaka city and HCMC was held at Osaka city government building. Nine delegates from HCMC including Mr. Vo Van Hoan, Deputy Chairman of HCMC People’s Committee, as well as eight from Osaka city including Mr. Toru Takahashi, Deputy Mayor of Osaka city, discussed this project and City-to-City Collaboration until 2020.
2 nd Progress Reporting to Ministry of the Environment Japan (Tokyo)	20 December 2019	Progress since kick-off meeting to MOEJ was explained.
The 4 th Field Survey (HCMC)	5 - 10 January 2020	Progress were reported in the meeting with HCMC (DONRE, DOT). Besides, introduction of the rainfall forecasting system was discussed with the SRHMC (South Regional Hydrometeorological Center). Information on next CCAP decision was also collected by attending the JICA-sponsored seminar on SPI-NAMA. To formulate JCM Model Project, several interviews were conducted with companies which are interested in introducing high-efficiency air conditioning, gas boiler or solar panel.
JCM Seminar (Tokyo)	15 - 17 January 2020	Two delegates from HCMC were invited to participate in the JCM City-to-City Collaboration Seminar hosted by MOEJ in Tokyo. In the seminar, Ms. Kieu from DOT expressed her opinion on future cooperation and necessary support in the Panel Discussion.
Final Reporting to Ministry of the Environment Japan (Tokyo)	21 February 2020	This year’s activities and next year’s activity plan were reported to MOEJ.

Source: Prepared by Nippon Koei

2.3.2 Mayor-level Policy Dialogue between Osaka City and HCMC

“Mayor-level Policy Dialogue for Low-carbon Society between Osaka City and HCMC” was held on 1st November 2019. Mr. Vo Van Hoan, Deputy Chairman of HCMC People’s Committee, and Mr. Toru Takahashi, Deputy Mayor of Osaka city attended the meeting. The outline are as follows.

【Outline of the Policy Dialogue】

Date : 1 November 2019 (Friday) 14:00-16:30
 Venue : The city hall of Osaka City 5th Floor, Conference room
 Attendees : Osaka city: 8, HCMC: 9, UITec (Urban Infrastructure Technology Center Foundation): 1, OWESA (Osaka Water & Environment Solutions Association): 1, GEC: 2, Meteorological Engineering Center: 2, Nippon Koei: 3, Interpreter: 2 (Total: 28 person)

Table 2.3 Agenda of the Policy Dialogue in FY2019

#	Time	Agenda
1	14:00 - 14:10	<Ho Chi Minh City and Osaka City> Opening Address
2	14:10 - 14:40	<Ho Chi Minh City: Presentation> Low Carbon Activities - Climate Change Action Plan for 2010-2020 and new vision 2020-2030 - Request for Support
3	14:40 - 15:10	<Osaka City: Presentation> Support for Creating Low Carbon City - Policies of Support - Future Vision
4	15:10 - 15:25	Photo Session & Break
5	15:25 - 16:05	<Cooperative Companies: Presentation> Ongoing Projects - JCM Formulation Studies (Nippon Koei) - Rainfall Prediction System (Meteorological Engineering Center)
6	16:05 - 16:25	<Ho Chi Minh City and Osaka City> Discussion about ongoing projects and future vision
7	16:25 - 16:30	<Osaka water and environment solution association> Closing Address

Source: Prepared by Nippon Koei

In the Policy Dialogue, following the opening remarks by Mr. Vo Van Hoan, Vice Chairman of HCMC People’s Committee and Mr. Toru Takahashi, Vice Mayor of Osaka City, DONRE and Environment Bureau of Osaka City made presentations on the project’s initiatives, overview and progress. Then, Nippon Koei explained the outline of JCM scheme and

Meteorological Engineering Center (hereinafter called “MEC”) explained the rainfall prediction system which contributes to infrastructure management by HCMC.



Policy Dialogue



Policy Dialogue



Presentation by DONRE



Group photo in front of Osaka City Hall

2.3.3 Support for CCAP 2021-2025

1) September 2019

In order to support GHG emission reduction policy in Vietnam, JICA has implemented an SPI-NAMA Project (Project to Support the Planning and Implementation of Nationally Appropriate Mitigation Actions in a MRV Manner). On 11 September 2019, an Interim Report Meeting of the SPI-NAMA project by JICA and others was held in HCMC. Nippon Koei, along with Osaka City Environment Bureau, participated in the Interim Report Meeting to collect information on the next CCAP.

In this Interim Report Meeting, experts from HCMC and JICA presented a progress of the formulation of the next CCAP and expected effects of CCAP. Main contents were 1) MONRE's work on strengthening coordination capacity to promote the formulation and implementation of NAMA, and 2) progress in capacity building of relevant ministries and local governments through low-carbon urban NAMA pilots. For formulating the next CCAP, the following activities have been implemented under the SPI-NAMA project.

Activity 1: Estimating future GHG emission trend (BAU) and emission reduction potential

Activity 2: Determining and specifying priority mitigation programs, options and actions

Activity 3: Examining policy options to promote the programs and actions determined, including current policy review and policy recommendation

As the results of activities so far, 1) Policy review and GHG emissions projections toward 2030 using AIM (Asia-Pacific Integrated Model) Model, 2) Consideration of energy efficiency in buildings and industrial sector, and 3) Consideration of energy efficiency and renewable energy in the transport/seaport sector.

The agenda of the Interim Report Meeting is as follows.

Table 2.4 Agenda of Interim Report Meeting for the SPI-NAMA

Draft Agenda for Interim report meeting for SPI-NAMA Project Activities in HCMC in 2019

Date: 11 September, 2019 8:30- 15:30

Venue: Sheraton Saigon Hotel, Ho Chi Minh City (HCMC), Viet Nam

Co-Organized by: MONRE, HCMC/DONRE, and JICA

Participants:

Viet Nam MONRE, DONRE, DOC, DOIT, DOST of HCMC, and key organizations related to the SPI-NAMA Project

Japan JICA Chief Advisor (SPI-NAMA), HCMC Experts Team (Team Leader, Transport Experts, Coordinator), and National Specialists

*Vietnamese-English Simultaneous Interpretation

08:00-08:30	Registration	MC: - Ms. Tran Hong Lan – DONRE - Mr. Makoto Kato - Team Leader, HCMC Expert Team
08:30-08:45	Opening Remarks	● JICA ● HCMC DONRE
08:45-08:55	Photo session	
08:55-09:10	Overall Progress and expected contribution of SPI-NAMA project activities in HCMC in 2019	● Mr. Makoto Kato Team Leader, HCMC Expert Team
09:10-09:20	Q&A	● Participants
09:20-09:45	Progress of policy review related to HCMC CCAP Update	● JICA Expert Team
09:45-10:00	Coffee break	
10:00-10:25	Progress to date of GHG Emissions Projection by using the Asia-Pacific Integrated Model (AIM)	● JICA Expert Team
10:25-10:45	Q&A / Open discussion	● Facilitated by Makoto Kato & Dr. Mai Tuan Anh
10:45-11:05	Progress to date of Energy Efficiency	● JICA Expert Team
11:05-11:20	Progress to date of Transport Sector	● JICA Expert Team
11:20-11:35	Q&A / Open discussion	● Facilitated by Makoto Kato & Dr. Mai Tuan Anh
11:35-12:00	Toward finalization of work Discussion on prioritization of sector, programmes, policy measures, and recommendation to address the current needs and caps	● Dr. Jun Ichihara, JICA ● Dr. Mai Tuan Anh DONRE
12:00	Lunch	

Source: Documents distributed in the Meeting



Interim Report Meeting



Presentation by JICA expert

2) January 2020

A Final Report Meeting on SPI-NAMA project was held in January 2020, and progress of the project since the Interim Report Meeting and the final achievement of the project were reported. The estimated GHG emission in Vietnam and other relevant data were announced as the outcome of the project, which was implemented for 5 years.

In the SPI-NAMA project, fifty-five (45) technologies were selected as a technology which can contribute to NDC, and their effects for GHG emission reduction was evaluated. In addition, the technical support for realizing low carbon city was conducted regarding to transportation sector and energy sector that give a big impact on GHG emission in Vietnam.

The government of HCMC has acquired a knowledge on GHG emission reduction through the SPI-NAMA project, and it might become a base of actions to promote activities for low carbon society.

