

FY2023
City-to-City Collaboration Programme for
Zero-Carbon Society

Promotion of Carbon Neutrality based on Climate Change
Policies in Ho Chi Minh City and Thu Duc City

Report

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Nippon Koei Co., Ltd.
Osaka City

FY2023
City-to-City Collaboration Programme for
Zero-Carbon Society

Promotion of Carbon Neutrality based on Climate Change Policies
in Ho Chi Minh City and Thu Duc City

Report

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4. Yuasa Trading Vietnam
5. ENDO Lighting Vietnam
6. BSL/Sumitomo Mitsui Trust Panasonic Finance
7. Johnson Controls-Hitachi Air Conditioning
8. Space Shift

Abbreviations

| | |
|--------|---|
| AI | Artificial intelligence |
| BAU | Business-as-Usual |
| BESS | Battery Energy Storage System |
| BRT | Bus Rapid Transit |
| CCAP | Climate Change Action Plan |
| CFC | Chlorofluorocarbon |
| CNG | Compressed Natural Gas |
| COP | Conference of the Parties |
| C2P2 | Clean City Partnership Program |
| CTC | Carbon Tetrachloride |
| DOC | Department of Construction |
| DOFA | Department of Foreign Affairs |
| DOIT | Department of Industry and Trade |
| DONRE | Department of Natural Resources and Environment |
| DX | Digital Transformation |
| EMS | Energy Management System |
| EV | Electric Vehicle |
| FIT | Feed-in Tariff |
| G7 | Group of Seven |
| GDP | Gross Domestic Product |
| GHG | Greenhouse Gas |
| GIS | Geographic Information System |
| HCMC | Ho Chi Minh City |
| HEPZA | Ho Chi Minh City Export Processing and Industrial Zones Authority |
| HFC | Hydrofluorocarbon |
| IFC | International Finance Corporation |
| INDC | Intended Nationally Determined Contribution |
| IPCC | Intergovernmental Panel on Climate Change |
| IT | Information Technology |
| IUCN | The International Union for Conservation of Nature |
| JAXA | Japan Aerospace Exploration Agency |
| JCH | Johnson Controls-Hitachi Air Conditioning Vietnam LLC |
| JCM | Joint Crediting Mechanism |
| JETP | Just Energy Transition Partnership |
| JPRSI | Japan Platform for Redesign Sustainable Infrastructure |
| JICA | Japan International Cooperation Agency |
| LED | Light-emitting Diode |
| LEED | Leadership in Energy & Environmental Design |
| LPG | Liquefied Petroleum Gas |
| LULUCF | Land-Use, Land-Use Change and Forestry |
| MICE | Meetings, Incentives, Conference and Exhibitions |
| MOEJ | Ministry of the Environment, Japan |
| MOIT | Ministry of Industry and Trade |
| MONRE | Ministry of Natural Resources and Environment |
| MOT | Ministry of Transport |

| | |
|----------|--|
| MRT | Mass Rapid Transit |
| MRV | Measurement, Reporting and Verification |
| NDC | Nationally Determined Contribution |
| NKV | Nippon Koei Vietnam |
| OCCI | Osaka Chamber of Commerce and Industry |
| ODA | Official Development Assistance |
| O&M | Operations and Maintenance |
| PC | People's Committee |
| PDP | Power Development Plan |
| PJT | Project |
| PV | Photovoltaic |
| REF | Reference |
| SACA | Saigon Construction and Building Material Association |
| SAWACO | Saigon Water Corporation |
| SHP | Saigon Hightech Park |
| SMTFPC | Sumitomo Mitsui Trust Panasonic Finance Co., Ltd. |
| SOGEC | Sojitz Osaka Gas Energy Company Ltd. |
| SRHMC | Southern Region Hydro-Meteorological Centre |
| UAV | Unmanned Aerial Vehicle |
| USD | United States Dollar |
| VCCI-HCM | Vietnam Chamber of Commerce and Industry in Ho Chi Minh City |
| VGBC | Vietnam Green Building Council |
| VND | Vietnam Don |
| VNSC | Vietnam National Space Center |

CHAPTER 1 BACKGROUND AND OBJECTIVE

1.1 Background of the Programme

As the Sixth Assessment Report (AR6) released by the Intergovernmental Panel on Climate Change (IPCC) Working Group III in 2022 shows that cities generate approximately 70% of global greenhouse gas (GHG) emissions, it is essential to make cities accelerate climate action to meet the Paris Agreement goal of limiting the temperature increase to 1.5°C above pre-industrial levels. To achieve zero-carbon cities, the Japanese government and cities are working together to create more than 100 “decarbonization leading areas” under the Regional Decarbonization Roadmap formulated in June 2021 and promote expansion of these regions throughout Japan.

For the world to move toward zero-carbon society, it is necessary to accelerate the movement toward making a sustainable zero-carbon society, especially in Asia, where economic growth is remarkable. Support for cities’ efforts is being strengthened internationally to zero-carbon cities, which are the places of activities that support social and economic development.