Table 2.5 Agenda of Final Report Meeting on the SPI-NAMA

08:30-09:00	Registration	
	Opening Session	
09:00-09:10	Opening Remarks	<ul style="list-style-type: none"> ● MONRE/DCC (TBC) ● Mr. Nguyen Toan Thang Director General of HCMC DONRE (TBC) ● Mr. Hiromichi Murakami, Deputy Director-General, JICA
09:10-09:25	Key Note Presentation: Updates of Viet Nam's climate change policy in particular on the readiness for NDC implementation, and steps envisaged in 2020 and beyond	<ul style="list-style-type: none"> ● Dr. Luong Quang Huy Director, MONRE/DCC
09:25-09:35	Updates of HCMC's climate action and vision for updating the Climate Change Action Plan (CCAP)	<ul style="list-style-type: none"> ● Dr. Mai Tuan Anh Director, HCMC DONRE
09:35-10:00	Results of support for HCMC by JICA SPI-NAMA, major outputs of 2019 activities, and summary of policy recommendations	<ul style="list-style-type: none"> ● Dr. Jun Ichihara, Chief Advisor JICA SPI-NAMA Mr. Makoto Kato, Team Leader, Short-term Expert Team
10:00-10:15	Group Photo and Coffee Break	
	Session 1: Results of Activities under SPI-NAMA/HCMC2019 Component	
10:15-10:35 (Q&A: 5 min)	Result of GHG emissions projection using Asia-Pacific Integrated Model (AIM)	<ul style="list-style-type: none"> ● Dr. Nguyen Tung Lam et al, ISPONRE
10:35-10:55 (Q&A: 5 min)	Result of policy measure development for future HCMC Climate Change Action Plan	<ul style="list-style-type: none"> ● Ms. Akiko Ishii and Dr. Quoc Ho Bang et al, Vietnam National University at Ho Chi Minh
10:55-11:25 (Q&A: 5 min)	Feasibility Study on low carbon technology introduction in the transport/energy efficiency subsector Measurement, Report and Verification of impact of GHG emissions reduction in urban railways in Viet Nam	<ul style="list-style-type: none"> ● Dr. Yasuki Shirakawa & Mr. Katsuyuki Ozaki and Le Thi Thanh Nhan Transport Development and Strategy Institute
	Session 2: Actions for enhancing HCMC Climate Change Action Plan toward 2030	
11:25-11:35	Enhancing future climate actions in HCMC	<ul style="list-style-type: none"> ● Mr. Joselito Guevarra C40
11:35-11:50	Comments by key representative ➢ Dr. Luong Quang Huy, MONRE/DCC ➢ Dr. Mai Tuan Anh, HCMC/DONRE ➢ Mr. Nguyen Duc Thuyet, MOT/DOE ➢ Mr. Makoto Kato, JICA Experts ➢ Other key participants	<ul style="list-style-type: none"> ● To be facilitated jointly by Mr. Thang (TBC) and Dr. Jun Ichihara, JICA Chief Advisor
11:50-12:00	General discussion by all participants	<ul style="list-style-type: none"> ● To be facilitated jointly by Dr. Mai Tuan Anh and Dr. Jun Ichihara, JICA Chief Advisor
	Closing session	
12:00	Closing remarks	<ul style="list-style-type: none"> ● MONRE/DCC (TBC) ● Mr. Nguyen Toan Thang Director General of HCMC DONRE (TBC) ● Mr. Hiromichi Murakami,

Source: Documents shared by DONRE

2.3.4 Rainfall Prediction System

One of the requests from the HCMC in last year's Policy Dialogue was to build a rainfall prediction model, one of the measures to adapt to climate change, and to put it into practical use in HCMC. Based on this request, Osaka City and MEC conducted discussions with officials of HCMC and SRHMC (South Regional Hydrometeorological Center) in Vietnam. Additionally, MEC is a company in Osaka City, and a subsidiary of Kansai Electric Power Company (KEPCO) that develops and sells rainfall prediction systems in Kansai region of Japan. The following table shows activities of the MEC in HCMC last year.

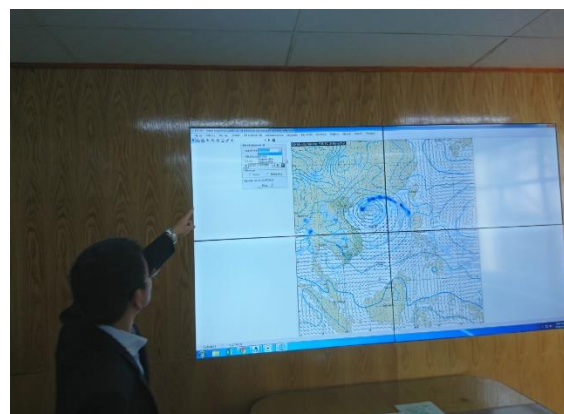
Table 2.6 Activities of MEC in HCMC

Year	Overview
11 June 2018	Utilizing local meteorological models such as WRF (Weather Research and Forecasting) model, a rainfall forecasting system for HCMC (rainfall forecast up to 3 days ahead, spatial analysis degree 5km) has been constructed. A trial version was proposed.
6 September 2018	In the Policy dialogue held in HCMC, when the results of the MEC in Japan were introduced, trial rain forecasting system, and accuracy verification results of the system were reported.
10 September 2019	Information was exchanged with SRHMC and field trip of the Bureau was conducted to confirm the status of the rainfall forecasting system in Vietnam.
October 2019	The introduction of a short-time rainfall forecasting system was proposed to SRHMC by e-mail based on the current status of meteorological observation and rainfall forecasting in Vietnam, as well as the risk of heavy rainfall which is expected to increase in the future due to climate change.
1 November 2019	In Policy Dialogue held in Osaka City, when the status of the study on the introduction of a rainfall forecasting system was reported to HCMC, and future research policy was also explained.

Source: Prepared by Nippon Koei based on the materials of Meteorological Engineering Center



Meeting with SRHMC



Presentation at SRHMC

Source: Provided by Meteorological Engineering Center

According to the survey in FY2019, it was confirmed in Vietnam that the weather forecast system using numerical forecast model (WRF) was established by using the output values of the global meteorological model. It was also confirmed that one weather radar has been installed as of October 2019, and three additional radars will be installed in the future. However, the rainfall forecasting system using the weather radar has not been introduced yet.

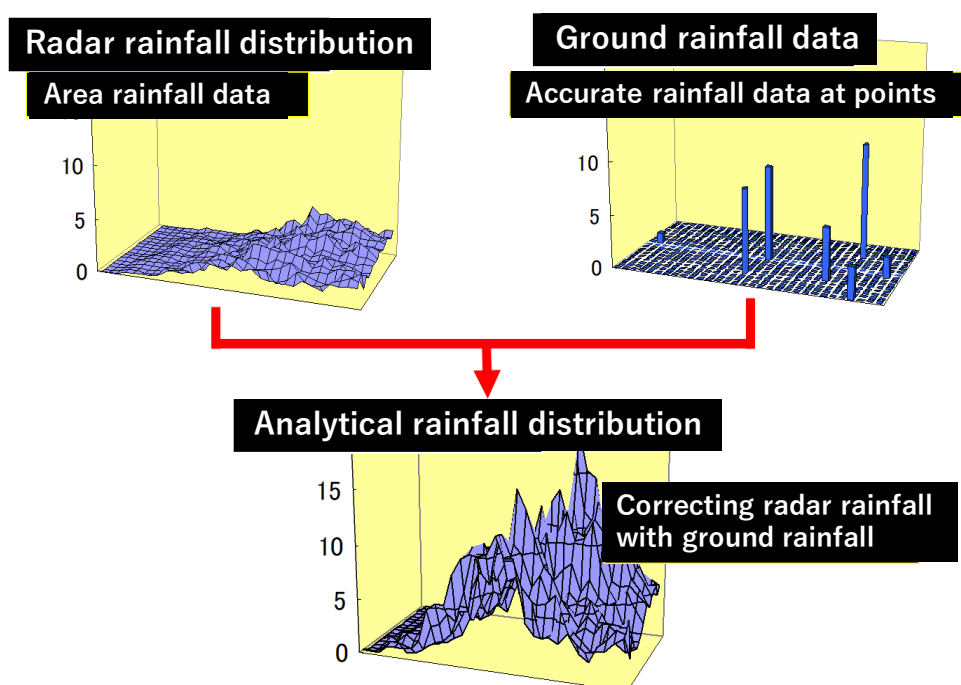
Based on the current situation, it was decided to consider introducing a “hybrid rainfall forecasting system” which optimally combines the results of rainfall forecasting using weather radar and the forecasting results of the numerical forecast model WRF.

【Rainfall prediction using weather radar】

Rainfall forecasting using meteorological radar is performed by (1) creation of analytical rainfall distribution using radar and ground rainfall data, (2) identification of rainfall area movement vector, and (3) rainfall area movement prediction by movement vector.