As an example, the Ministry of the Environment, Japan (MOEJ) launched the Clean City Partnership Program (C2P2) with JICA in February 2023 to address the challenges facing global cities from multiple perspectives, and this project is the main activities of C2P2. The C2P2 will provide comprehensive and synergistic support to partner cities to address urban challenges, including climate change, environmental pollution, circular economy, and nature positive issues through further mobilization of technology and funds in collaboration with Japanese local governments, private companies, and financial institutions. It will also promote collaboration with other key stakeholders, including G7 and other countries and international development banks.

In this City-to-City Collaboration Programme, Japanese research institutes, private companies, universities, etc., together with Japanese cities that have experience and know-how in the formation of decarbonized societies, conduct research projects to support overseas partner cities in forming decarbonized societies and introducing facilities that will contribute to forming decarbonized societies.

The City-to-City Collaboration Programme between Osaka City and Ho Chi Minh City has completed Phase 1 (2019-2021), and this fiscal year is positioned as the second year of Phase 2 for next three years. This year, the project aims to promote carbon neutrality in the areas of energy-saving, renewable energy, waste management, and CFC recovery and destruction, which were identified through discussions and research activities up to last year, and which are highly needed in Ho Chi Minh City and Thu Duc City. In addition, as part of the study of the potential use of digital technology for further decarbonization, the DX sector will be examined. The project also covers Thu Duc City, which was newly established within Ho Chi Minh City in January 2021.

1.2 Participating Cities in the Project

1.2.1 Osaka City Government

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 is the famous commercial city based on manufacturing industry and heavy industry with the largest Gross Domestic Product (GDP) among ordinance-designated cities in Japan. In addition, Osaka City has a wide range of networks with foreign cities and has been implementing and promoting various activities with sister cities, friendship cities and business partner cities including HCMC in Viet Nam. Overview of statistics for Osaka City is as follows.

Table 1.1 Overview of Osaka City

| # | Item | Overview |
|---|--|--|
| 1 | Area | 225.33 km ² (as of April 1, 2023) |
| 2 | Population | 2,768,139 (as of August 1, 2023) |
| 3 | Population density | 12,285 people/km ² (as of August 1, 2023) |
| 4 | Number of households | 1,527,741 (as of August 1, 2023) |
| 5 | Number of industrial enterprises | 4,879 (As of June 2020: Industrial census in 2020) * Number of enterprises with more than 4 workers |
| 6 | Value of shipments of manufactured goods | JPY 3,747 billion (As of June 2020: Industrial census in 2020) |
| 7 | Main industries | Metal materials manufacturing: 997 enterprises (20.4% of total) Printing: 620 enterprises (12.7% of total) Production-use machinery and Business-use machinery: 485 (9.9%) (As of June 2020: Industrial census in 2020) |

Source: Prepared by Nippon Koei based on Osaka City's website

1.2.2 Ho Chi Minh City (HCMC)

HCMC located in the southern part of the country is the biggest commercial city in Viet Nam with population of approximately 9.4 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. HCMC has tropical climate with rain season (May to November) and dry season (December to April), 1,800-1,900 annual rainfall and 28 degree Celsius of average temperature. Geographic character of HCMC is 20 m of above sea level and location near rivers and coasts, land-use change by industrialization and effects of recent climate change lead to flooding in rain season, which has been recognized as one of the urban issues. Furthermore, because of industrialization and population growth have influenced drastic increase of energy consumption, which naturally raise Green House Gas (GHG) emissions. In the contexts, needs of urban decarbonization is gradually increasing by installation of energy-saving and renewable energy technologies which this project promotes.

The basic statistic data of HCMC including Thu Duc City is as follows.

Table 1.2 Overview of HCMC (including Thu Duc City)

| # | Item | Overview |
|---|----------------------|--|
| 1 | Area | 2,095.4 km2 (as of 2022) |
| 2 | Population | 9,389,720 (as of 2022, approximately 9.4% of national total and the largest in the country.) |
| 3 | Population density | 4,481 people/km2 (As of 2022) |
| 4 | Number of households | 2,558,914 (as of 2021) |
| 5 | GDP per person | USD 5,028 (As of 2022) |

Source: Prepared by Nippon Koei from the General Statistics Office of Viet Nam



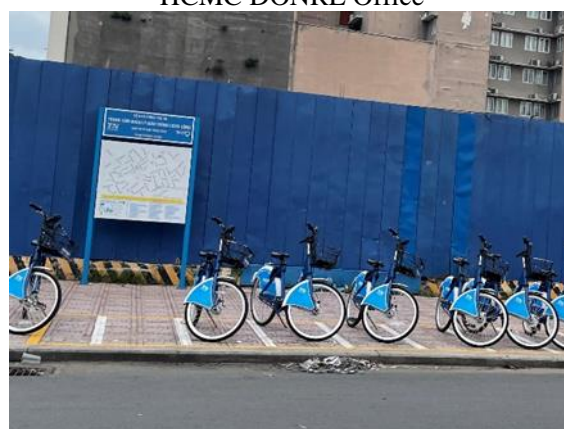
HCMC People's Committee Hall



HCMC DONRE Office



Traffic in HCMC



Rental Cycle in HCMC



Garbage Truck in HCMC



Rubbish Bin (non-separate) in HCMC



View of Thu Duc City

Source: Taken by Nippon Koei



Rubbish Bin (separate) in Thu Duc City

Figure 1-1 Current cityscape of HCMC and Thu Duc City

1.2.3 Thu Duc City

On 1 January 2021, Thu Duc City was newly established under the administration of HCMC with the merger of three districts, District 2, 9 and Thu Duc District, pursuant to Resolution No. 1111/NQ-UBTVQH14. The concept of “city within a city” is a first model in Viet Nam, and Thu Duc City is expected to become a central city of major economic development in HCMC and southern Viet Nam. The city emblem is designed with two letters, "T" and "D," which are the initials of Thu Duc City (Figure 1-2). The bird's feathers on the "T"