The image of the creation of the analytical rainfall distribution using radar and ground rainfall data is as follows.

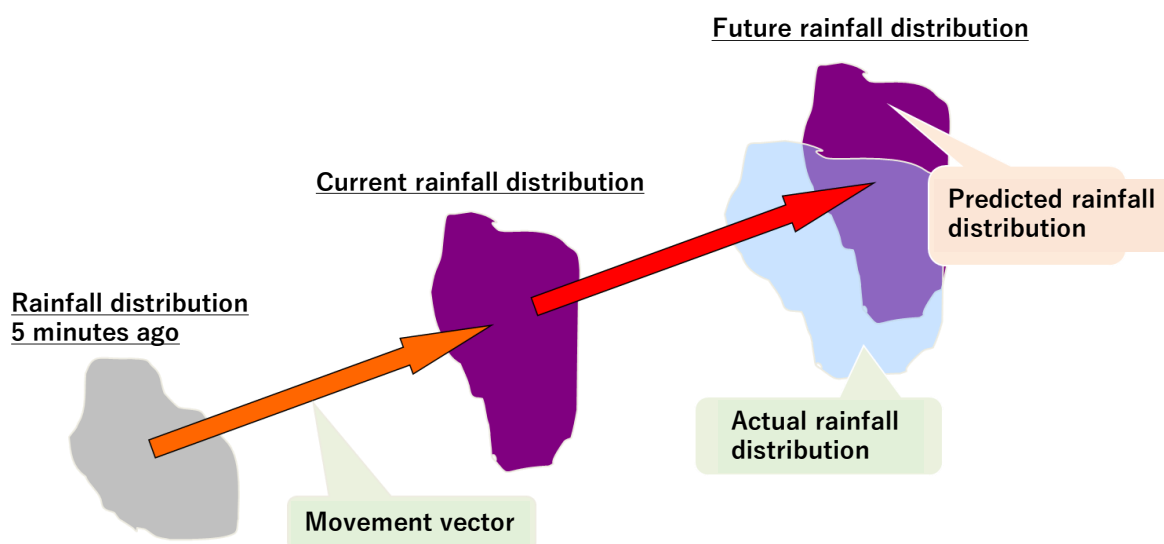
Creation of analytical rainfall distribution



Source: Meteorological Engineering Center

Figure 2.2 Creation of Analytical Rainfall Distribution

The identification of the movement vector and accordingly the prediction of the movement of rainfall area are performed based on the following concept.



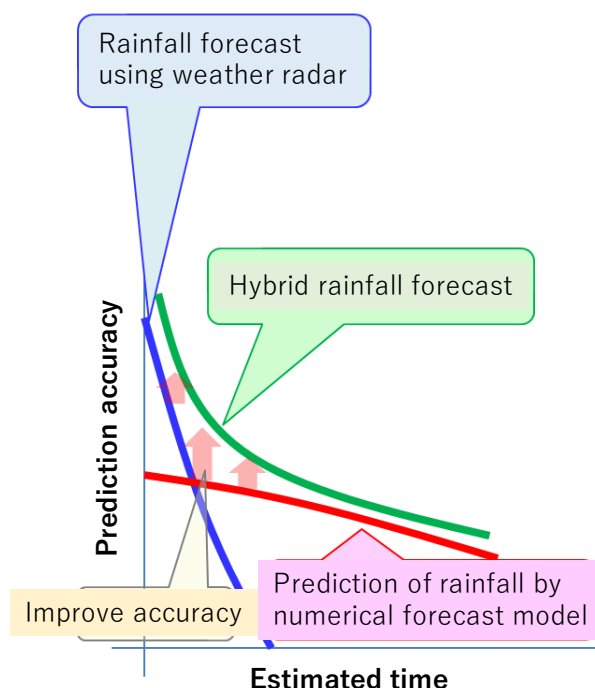
Source: Meteorological Engineering Center

Figure 2.3 Image of Prediction of Movement of Rainfall Area

【Hybrid rainfall prediction system】

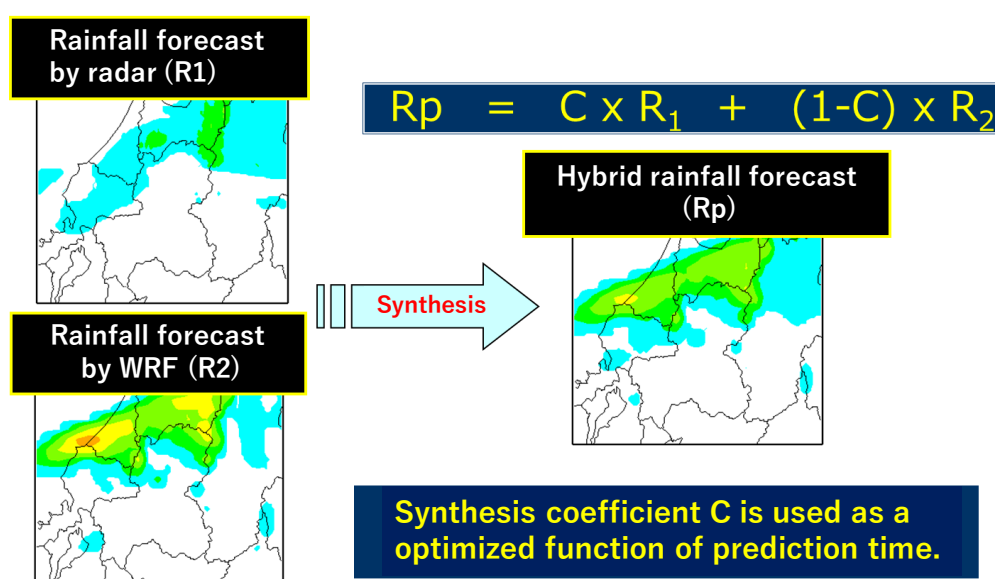
Rainfall prediction by utilizing information from weather radar has a characteristic that the accuracy is very high immediately after the start of the prediction but its accuracy decreases rapidly as time goes by. On the other hand, the accuracy of rainfall prediction by the numerical forecast model WRF does not decrease much as time elapses.

For the above features, the hybrid rainfall prediction system is a system that combines the rainfall prediction results of these two prediction methods with a synthesis coefficient optimized as a function of the prediction time, which makes it possible to output a high accurate rainfall prediction value up to six hours ahead.



Source: Meteorological Engineering Center

Figure 2.4 Functions related to Hybrid Rainfall Prediction



Source: Meteorological Engineering Center

Figure 2.5 Hybrid Rainfall Prediction System

Based on the results of the survey in FY2019, consideration of the introduction of a hybrid rainfall prediction system will be continued in FY2020 and beyond. The schedule of the survey is as follows, which has already been agreed with SRHMC.

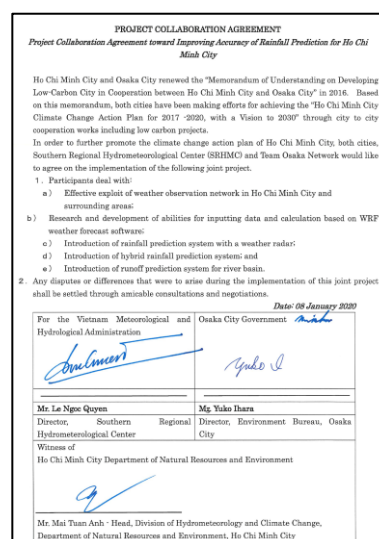
Table 2.7 Schedule on Introducing Rainfall Prediction System

item	Details	1st year	2nd year	3rd year	4th year	5th year
0. Gathering information for the introduction of rainfall forecast system	Grasp the current status and plans of meteorological radar observations and surface rainfall observations					
	Organizing issues for introducing rainfall forecast system					
1. Examination of rainfall forecast method using observation information of meteorological radar in Vietnam	Collection and organization of meteorological radar observation data					
	Collection and arrangement of ground rainfall observation data					
	Construction of rainfall forecast model using meteorological radar information					
	Rainfall forecast calculation by constructed rainfall forecast model					
	Accuracy evaluation of rainfall forecast calculation results					
2. Examination of rainfall forecast method by WRF	Arrangement of rainfall predicted data by WRF operated in Vietnam					
	Accuracy evaluation of rainfall forecast calculation results by WRF					
3. Examination of application of hybrid rainfall forecast method	Examination of application of optimal synthesis method of forecast results					
	Accuracy evaluation of forecast results by optimal synthesis					
4. Introduce the rainfall forecast system	System design					
	System construction					
5. Consideration of introduction of inundation forecast system using output of rainfall forecast system						

Source: Meteorological Engineering Center

With the aim of further strengthening cooperation with the introduction of a hybrid rainfall forecasting system, Osaka City and SRHMC have concluded “Project Collaboration Agreement toward Improving Accuracy of Rainfall Prediction for Ho Chi Minh City” on 8 January 2020.

Under this agreement, Osaka City, SRHMC and the MEC will cooperate under the City-to-City Collaboration project, aiming to introduce a hybrid rainfall prediction system to HCMC in about five years.



Source: Provided by Osaka City

Figure 2.6 Project Cooperation Agreement

2.3.5 Discussion on MICE

HCMC is Vietnam's largest economic and tourism city, with over 20 million tourists visiting the city each year. The city's tourism revenues account for 45% of the country as foreign tourists are increasing at a rate of 10% each year. Therefore, discussions were held with the HCMC Department of Tourism (DOT) aiming for the JCM Model Project formulation of tourist facilities in HCMC. DOT is currently drafting the "Meetings, Incentives, Conference and Exhibitions (MICE) Tourism Program", and collecting information to explore the possibility of forming JCM Model Projects related to this program. As a recent trend in tourism sector, "eco-friendly", "LOHAS (lifestyles of health and sustainability)", "energy saving", and "low carbon" have been used as a concept for tourist facilities to attract many tourists. Thus, utilizing JCM scheme in tourism sector was considered as one of the tools to contribute to the above concepts.

Furthermore, the MICE program is in the process of considering specific policies from 2020 to 2030 for the "2045 Vision", which is "realizing a low-carbon, sustainable city adapting to climate change". In particular, the Mekong Delta and the eight key provinces of the Southern Key Economic Region (SKER) are emphasizing on climate change and sustainable development.

DOT is interested in energy saving projects by using JCM scheme, and they will share a list of tourist facilities in HCMC to consider JCM Model Project formulation in FY2020. Exchanging information with the DOT will be continued and JCM Model Project formation surveys at tourist facilities will be conducted.

In addition, with the cooperation of DOT, a questionnaire was sent to Hotel Nikko Saigon and Rex Hotel in HCMC. And information on the existing facilities of the two hotels was collected. Based on the results of the questionnaire, JCM Model Project formation is under consideration.



Meeting with DOT



Meeting with hotel staff in HCMC

2.3.6 JCM Seminar on City-to-city Collaboration

Hosted by the Ministry of the Environment, “Seminar on City-to-City Collaboration for Zero-carbon Society” was held in Tokyo on January 16 and 17, 2020. The following two person from HCMC were invited.

Ms. Tran Hong Lan : DONRE, HCMC
Ms. Vo Thi Thanh Kieu : Department of Tourism, HCMC

The outline of this seminar is shown in the table below.

Table 2.8 Program Outline of the Seminar

	16 Jan. (Thurs.)	16 Jan. (Fri.)
AM	Private seminar – 1	Closed seminar – 2
PM	Site visit (Gas Science Museum)	Open seminar

Sources: Refer to IGES’ material, prepared by NK

At a private seminar on the morning of Jan. 17th, a panel discussion was held by invited guests from each city. Ms. Kieu, as the representative of HCMC, shared her point of view of the following aspects on the platform. 1) The benefits gained by participating in the City-to-City Collaboration projects, 2) the important points in promoting decarbonized and sustainable urban development, and 3) the role city should play in realizing a decarbonized society. Opinions were exchanged around the three points of each city in the panel discussion.



Presentation by MOEJ



Presentation by Nippon Koei.



Ms. Kieu in the panel discussion



Group photo

CHAPTER 3 JCM MODEL PROJECT FORMULATION STUDY

3.1 INTRODUCTION OF AIR-CONDITIONING EQUIPMENT

3.1.1 Overview of the Feasibility Study

In the industrial sector in HCMC, energy consumption is increasing year by year. Meanwhile, some companies are becoming aware that their daily power costs need to be improved and reduced. HCMC is a city in the tropical monsoon region, with air conditioning being used throughout the year and widely deployed in various buildings in the city. Therefore, energy saving of the air conditioning equipment is effective for reducing energy consumption and environmental load.

This year, in cooperation with Hitachi-Johnson Controls Air-Conditioning, Inc. (hereinafter called “JCH”), a JCM Model Project formation study was conducted on the introduction of high-efficiency air conditioning equipment in HCMC. JCH is a Japanese subsidiary of a joint venture which was established by Johnson Controls and Hitachi Global Life Solutions in October 2015. JCH manufactures and sells air conditioning equipment.

In the JCM Model Project formation study, information was collected, meetings were conducted mainly with JCH customers and companies in HCMC who are interested in JCM. The feasibility study was implemented according to the following study items to formulate JCM Model Project at candidate sites.

Table 3.1 Study Items for Introducing Air-conditioning System

#	Item	Overview
1	Examination of specifications of introduced equipment	The details of the existing facilities were investigated, while the introduced technologies were examined. Proposals were made to the candidate about the introduced technology.
2	Formulation of project plan and evaluation of project feasibility	For each building, as the project cost was estimated, the energy saving effect, the payback period of the investment, and the amount of CO ₂ emission reduction were examined.
3	Review and finalize the International Consortium	The international consortium and the implementation system were examined for the application for JCM model project. JCH is supposed to be the representative operator.
4	Form MRV plan	An appropriate monitoring plan was examined for the purpose of the application for JCM model project.

Source: Prepared by Nippon Keoi

3.1.2 Assumed Equipment Specifications

In this feasibility study, the introduction of JCH made multi air-conditioner (Variable Refrigeration Flow, VRF) for buildings is being considered. The main advantages of VRF are summarized below.

- Energy loss is minimized by introducing advanced technology to compressors, heat exchangers and outlets.

- Power savings by properly calculating the cooling capacity which is required by each indoor unit.
- By standardizing the operation time of each unit, the burden can be dispersed.
- Easy installation of equipment due to small size and light weight.
- Various pipe connections are possible, so even complex buildings can be installed easily.



Source: Hitachi-Johnson Controls Air Conditioning, Inc

Figure 3.1 Image of High-efficiency Air-conditioning System

3.1.3 Result of the Feasibility Study

For the aim to formulate JCM Model Project by the introduction of high-efficiency air-conditioning equipment, interviews were held with companies in HCMC. Whether air-conditioning equipment would be updated, or any plan of new installations were asked during the meeting. The interviewed companies are shown in the table below.

Table 3.2 Interview Results for Introducing VRF

#	Date	Place	Status
1	~2019. July	Tan Phu Hung International Investment Joint Stock Company	The JCM model project (third open call for participants) was applied this year and adopted.
2		Daibiru Saigon Tower	The JCM model project (third open call for participants) was applied this year and adopted.
3	2019. July. 30 th	Saigon Hi-Tech Park (SHTP)	Asked SHTP to inform the JCM system to private companies inside the Park. We will hold individual interviews with any companies that are interested. There are no specific candidates at this time.

4		QTSC (Quang Trung Software City)	There are public and private-owned buildings in QTSC. Private-owned buildings would be targeted to collect information collection for JCM Model Projects. There are no specific candidates at this time.
5	2019. July. 31 st	Hanoi Telecom Corporation	The JCM model project (third open call for participants) was applied this year and adopted.
6		Vietnam National University, Ho Chi Minh City	Plan to build a new campus in three years. It is difficult to form a JCM Model Project at this time.
7		IDEA High-tech R&D	The JCM model project (third open call for participants) was applied this year and adopted.
8	2019. Sept. 9 th	Real estate company	The building owner (Hongkong) is considering whether to invest energy saving business. In the future, JCM Model Project formation would be considered if the owner made investment decision.
9	2019. Sept. 13 th	The Japanese School in HCMC	The renovation and expansion of the school building is under planning, and the construction will start in three years. Regarding the introduction of air conditioning equipment in the new school building, information would continue to be exchanged in the future and the feasibility of applying for JCM model project would be studied.
10	2019. Oct. 22 nd	Japanese construction equipment manufacturer	The company who was participated in the JCM seminar held on September 11 th has expressed interest in JCM Model Project formation. Discussions are currently underway with the aim of applying for JCM model project in FY2020
11	2020. Jan. 8 th	Japanese metallic processing manufacturer	The outline of JCM and the introduction of JCH air-conditioner were introduced. There are no specific candidate projects at this time, but we will continue to exchange information in the future.
12	2020. Jan. 9 th	Industrial apparel manufacturer	The outline of JCM and the introduction of JCH air-conditioner were introduced. There are no specific candidate projects at this time, but we will continue to exchange information in the future.