Source: Thu Duc City Official site

Figure 1-2 City Emblem of Thu Duc City

represent land features such as the Saigon River, the six lines on the "D" represent the Communist Party and the government, and the squares in the upper left corner represents buildings, high-tech parks, etc. Thu Duc City functions as an advanced area for science and technology, and there is the Saigon Hi-Tech Park (SHP) in Thu Duc City. In addition, eight innovation centers, including the SHP are planned to be established in Thu Duc City.

The gross regional product (GRP) of Thu Duc City is expected to contribute to 7% of national GDP, equivalent to 30% of Ho Chi Minh City's GRP. In order to expand Thu Duc City's function as a core city, the HCMC People's Committee has decided to implement measures to expand the authority of Thu Duc City from December 23, 2022, to the end of 2024. According to Resolution No. 1538/QĐ-TTg, the population is currently about 1.01 million and is expected to reach 1.5 million by 2030, 2.2 million by 2040, and 3 million after 2040.

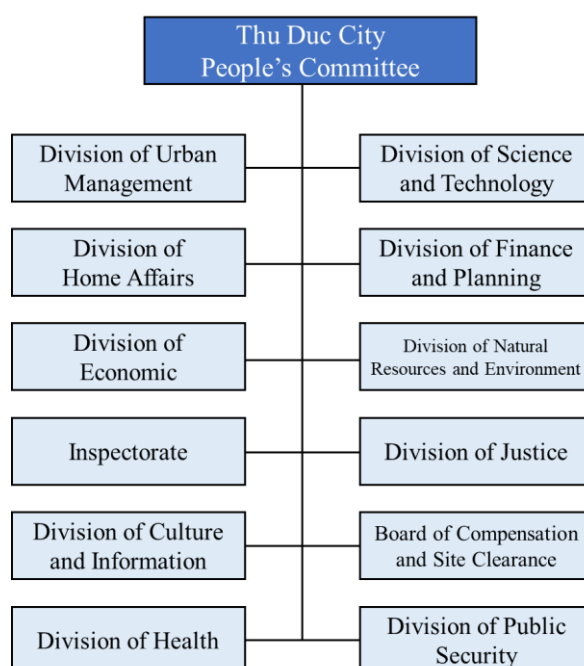
The basic statistic data of Thu Duc City is as follows.

Table 1-3 Overview of statistics for Thu Duc City

| # | Item | Overview |
|---|--------------------|--|
| 1 | Area | 211.56 km ² |
| 2 | Population | 1,013,795 (as of 2020, approximately 10% of HCMC's population) |
| 3 | Population density | 4,792 people/km ² (as of 2020) |
| 4 | GDP per person | 4,931 USD (national average: 3,717 USD) (as of 2021) |

Source: Prepared by Nippon Koei from the Decision No. 1111/NQ-UBTVQH14

As shown in Figure 1-3, the organization of Thu Duc City has 12 departments including the Department of Natural Resources and Environment (DONRE) under the Thu Duc City People's Committee.



Source: Prepared by Nippon Koei based on Thu Duc City Official Site

Figure 1-3 Organization Structure of Thu Duc City People's Committee

The Master Plan for Thu Duc City to 2040, approved in September 2021, is expected to encompass a wide range of initiatives, including the development of transportation systems, environmental protection measures, and social services, as well as the creation of new economic zones and residential areas. Although the Master Plan stipulates that the project's implementation duration should not exceed 12 months, implementation has been delayed due to the effect of COVID-19.

1.3 Objective of the Project

Based on the MOU between the two cities, the purpose of this project is to 1) support the implementation of the "HCMC's Climate Change Action Plan (CCAP)" through policy dialogue, strengthen institutional building and support initiatives toward decarbonization, and contribute to the decarbonization domino through information dissemination and mutual sharing to neighboring cities and third countries.

In addition, by leveraging the previous experiences of the JCM Model projects and JCM Eco Leasing Projects formulation, this project 2) promotes horizontal development of "high-efficient air conditioners, boilers, and LED lighting" for energy-saving and "solar power generation projects" for renewable energy. Furthermore, as new fields, it forms new projects in "waste management," "CFC recovery and destruction," and "Digital transformation (DX)".

1.4 Implementation Procedure and Structure

1.4.1 Institutional Support

In this project between HCMC People's Committee and Osaka City, Department of Natural Resources and Environment (DONRE) of HCMC and Environmental Bureau of Osaka City are departments in charge and develop the collaboration structure for solution of urban issues and formulation of zero-carbon society.

This year, through the policy dialogue between the two cities and technical workshop, policies and initiatives related to the environment and decarbonization are shared with relevant organizations and private companies. Moreover, this project supports identification of new JCM model projects based on HCMC's CCAP.

At this time, Thu Duc City is involved in the project in conjunction with HCMC. However, we envision assisting Thu Duc City in the environmental and decarbonization sectors as the city develops its own systems and plans.

1.4.2 Promotion of Renewable Energy and Energy-saving Equipment

In HCMC and Thu Duc City, several JCM projects for energy-saving facilities (high-efficiency chillers, high-efficiency gas boilers, and LEDs with dimming) were formulated by partner companies through past City-to-City collaboration activities. This year, the Project contacts industrial parks in Viet Nam to introduce the JCM scheme to companies interested in decarbonization technologies and to identify new projects.

1.4.3 Study for Waste Management

HCMC and Thu Duc City currently landfill approximately 10,000 tons/day of waste. The consumption of fossil fuels due to inefficient waste collection and methane emissions from landfills are issues that need to be improved to promote urban decarbonization. The GHG emissions from the waste sector in 2018 was 3,355,246 tons of CO₂ equivalent per year, accounting 5.8% of cities' total GHG emissions.

Since HCMC has requested reference information on mechanisms such as waste collection fees as a source of funding for proper waste disposal, these topics will be examined in this year.

1.4.4 Study for Fluorocarbon Recovery and Destruction

The study in CFC recovery and destruction is a new area added in Phase 2. In HCMC and Thu Duc City, proper disposal of air conditioning equipment, destruction or reuse, in the renewal of facilities such as office buildings, commercial facilities, and hotels, will contribute to the reduction of CFC gas derived from the equipment, which has a higher greenhouse effect than CO₂. Based on the Fluorocarbon recovery needs identified in last year's survey, this year business models for Fluorocarbon recovery and destruction utilizing the "F-Gas Recovery and Destruction Model Projects" was examined. In addition, as Viet Nam government has been developing a law requiring the Fluorocarbon recovery and destruction from January 2024, interviews with air conditioner manufacturers and related parties was conducted to investigate the domestic trend in Viet Nam.

1.4.5 Study for DX

The overseas deployment of advanced digital technology implementation is being promoted in Japan's "Digital Garden City Nation". This year, after confirming HCMC's interest in DX implementation, the feasibility of introducing DX technology, such as improving efficiency in the logistics sector and calculating GHG absorption in the forestry sector was examined.

1.4.6 Implementation Structure

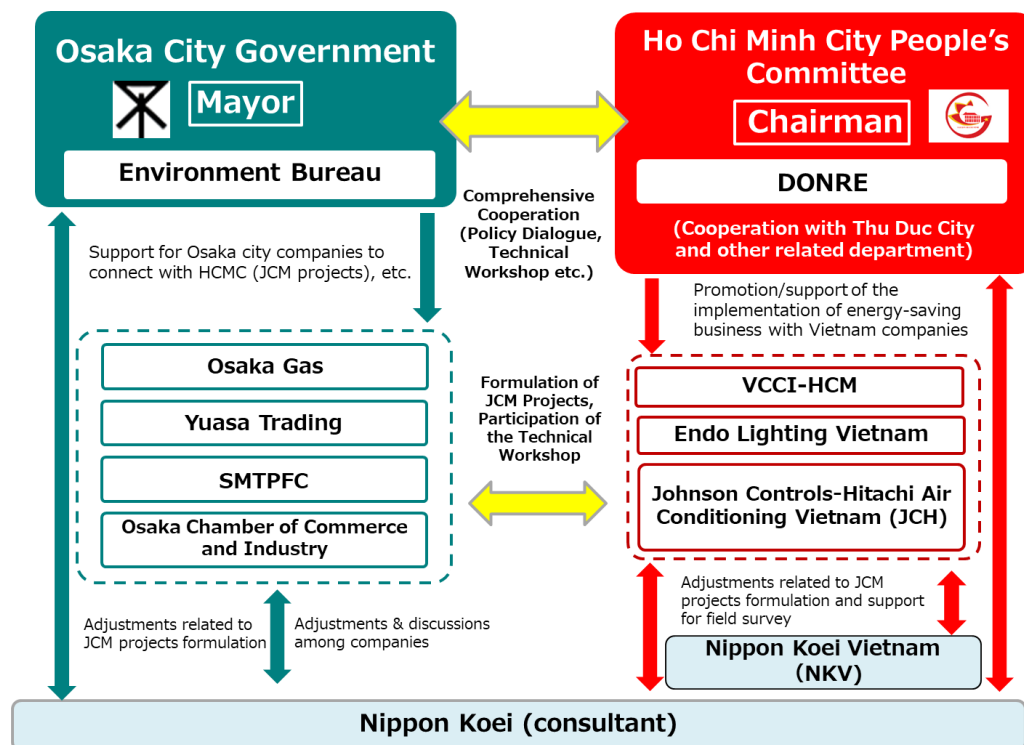
Under the collaboration between HCMC DONRE and Environment Bureau of Osaka City, the implementation structure was formulated to discuss city issues and share information. Thu Duc City was also able to participate in various consultations and activities in this year.