Source: Prepared by Nippon Koei

Furthermore, with the aim of promoting the formation of JCM Model Projects in HCMC, JCM seminar was held for companies at Hotel Nikko Saigon. In the seminar, JCM was introduced, and high efficiency air-conditioning equipment was introduced by JCH. In addition to air-conditioning equipment, SHARP and MIURA also introduced solar power generation systems,

gas once-through boilers, and fuel conversion, which are key technologies in this year's JCM Model Project formation study. Approximately 100 people, mainly from companies in HCMC, participated in the seminar. They showed high interest in JCM and technologies of each company. The outline of this seminar is as follows.

Date : 11 September 2019 (Wed.), 9:30 – 12:00
 Venue : Hotel Nikko Saigon 3rd floor Origami Ballroom
 Attendees : Approximately 100 people from companies in HCMC
 Agenda : See the following table

Table 3.3 Agenda of JCM Seminar for Private Companies

Time	Activities
9:00 – 9:30	Welcome guest
9:30 – 10:15	[Overall JCM Subsidy Scheme] Introduction about JCM, Q&A
10:15 – 10:45	[Air-conditioning] Johnson Controls-Hitachi Air Conditioning VN's case study + product intro, Q&A
10:45 - 11:00	Coffee Break
11:00 – 11:30	[Solar PV] Sharp Solar Panel's case study & product intro, Q&A
11:30 - 12:00	[Utilizing Natural Gas] Sojitz Osaka Gas Energy's case study & product intro, Q&A
12:00 – 12:30	[GAS Boiler] Miura's case study & product intro, Q&A
12:30	Lunch time & Free Q&A (at 2 nd floor, please keep your lunch voucher & give to reception)

Source: Materials provided by JCH

After the seminar, information was exchanged with attending companies to apply for the JCM Model Project in FY2020 and beyond. It is very meaningful to hold such seminars locally to make private companies widely aware of the JCM subsidy system and the excellent energy-saving and renewable energy technologies of Japanese companies. Therefore, JCM seminars for companies will be held in cooperation with Japanese companies in FY2020.



JCM Seminar on Sept. 11th



Presentation by Osaka City staff

3.1.4 Confirmation of Project Plan and Estimated CO2 Emission Reduction

Among the companies interviewed this year, the following six companies were identified as candidates for JCM model projects.

- 1) Hanoi Telecom office building
- 2) Tan Phu Hung Hotel in Danang
- 3) Daibiru Saigon Tower
- 4) IDEA High Tech R&D Center
- 5) Japanese hotel
- 6) Japanese construction equipment manufacturer

The candidates from 1) to 4) above were applied for the third public application in FY2019 because preparations for the JCM Model Project application were completed at an early stage. And they were officially adopted at the end of November 2019. Details of the projects are shown in Section 3.1.7.

Regarding the candidates of 5) and 6) as above, the project plan and feasibility evaluation were examined aim to apply for the JCM model project in FY2020. Based on the information collected from each company, GHG emission reductions and cost effectiveness were estimated. The calculation results are shown in the table below.

Table 3.4 Project Evaluation at Candidate Companies

#	Candidate Company	GHG emission reduction (15 years)	Cost effectiveness
1	Japanese hotel	2,361 tCO ₂	3,837 Yen/tCO ₂
2	Japanese construction equipment manufacture	4,965 tCO ₂	2,508 Yen/tCO ₂

Source: Hitachi-Johnson Controls Air Conditioning, Inc

The existing methodology (VN_AM006) was applied for the calculation of GHG emission reduction. Both GHG reductions and cost-effectiveness satisfy the JCM application conditions, and the project is highly energy-saving.

3.1.5 Coordination for International Consortium

As one of the conditions of JCM Model Project, it is preferable that the subsidy amount be above 50 million JPY. Hence, when the subsidy percentage is 40% of equipment cost for example, the initial investment for the equipment needs to be more than 125 million JPY. There are quite few private companies that have an investment of this scale. Although a great deal of industrialization occurs in and around HCMC, energy consumption of such office buildings is not large and possible investment scale is relatively small. Accordingly, it is necessary to consider combining several candidate projects in one project to achieve the necessary scale in JCM Model Project formation.

When the application of combined JCM Model Project is prepared, the workload on the Representative Participant of JCM Model Project will be quite heavy, since coordination and document preparation are necessary. This includes international consortium agreement, material for financial status, business and fund procurement plan, document for intention of project participation, etc. for several participant companies.

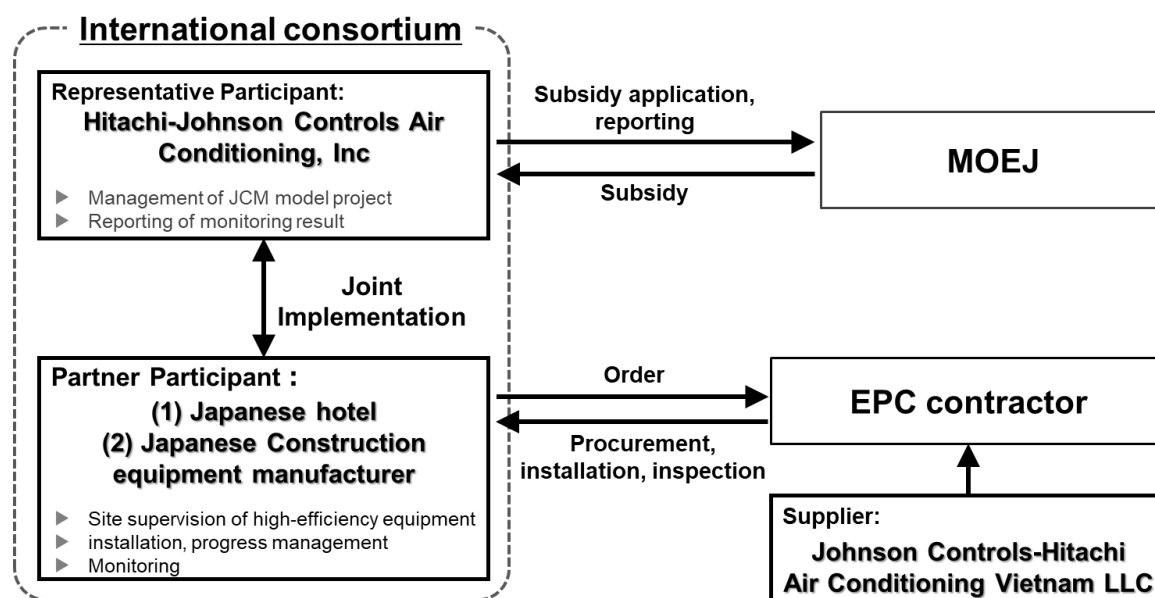
For the candidate projects identified in FY2019, the Representative Participant of the International Consortium is scheduled to be JCH (Japan subsidiary). In addition, as mentioned above, a number of local companies will be joint as the Partner Participants in order to clear the application conditions.

When preparing a proposal consisting of multiple Partner Participants, it is required in the application for JCM Model Project, such as agreements related to international consortium agreement, company information, financial statement, and documents indicating the status of decision-making on participation in the proposed project. There is a concern that the burden on the Representative Participant will be significantly increased in preparing the documents to be submitted.

On the other hand, in addition to meeting the JCM application conditions, it will also be an opportunity for the Representative Participant to spread its products widely in Vietnam.

Therefore, in consultation with JCH, it is assumed that multiple companies will be proposed as joint business operators.

The assumed implementation system is as follows.