Studies for development of JCM projects were implemented by cooperating with companies with experiences of businesses in Viet Nam, Osaka Gas Co., Ltd., which is gas supplier of fuel switching projects, Yuasa Trading Co., Ltd., which is trading company with experience in JCM model projects in Viet Nam, ENDO Lighting Viet Nam, which is manufacturer of highly efficient LED lighting, Sumitomo Mitsui Trust Panasonic Finance Co., Ltd. (SMTMPC), which

has experience in the JCM Eco Lease Scheme, and the Osaka Chamber of Commerce and Industry (OCCI), which supports the overseas expansion of companies in Osaka and Kansa area. In addition, Johnson Controls-Hitachi Air Conditioning Vietnam LLC (JCH), which is an air conditioning manufacturer, and the Vietnam Chamber of Commerce and Industry (VCCI) HCM, which unites approximately 3,000 private companies in HCMC and surrounding areas, were newly joined this year.

Nippon Koei Co. Ltd. (hereafter “Nippon Koei”) has supported these City-to-City Collaboration activities and carried out studies for introducing zero carbon technology and advanced environmental technologies. Nippon Koei Viet Nam (hereinafter “NKV”, local subsidiary of Nippon Koei) supported the data collection and survey of candidate facilities and companies for project formulation.

The implementation structure of this project is as follows.



Source: Prepared by Nippon Koei

Figure 1-4 Implementation Structure

1.5 Project Schedule

The project period is from 21 June 2023 to 8 March 2024. The schedule is shown below.

| # | Activities | FY2023 | | | | | | FY2024 | | | |
|---------------------------------------|--|------------------------------|--------------------------------|-----------------------|-----------------------|------------------------|----------------------|---------------------------------------|-----------------------|-------------------------|-----|
| | | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Mar |
| 1. City-to-City Collaboration Project | | | | | | | | | | | |
| 1) | Conduct on-site/online meetings and policy dialogue | | ▽ Kick-off | | | ▼ Policy Dialogue | | Final report, discussion | | on next year's activity | |
| 2) | Planning and implementation of workshops | | | ▼ JCM Seminar | | ▼ Workshop | | ▼ JCM Seminar | | | |
| 3) | Information collection and knowledge sharing on carbon neutral policies | | | | | | | | | | |
| 4) | Support for expansion of JCM model projects | | | | | | | | | | |
| 5) | Information collection on local environmental regulations, including Fluorocarbon recovery | | | | | | | | | | |
| 6) | Information collection on digital needs, including DX | | | | | | | | | | |
| 7) | Collaboration with other organizations | | | | | ▼ Meeting with JICA | | | | | |
| 2. Formulation of JCM Model Project | | | | | | | | | | | |
| 1) | Discussions with/support for candidates of JCM applications | FY2023 JCM call for Proposal | | | | | | | | | |
| 2) | Discussions with companies regarding project formation, site surveys | | ▼ Submitted JCM projects | | | | | | | | |
| 3) | Surveys by local staff | | ▽ | → 1st Field Survey | → 2nd Field Survey | | | | → 3rd Field Survey | | |
| 4) | Preparation for formation of JCM projects for next year | | | | | | | | | | |
| 3. Event | | | | | | | | | | | |
| 1) | Workshops | | | ▼ JCM Seminar | | ▼ Workshop | | ▼ JCM Seminar | | | |
| 2) | Presentations at related meetings, coordination, etc. | | ▽ Presented at JPSI Seminar | | | | | Seminar on City-to-City Collaboration | | ▼ | |
| 4. Reporting | | | | | | | | | | | |
| 1) | Monthly report to MOEJ | | | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ |
| 2) | Progress meeting with MOEJ | | ▽ Kick-off | | | | ▽ Progress report | | | ▽ Final report | |
| 3) | Domestic meetings with Osaka City/companies | | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | ▼ | |
| 4) | Final report | | | | | | | | Submission | | |

Source: Prepared by Nippon Koei

Figure 1-5 Project Schedule

CHAPTER 2 ACTIONS TO CLIMATE CHANGE BY OSAKA CITY AND HO CHI MINH CITY

2.1 Actions to Climate Change by Osaka City

The Osaka City has taken the following actions as its main policies for decarbonization.

2.1.1 Osaka City Action Plan of Global Warming Countermeasures (Area Measures)

Former Mayor of Osaka City, Mr. Yoshimura announced to aim at realizing 2050 Zero-Carbon City in Osaka City Council of 27 November 2020 and reported it to the Ministry of the Environment, Japan (MOEJ) on 9 December 2020. Also, implementation of measures to achieve goal of FY2030 and an approaches and measures to realize “Zero-Carbon Osaka”, that is, zero-carbon society leading to the maturity of Osaka City are clearly stated in “Osaka City Action Plan of Global Warming Countermeasures (Area Measures)” which was prepared in March 2021. The Action Plan was revised in October 2022, in accordance with the acceleration of efforts to achieve carbon neutrality in Japan and the world.

“Osaka City Action Plan of Global Warming Countermeasures (Area Measures)” showed the target of the plan and vision for 2050 as follows.

Target of the Action Plan

To reduce 50 % of GHG emission reduction by FY2030, compared with FY2013 to achieve net zero emission of GHG in 2050. (target raised from 30% to 50%)

Vision for 2050

“Zero-Carbon Osaka -Realization of zero-carbon society leading to maturity of Osaka-”

“Zero Carbon Osaka” is defined as the situation that five kinds of cities below have been formulated. Also, approach to each City is illustrated in the Action Plan.

- City with decarbonized energy
- City disseminated decarbonized actions with full of zero-carbon mind
- Sustainable City integrated decarbonized method
- City leading decarbonization by utilizing various connections
- City well-prepared for climate change

2.1.2 Osaka City’s Environmental Education

The City of Osaka has prepared a supplemental reader of "Osaka Environment Studies" for elementary and junior high schools to enhance environmental education to promote a

sustainable society in areas such as global warming, biodiversity, waste reduction, and urban environment conservation. They distribute the books to public elementary and junior high schools, including prefectural junior high schools (combined junior and senior high schools). (Source: Osaka City HP¹)

Through this initiative, Osaka City aims to foster knowledge of children to understand the relationship between human life and the environment, including nature, through research activities, experience, and practice and lives while cherishing the environment. Environmental issues are categorized into five areas: "biodiversity," "circulation," "global warming," "energy," and "urban environment conservation". In addition, the content has been devised to match the development stages of the students based on the opinions of teachers who use this material.

Ho Chi Minh City DONRE recognizes that efforts at the household level and education are essential in solving environmental issues. Therefore, Osaka City introduced this environmental education with DONRE during the Policy Dialogue in this year.

2.1.3 Specific Activities Toward Carbon Neutrality in Osaka City

Osaka City is implementing various measures to achieve carbon neutrality by 2050 as set forth in the "Osaka City Action Plan on Global Warming. The following measures were introduced at this year's Policy Dialogue.

1) Introduction of Rooftop Solar Power Generation

Based on the Feed-in Tariff (FIT) program, Osaka City has leased the roofs of city-owned elementary and junior high schools and gymnasiums to private companies since 2017, and installed solar panels on 181 schools over a three-year period until 2020. This has helped to expand renewable energy and make effective use of assets, as well as provide environmental education for children.

2) Waste to Energy

All six waste incineration plants in Osaka City generate electricity, with an annual output of approximately 470 million kWh/year. Three of these plants supply steam to neighbouring facilities.

3) Environment Friendly Building

In order to promote energy-saving at the building stage, Osaka City has established its own environmentally conscious system for buildings, and requires buildings above a certain size to comply with the ordinance on "conformity of heat insulation performance, etc. in buildings other than residences" and "conformity with energy-saving standards for residences," which are not covered by the Building Energy Efficiency Act.

¹ <https://www.city.osaka.lg.jp/kankyo/page/0000307615.html>

2.2 Actions to Climate Change by the Central Government of Viet Nam and HCMC and Thu Duc City

2.2.1 Actions to Climate Change by the Central Government of Viet Nam

The Vietnamese Government has taken the following actions as its main policies for decarbonization.

(1) Nationally Determined Contribution (NDC)

Vietnamese Government firstly submitted Nationally Determined Contribution (NDC) in November 2016 and then revised it in September 2020 and November 2022. To achieve the long-term targets of Viet Nam's National Climate Change Strategy to 2050, the latest version of the NDC (2022) significantly increases the GHG reduction targets from the previous update (2020). The GHG reduction targets in the latest NDC (2022) have been updated from 9% to 15.8% unconditional and from 27% to 43.5% conditional by 2030 compared with Business-as-Usual (BaU) scenario. The target GHG reduction reductions by 2030 for each sector are shown in the table below.

Table 2-1 Reduction targets by sector in revised NDC (2022)

| Sector | GHG emission reduction Unconditional Contribution | | GHG emission reduction with international support | | GHG emission reduction Conditional Contribution | |
|--------------|---|--|---|--|---|--|
| | Compared to BAU scenario (%) | Reduction amount (Mil. tonnes of CO ₂ eq) | Compared to BAU scenario (%) | Reduction amount (Mil. tonnes of CO ₂ eq) | Compared to BAU scenario (%) | Reduction amount (Mil. tonnes of CO ₂ eq) |
| Energy | 7.0 | 64.8 | 17.5 | 162.2 | 24.4 | 227.0 |
| Agriculture | 1.3 | 12.4 | 4.1 | 38.5 | 5.5 | 50.9 |
| LULUCF* | 3.5 | 32.5 | 1.5 | 14.1 | 5.0 | 46.6 |
| Waste | 1.0 | 8.7 | 2.2 | 20.7 | 3.2 | 29.4 |
| IP | 3.0 | 27.9 | 2.4 | 21.9 | 5.4 | 49.8 |
| Total | 15.8 | 146.3 | 27.7 | 257.4 | 43.5 | 403.7 |

*LULUCF: Land Use, Land Use Change and Forestry

Source: Updated Nationally Determined Contribution (NDC), The Socialist public of Viet Nam

Based on the targets of NDC, Vietnamese Government has been implementing various policies. Under the national policies, each municipality is carrying out individual policies. The main national policies are shown below.