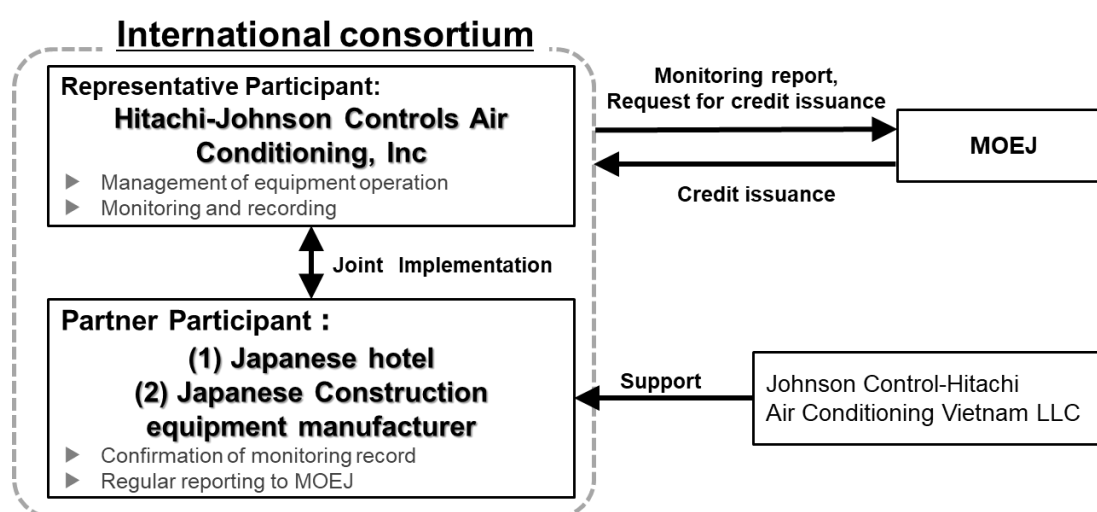


Source: Prepared by Nippon Koei based on the material provided by Hitachi-Johnson Controls Air Conditioning, Inc

Figure 3.2 International Consortium for the VRF Project

3.1.6 Monitoring Plan

Monitoring is assumed to be implemented as part of daily operation by operation manager in the facilities. Implementation structure of monitoring is proposed as shown in the figure below. Monitoring report will be submitted to MOEJ by a Representative Participant.



Source: Prepared by Nippon Koei based on the material provided by Hitachi-Johnson Controls Air Conditioning, Inc

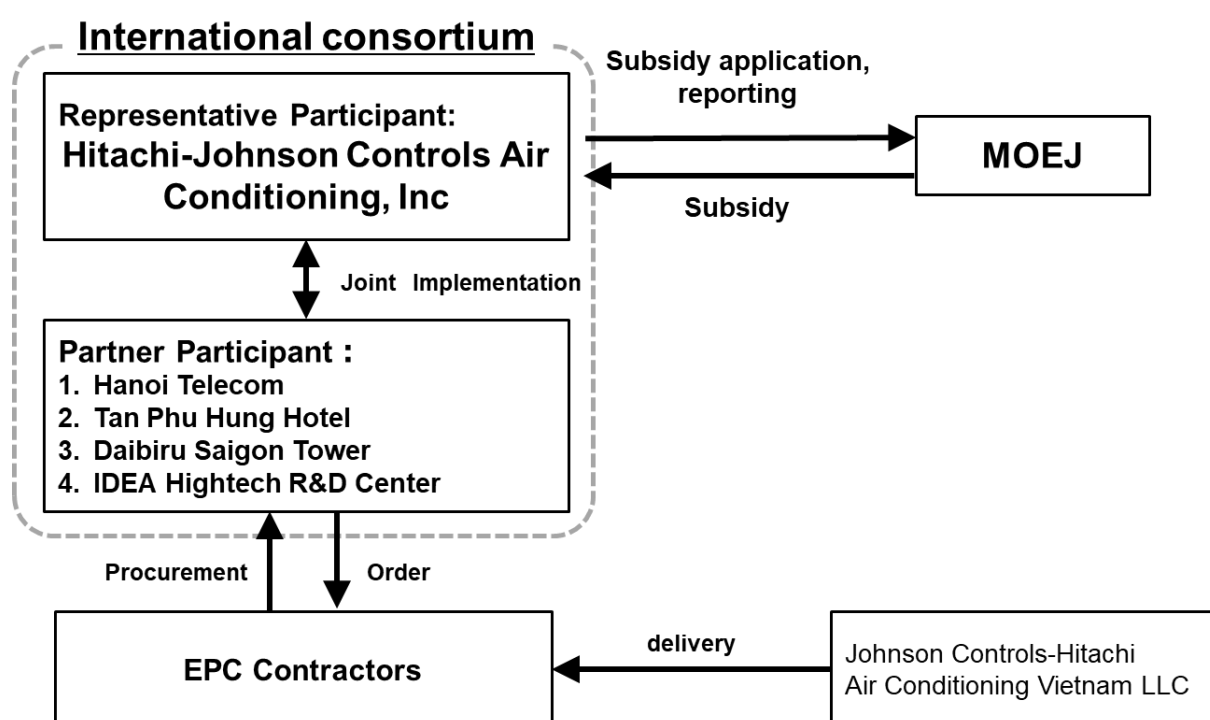
Figure 3.3 Monitoring Structure of the VRF Project

3.1.7 Outcome of the Feasibility Study for JCM Model Project Formulation

As a result of the JCM Model Project formation survey conducted in the City-to-City Collaboration, the “Introduction of high-efficiency air conditioner (VRF) and air-cooled chiller to hotels and office buildings” were applied to the JCM model project (third recruitment) this year. It was officially adopted at the end of November 2019.

This project aims to introduce high efficiency air-conditioning equipment to hotels and office buildings in HCMC, Da Nang, and Hanoi in order to save energy related to air conditioning. The project implementation period is 15 years, based on Attachment 1 "Air Conditioning Equipment" of the "Ministry Ordinance on the Service Life of Depreciable Assets (Ministry of Finance Ordinance No. 15 of 1965)".

The implementation system is shown below. The representative operator is JCH (Japanese subsidiary), and the four joint operators were combined into one business.



Source: Prepared by Nippon Koei based on the material provided by Hitachi-Johnson Controls Air Conditioning, Inc

Figure 3.4 Implementation Structure for Selected Project

Overview of the four partners is shown in the table below.



Table 3.5 Overview of the Partner Participants



#	Company name	Company profile
1	Hanoi Telecom Joint Stock Company	Leading telecommunications company in Vietnam. The company intends to actively promote environmentally friendly activities by introducing high efficiency equipment in a new office building scheduled to open in April 2021 in Hanoi.
2	Tan Phu Hung International Investment Joint Stock Company	The company was established in 2017 to invest in Tha Phu Hung Hotel Da Nang, which is scheduled to open in Da Nang in May 2020. Tha Phu Hung Hotel Da Nang is the third hotel it will build in Vietnam.
3	Daibiru Saigon Tower Co., Ltd	A local subsidiary of Daibiru Corporation. Daibiru Saigon Tower, which is managed by the company, is located in the centre of HCMC and has many tenants including law firms and accounting firms.
4	IDEA High-tech R&D Centre	IDEA Group was established in 2010 with outsourcing of CAD/CAM as a pillar of business of Japanese companies. IDEA High-tech R&D Centre is a new company established and funded by the IDEA Group with new office buildings.

Source: Prepared by Nippon Koei based on the material provided by Hitachi-Johnson Controls Air Conditioning, Inc

The facilities introduced in each target area are as follows.

Table 3.6 Overview of Installed Equipment

#	Target area	New establishment / replacement	Introduced equipment	Image
1	Hanoi Telecom (Ha Noi)	New installation	Hitachi VRF (Multi air-conditioner for buildings) 82 System	
2	Tan Phu Hung Hotel (Da Nang)	New installation	Hitachi VRF (Multi air conditioner for buildings) 13 System	

3	Daibiru Saigon Tower (Ho Chi Minh)	replacement	York air-cooled screw chiller 1 Unit	
4	IDEA High-tech R&D (Ho Chi Minh)	New installation	Hitachi VRF (Multi air-conditioner for buildings) 11 System	

Souece: Prepared by Nippon Koei baed on the material provided by Hitachi-Johnson Controls Air Conditioning, Inc

The reduction in CO₂ emissions from this project is due to a reduction in electricity consumption for air conditioning equipment. Annual GHG emission reductions are expected to total 2,661 tons.

The existing methodology (VN_AM006) was applied to the calculation of GHG emission reductions related to VRF, but the methodology for air-cooled screw chillers has not been formulated in Vietnam so far. Regarding the methodology of the air-cooled screw chiller, it is proposed to use a calculation formula using the standard term coefficient of performance (Integrated Part Load Value: IPLV) when applying for this project.

3.2 STUDY ON THE INTRODUCTION OF GAS ONCE-THROUGH BOILER

3.2.1 Survey Overview

In FY2019, in cooperation with Osaka Gas Co., Ltd. (hereinafter called “Osaka Gas”), a JCM Model Project formation study on the introduction of a high efficiency gas once-through boiler in HCMC was conducted. Besides, Osaka Gas Singapore Pte. Ltd., an Osaka Gas 100% owned subsidiary company, plans to establish a joint venture company, "Sojitz Osaka Gas Energy Company Ltd." in August 2019 with Sojitz Corporation and Sojitz Vietnam. The company operates a natural gas supply business in Vietnam.