Table 2-2 National policies for climate change and energy use in Viet Nam

| Name of regulation (Date of enforcement) | Objectives |
|---|---|
| ★National Electricity Development Plan VIII for the period of 2021-2030, with a | <p>Overall objectives</p> <ul style="list-style-type: none"> - Supplying enough electricity demand in the country, meeting socio-economic development goals with an average GDP growth of about 7%/year in the period 2021-2030. |

| Name of regulation (Date of enforcement) | Objectives |
|---|--|
| vision to 2050 (PDP8) (Decision 500/QĐ-TTg) 15 May 2023 | <u>Specific objectives</u> <ul style="list-style-type: none"> - Total capacity of power plants serving domestic demand is 150,489 MW by 2030 and 490,529-573,129 MW by 2050. - Raise the ratio of renewable energy in the power source composition in 2050 to more than 60%. |
| ★National Climate Change Strategy to 2050 (Decision 896/QĐ-TTg of the Prime Minister) 07 March, 2022 | <u>Overall objectives</u> <ul style="list-style-type: none"> - Reduce GHG emissions by 43.5% by 2030 compared to BAU, peaking in 2035 and achieving net zero emissions by 2050. <u>Specific objectives</u> <ul style="list-style-type: none"> - Adaptation to climate change: To reduce vulnerability and risks to the impacts of climate change through improved resilience and the adaptability of natural, economic and social systems, minimizing losses harm caused by natural disasters and climate extremes increased due to climate change. - Reduce greenhouse gas emissions: To meet emissions targets net zero by 2050, actively contributing responsibly to the national community protecting the Earth's climate system; improve the quality of growth and competitiveness picture of the economy |
| ★Nationally Determined Contribution (NDC) Updated November 2022 | <u>Specific objectives</u> <ul style="list-style-type: none"> - Reduce GHG emissions by 15.8% unconditional and 43.5% conditional GHG reductions relative to BAU by 2030. |
| ★National Strategies on Green Growth 2011-2030 with a vision by 2050 (Decision 1658/QĐ-TTg) 1 October, 2021 | <u>Overall objectives</u> Accomplish green growth, thereby promoting the economic restructuring associated with innovation of growth model, in order to achieve economic prosperity, environmental sustainability and social equality; strive towards green and carbon-neutral economy and contribute to achievement of the goal to reduce global warming. |
| National Program on Economical and Efficient Use of Energy for the period 2019 – 2030 (Decision 280/QĐ-TTg of the Prime Minister) 13 March, 2019 | <u>Overall objectives</u> "National program on economical and efficient use of energy in the period of 2019 - 2030" is the implementation step to concretize the energy development strategy, an important element in the National Sustainable Development Strategy, with the aim to turn Viet Nam into a country using energy saving and efficiency. <u>Specific objectives</u> <ul style="list-style-type: none"> - To mobilize all the national and international resources for stimulating economical and efficient use of energy through the synchronous implementation of assignments and solutions of State management, technical assistance, science and technology research and product development, market transition, human resource training and development, and also utilization of support from the international community in the field of economical and efficient use of energy. - To formulate the habit of using energy economically and effectively in all social activities; to reduce intensive use of energy in a variety of economic sectors and industries; energy efficiency becomes a regular activity in key energy users and key economic sectors that consume a lot of energy, with an aim at green growth and sustainable development. |
| Action Plan for Implementation of Paris Agreement on Climate Change | <u>Overall objectives</u> To identify and implement appropriate activities and solutions until 2020 and 2030 to gradually carry out all the provisions in the Paris Agreement applicable to Viet Nam. <u>Specific objectives</u> |

| Name of regulation (Date of enforcement) | Objectives |
|---|---|
| (Decision 2053/QĐ-TTg of the Prime Minister) 28 October, 2016 | <ul style="list-style-type: none"> - To fulfil commitments in the Intended Nationally Determined Contribution (INDC) to mitigate GHG emissions. - To fulfil commitments in the Intended Nationally Determined Contribution to adapt to climate change. - To prepare human, technical and financial resources to fulfil commitments in the Intended Nationally Determined Contribution and contribute to the transition to a low-carbon, highly resilient economy. - To establish and operate the transparency system (MRV system) to monitor and assess the implementation of adaptation, mitigation, and resource preparation. - To revise institutions and policies to establish a favorable environment and focus national efforts to respond to climate change |
| National Target Program to Respond to Climate Change period 2012-2015 (Decision 1183/QĐ-TTg of the Prime Minister) 30 August, 2012 | <u>Specific objectives</u> <ul style="list-style-type: none"> - To gradually realize the National Strategy on climate change. - To increase awareness and capacity to adapt to climate change. - To orient to reduce greenhouse gas emissions. - To develop low-carbon economy. - To actively cooperate with international communities to protect the global climate system. |

Source: Prepared by Nippon Koei based on each policy.

★ is detailed in 2.2.1.

(2) National Climate Change Strategy toward 2050

In March 2022, the Vietnamese government formulated the “National Climate Change Strategy for 2050”. The strategy set targets that a 43.5% reduction in GHG emissions relative to BAU by 2030, peaking in 2035, and achieving net zero by 2050. The GHG reduction targets for each sector are shown in Table 2-3.