In addition, information was collected assuming that once-through boiler from Japanese boiler maker Miura Co., Ltd. (hereinafter Miura) would be installed. In the JCM formulation survey, information was collected, and interviews were conducted mainly with customers of Osaka Gas, Miura and companies in HCMC who are interested in JCM. For selected candidate companies, the following items were surveyed.

Table 3.7 Study Items for Introducing Gas Boiler

#	Survey item	Overview description
1	Examination of specifications of introduced equipment	The details of the existing facilities were investigated, and the introduced technologies were examined. A proposal was made to the candidate about the introduced technology.
2	Formulation of business plan and evaluation of business feasibility	For each plant, the project cost was estimated, energy saving effects, investment payback years, and CO ₂ emission reductions were examined.
3	Review and finalize the international consortium system	The international consortium and the implementation system were examined for the application for JCM model project.
4	Preparation of MRV plan	An appropriate monitoring plan was examined for the application for JCM equipment subsidy project.

Source: Prepared by Nippon Koei

3.2.2 Assumed Equipment Specifications

In this study, the introduction of a high efficiency gas once-through boiler manufactured by Miura is being considered. High efficiency once-through boilers push boiler water through one direction the water tubes and convert it to steam without circulation. Because it has a small amount of water holding, it's easy to start-up. And its size is small, space-saving. Besides, the once-through boiler is a technology has been developed and introduced mainly in Japan, which has features such as low noise and low NO_x emission.

The following table shows the advantages of once-through boiler over other boilers.

Table 3.8 Advanced Performance of Once-through Boiler

Advantage	Overview
Once-through boiler with high mobility, load following, and advanced control	Different from water tube boiler, once-through boiler produces steam in a pile. By this, starting and response to load variation is fast. High-level control for stable steam production amount and temperature control is conducted.
Space saving	Only 60% of space is necessary compared with other boilers.
High efficiency in low load operation	It controls in response to load variation. High efficiency operation is possible in broad range of load.
Recovery of exhaust combustion gas by economizer	High-efficiency is enabled by an economizer that recovers remaining heat in exhaust gas and pre-heating the water pressurized by feed-in pump.
Low NO _x , low CO emissions	Emission of NO _x and CO is low, which was enabled by lowering combustion temperature and arrangement of nozzle location.

Source: Prepared by Nippon Koei



Source: MIURA

Figure 3.5 Image of High-efficiency Once-through Boiler

3.2.3 Results of the Feasibility Study

Aim to formulate JCM Model Project for high efficiency equipment introduction, interviews were held mainly with companies in HCMC. Interviews were made whether they plan to update

the existing or newly introduce air conditioning equipment. The interviewed companies are shown in the table below.

Table 3.9 Interview results for Introducing Gas Boiler

#	Date	Company	Status
1	2019. July. 29 th	Food Factory A	Currently using coal boiler and considering fuel conversion to gas. However, no candidate projects that can utilize JCM subsidies have been identified at this time.
2	2019. Aug. 1 st , Sept. 10 th , 2020. Jan. 8 th	Food Factory B	Out of seven factories in Vietnam, two plants are planning to introduce high efficiency gas once-through boilers. The application for JCM model project is scheduled for the following fiscal year. Discussions were held with related parties.
3	2020. Jan. 6 th	Beverage Factory A	It has been confirmed that there is no plan to introduce boiler at this time. On the other hand, they are interested in introducing solar power generation system and will consider internally a project that can utilize the JCM subsidy.
4		Food Factory C	They are interested in introducing boilers and solar power systems. They will consider internally a project that can utilize the JCM subsidy in the future. Bidding is required when introducing the equipment.
5	2020. Jan. 7 th	Beverage Factory B	There are three factories in Hanoi, Da Nang and HCMC. They will consider internally a project that can utilize the JCM subsidy in the future.
6		Towel Factory	A state-owned towel manufacturer with a 51% stake in the Vietnamese government. In addition to boilers, they are interested in introducing Panasonic's solar power generation system. There are also factories in Da Nang and Nha Trang.
7	2020. Jan. 8 th	Beverage Factory C	They showed high interest in JCM and confirmed willingness to participate in the JCM Model Project in the FY2020. LoI has been obtained for the application of FS.

Source: Prepared by Nippon Koei

Besides, No. 3~7 companies in the table above are medium and large-scale companies selected from the list of companies obtained from the Environmental Protection Agency through DONRE. These companies have shown high interest in the introduction of facilities utilizing JCM subsidies. The Study would continue exchanging information for the JCM Model Project formation in FY2020.

3.2.4 Project Plan and Project Evaluation

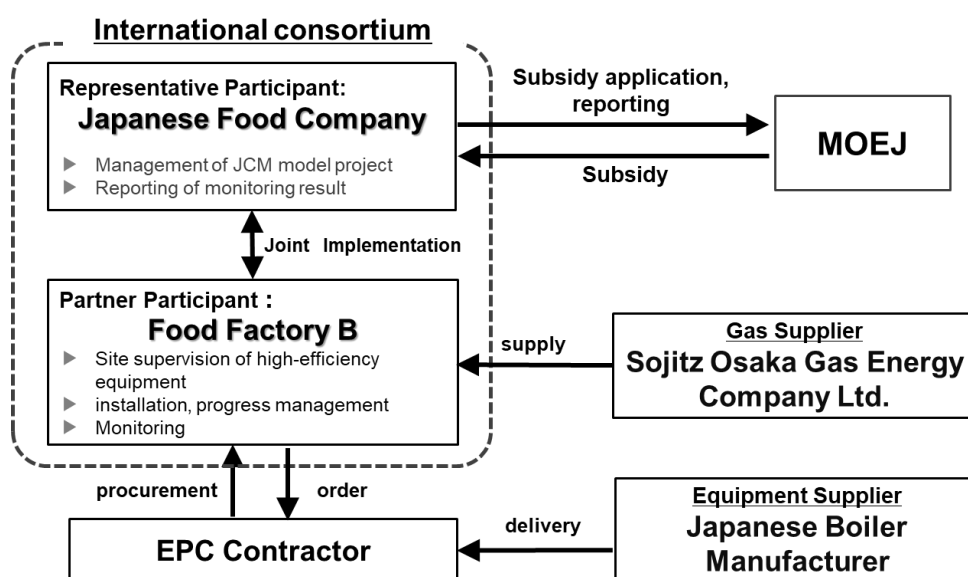
Food Factory B was identified as a candidate for JCM Model Project this year. Food Factory B is a Vietnamese subsidiary of Japanese food company. Food Factory B is considering converting fuel from coal to natural gas and installing once-through boiler in two of the seven factories in Vietnam.

Based on the basic information collected by Food Factory B, GHG emission reduction and cost effectiveness by installing once-through boilers were estimated. And it was confirmed that these estimated values meet the application condition of JCM Model Project.

3.2.5 Coordination for International Consortium

The international consortium system for JCM equipment subsidy application is assumed as follows. Food Factory B's parent company will be the Representative Participant, meanwhile manage the JCM Model Project, confirm and report the monitoring results.

Then, a Japanese boiler manufacturer would supply a high efficiency gas once-through boiler to the local EPC and install boilers in Food Factory B. Sojitz Osaka Gas Energy Company Ltd. would supply natural gas for once-through boilers.



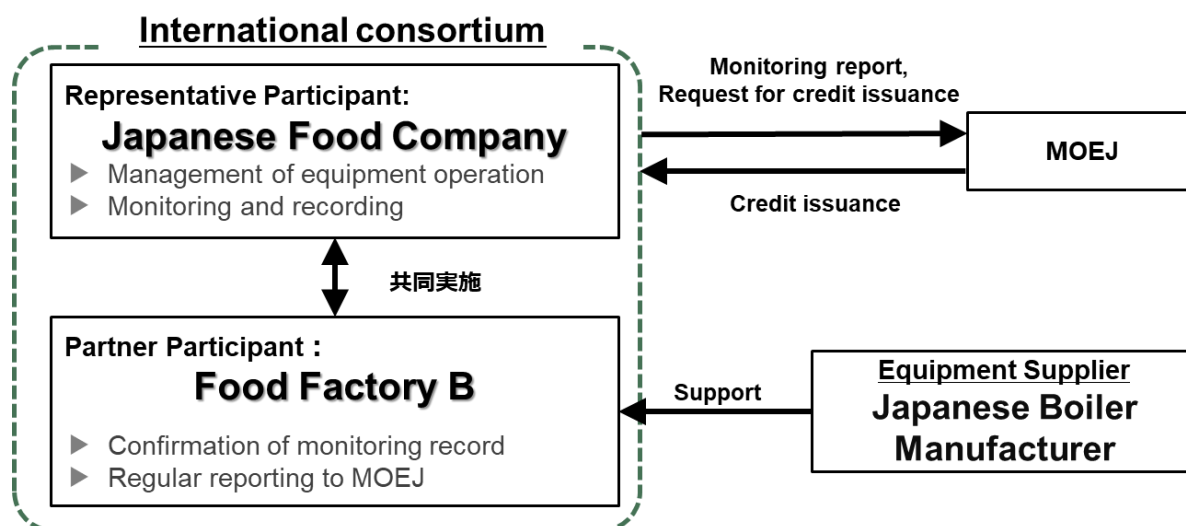
Source: Prepared by Nippon Koei

Figure 3.6 International Consortium for the Boiler Project

3.2.6 Plan for MRV

In the implementation of the JCM Model Project, monitoring is assumed to be implemented as part of daily operation by the Partner Participant. The expected MRV implementation system

is shown in the figure below. The data required for MRV will be measured and recorded mainly by the equipment manager of the Partner Participant, with the support of the Japanese subsidiary of boiler manufacturer in Vietnam. The results will be reported to the Representative Participant. The measurement data required for calculating GHG emission reduction is the fuel consumption of introduced high efficiency gas once-through boiler. And it is assumed that monitoring will be carried out under the above system.



Source: Prepared by Nippon Koei

Figure 3.7 Monitoring Structure of the Boiler Project

3.3 PREPARATORY SURVEY FOR LARGE-SCALE JCM MODEL PROJECT FORMATION

3.3.1 Overview of the Survey

With the aim of forming a large-scale JCM Model Project in and around HCMC, a preliminary study was conducted on the industrial sector such as cement factories, including literature surveys and site visits. In addition, based on the survey results of this year, the policy of JCM Model Project survey from the next year onward was examined.

Besides, the formation of large-scale JCM Model Projects requires more careful technical and financial considerations than small and medium-sized projects. Coordination work is required for the examination and selection of the equipment to be introduced, the selection of local business partners, the preparation of the budget, as well as the construction of financing scheme.

In addition, many large-scale facilities in Vietnam are state-owned enterprises or half-state enterprises with more than half of the capital owned by the government. Therefore, bidding is often inevitable for capital investment when expand a certain scale. Regarding this point, from FY2020 onward, when the Study has been embodied, support for bidding will be considered.

This year, the following items were surveyed.

Table 3.10 Survey Items for Large-scale JCM Project

#	Survey item	Overview
1	Activities to promote the understanding of the JCM system	A briefing of the JCM system was provided to the interviewing companies to promote their understanding of JCM.
2	Examination of specifications for introduced equipment	The outline of the existing equipment was surveyed and the introduced technology was discussed.
3	Formulation of business plan and evaluation of business feasibility	Estimating project costs, energy saving effects, years of investment recovery, and reductions in CO ₂ emissions were considered for each candidate project.

Source: Prepared by Nippon Koei

3.3.2 Survey Results

Interviews were held with companies in HCMC whether there is a plan for energy saving or renewable energy. The interviewed companies are shown in the table below.

Table 3.11 Interview Results for Large-scale JCM Project

#	Company	Overview	Collected Information on JCM Model Projects
1	Metal products manufacturer	A joint venture between Japanese metal products manufacturer and Australian metal products manufacturer, a company engaged in building materials (hot-dip galvanized steel sheet / painted steel sheet and sheet processing products).	They are interested in the newly introduction of solar power generation systems and the renewal of high efficiency air-conditioning systems. JCM formation study will be conducted in response to the request from the company.
2	Steel Company	A joint venture among Japanese steel company and Vietnamese steel company. A company that manufactures and sells steel bars and wires for construction.	The factory is actively saving energy. The company is considering updating lighting, compressor and water pump. JCM formation survey would be conducted in response to requests from the company.
3	Specialized trading company	This specialized trading company is a Vietnamese subsidiary and a multi-disciplinary trading company engaged in the distribution business.	They are interested in procuring Japanese-made solar power generation systems using JCM subsidies. Information was collected to select candidate projects to be considered specifically in the next year's JCM Model Project formation survey.
4	Beverage Factory C	A beverage company established by foreign capital	They are considering the introduction of energy-saving equipment or renewable energy system into the existing factories, and also replacing their existing hybrid vehicles by electric vehicles for domestic delivery.

Source: Prepared by Nippon Koei

CHAPTER 4 FUTURE PLAN

Based on the results of JCM Model Project formation survey and City-to-City Collaboration activities conducted this year, plans for FY2020 and onward are described as below.

4.1 APPLICATION FOR JCM MODEL PROJECT

As described in Chapter 3, JCM Model Project formation study on the introduction of air-conditioners and gas once-through boilers was conducted this year.

Based on the results of air-conditioning equipment surveys, application of VRF introduction in Japanese hotels and Japanese construction equipment manufacturers for JCM model project is under planning for FY2020. The international consortium and implementation system for this application have already been confirmed, and the equipment specifications to be introduced are in the final adjustment stage. Besides, the expected GHG emission reductions and Cost-effectiveness meet the conditions for the JCM model project.

On the other hand, based on the results of the study on gas once-through boilers, application for the next year's JCM model project is under planning for the introduction of high efficiency gas once-through boilers at Food Factory B. The application is for the two plants of Food Factory B, and a high energy-saving effect can be expected by switching fuel from coal to gas. Final adjustments to the International Consortium and the specifications of the equipment to be installed are currently discussed for the first application in FY2020.

In addition, since solar power generation manufacturers and Japanese trading companies have been willing to be participated in the JCM Model Project formation study in FY2020, cooperation to applying for JCM model project would start as soon as possible

4.2 PLAN FOR CITY-TO-CITY COLLABORATION PROJECT IN 2020

Osaka City and HCMC have repeated consultations and investigations by mayor-level policy dialogue and practitioner level meetings, according to the “Memorandum of Understandings on Cooperation between HCMC and Osaka City for the Realization of a Low-Carbon City”.

In order to realize the formation of low-carbon city in HCMC, the two cities have established good relations by activities as below.

- (1) develop human resources, organizations and systems for progress management;
- (2) share necessary expertise and technologies to achieve goals;
- (3) create projects for the formation of low-carbon cities;
- (4) cooperate in awareness raising and information dissemination to prevent global warming.

With this MOU's expiration date on December 31st, 2020, discussions will be held to renew the memorandum in the next year's City-to-City Collaboration project.

Utilizing the friendly relationship between the two cities and the environmental technologies of local companies in Osaka City, the Study will aim for further cooperation to realize low-carbon city/zero-carbon city in HCMC.

In addition, the survey results this year confirmed that the high potential of introduction of high efficiency air-conditioning equipment and gas once-through boilers is high in office buildings and factories inside and outside HCMC. Therefore, the study on JCM Model Project formation of the technology will be continued in FY2020.

Furthermore, considering requests of HCMC mentioned in past policy dialogue, cooperation will be promoted in FY2020 on the construction and practical application of rainfall prediction model, which is one of the adaptation measures for climate change.

As mentioned in Chapter 2, Osaka City and the Meteorological Engineering Center (MEC) have already started discussions with HCMC officials and SRHMC. Project cooperation agreement was signed between Osaka City and SRHMC in January 2020. Based on what, we are aiming to introduce hybrid rainfall prediction system in five years.

The following table summarizes the activity plan for FY2020.

Table 4.1 Activity Plan for FY2020

Policy	Sector	Overview
Study for JCM Model Project formulation	Study on introduction of high efficiency air-conditioning equipment	Introduce high efficiency air-conditioning equipment in office buildings and hotels in and outside of HCMC. Roll out JCM Model Projects related to air-conditioning project.
	Study on introduction of high efficiency gas once-through boiler	Consider introducing gas once-through boiler in five companies (such as beverage companies) which were introduced by the Environmental Protection Agency and DONRE.
	Preparatory survey for large-scale JCM Model Project formation	Aim to formulate large-scale JCM Model Project and conduct preliminary surveys such as literature surveys and site visits to industrial sector such as cement plants. Based on the results of this year's interview, we will examine specific cases related to the formation of the next JCM Model Project in the fields of renewable energy, energy saving and decarbonization technology.
City-to-city collaboration for low-carbon/zero-carbon cities	City-to-City Collaboration for climate change countermeasures	Hold a mayor-level policy dialogue in HCMC and discuss climate change measures. In addition to responding to mitigation measures such as JCM Model Project formation, we aim to respond to adaptation measures by conducting surveys on the introduction of hybrid rainfall prediction system.

Source: Prepared by Nippon Koei