Table 2-3 Targets by 2023 and 2050 in National Climate Change Strategy toward 2050

| Sector | Target by 2030 | | Target by 2050 | |
|--------------|--|---|--|---|
| | Reduction ratio compared to BAU scenario (%) | Emissions (Mil. tonnes of CO ₂ eq) | Reduction ratio compared to BAU scenario (%) | Emissions (Mil. tonnes of CO ₂ eq) |
| Energy | 32.6 | 457 | 91.6 | 101 |
| Agriculture | 43.0 | 64 | 63.1 | 56 |
| LULUCF | 70.0 | -95* | 90.0 | -185* |
| Waste | 60.7 | 18 | 90.7 | 8 |
| IP | 38.3 | 86 | 84.8 | 20 |
| Total | 43.5 | 530 | 100 | 0 |

* Total emissions and absorption

Source: Prepared by Nippon Koei based on the National Strategy for Climate Change until 2050 (Decision 896/QĐ-TTg), The Socialist public of Viet Nam

(3) National Electricity Development Plan VIII for the period of 2021-2030, with a vision to 2050 (PDP8)

The PDP8 for the period of 2021-2030, with a vision to 2050, was finalized in Prime Minister Decision 500/QĐ-TTg in May 2023, two and a half years later than originally planned, and took

effect immediately. The Vietnamese government has projected an average annual GDP growth rate of 7% between 2021 and 2030, and has set a plan for the same period to ensure that the country can supply enough electricity demand for socio-economic growth. The PDP8 plans for an increase in power generation capacity to 150,489 MW by 2030, which considering that the installed capacity at the end of 2022 was 80,704 MW, means that nearly 9,000 MW of installed capacity will need to be added each year. In addition, the long-term vision is to achieve net zero GHG emissions by 2050. The targets by 2030 and 2050 in PDP8 are shown in Table 2-4.

Table 2-4 Targets by 2023 and 2050 in PDP8

| Category | | Target by 2030 | Target by 2050 |
|------------------------------------|-------------|-------------------|-----------------------------|
| Total capacity of power generation | | 150,489 MW | 490,529~573,129 MW |
| Electricity production | | 56.7 billion kWh | 1,224.3-1,378.7 billion kWh |
| Coal-fired power | | 20% | 0% (全廃) |
| Gas thermal power | | 9.9% | 0% |
| LNG | | 14.9% | 2.9% |
| Hydrogen | | 0% | 4.7% |
| Renewable energy | Solar power | 8.5% | 32.0% |
| | Wind power | 18.6% | 28.5% |
| Investment | | 134.7 billion USD | 399.2- 523.1 billion USD |

Source: Prepared by Nippon Koei based on the National Electricity Development Plan VIII for the period of 2021-2030, with a vision to 2050

The Vietnamese government is focusing on renewable energy development (mainly solar power and wind power) and aims to promote roof-top solar power generation for private consumption by 2030, with a target of 50% for office buildings and residences, so the formation of JCM projects through this City-to-City Collaboration Project is expected to contribute.

(4) Green Building Regulation in Viet Nam

Green building regulations in Viet Nam aim to promote sustainable building practices and reduce the environmental impact of buildings. As of 2020, Viet Nam has nearly 150 certification cases that have been recognized as Green Building² according to different technical standards: LEED (USA), EDGE (IFC), LOTUS (VGBC), and Green Mark (Singapore). In Hanoi and Ho Chi Minh City, specific regulations are in place to support green building practices.

In Hanoi, the city has adopted the Viet Nam Green Building Council's (VGBC) green building rating system and requires that all new buildings of a certain size meet certain green building criteria. Additionally, the city has implemented a policy requiring all new public buildings to be certified green.

² Hanoi City People's Committee – Hanoi Urban Planning Institute
<http://vqh.hanoi.gov.vn/index.php?language=vi&nv=news&op=tin-lien-ket/phat-trien-cong-trinh-xanh-trong-dinh-huong-phat-trien-kien-truc-1492.html>

Ho Chi Minh City has also adopted the VGBC green building rating system and implemented similar regulations for new public buildings. Additionally, the city has established a green building fund to provide financial support for green building projects.

Up to now, there are quite a few strategies, orientations, and action plans of the State on sustainable development, environment, and energy. Directly related to green buildings, the following legal documents can be mentioned:

- Decision No. 1658/QĐ-TTg dated October 01, 2021, Approval for National green growth strategy for the 2021 - 2030 period, with a vision by 2050;
- Resolution No. 136/NQ-CP dated September 25, 2020, Resolution on Sustainable Development;
- Decision No. 280/QĐ-TTg dated March 13, 2019, Approval for National program for thrifty and efficient use of energy for the period of 2019 – 2030;
- Law No. 62/2020/QH14 dated June 17, 2020, Law on Amendments to Construction law.

Green building assessment and certification on the territory of Viet Nam is being supported by international organizations in Viet Nam, but it has not been managed by the Government. The assessment and certification of the green building is an existing demand in the market. Therefore, the establishment of criteria, standards, and methods of assessment and certification of the above works need to be regulated by competent state agencies as a legal basis for evaluation activities and certified green buildings in Viet Nam. The above contents have been shown (amended and supplemented) in the requirements of Law No.: 62/2020/QH14 dated June 17, 2020, the Law on Amendments to the Construction Law, in details specified in additional Clause 4 of Article 10, and amending Clause 2 of Article 162.

(5) Regulations for Solar Power Generation Plans

In response to the plan indicated in PDP8 to increase solar power generation to 12,836 MW by 2030, a decree is being prepared for its implementation. The draft decree of the Ministry of Industry and Trade (MOIT) as of December 2023 presents two cases for installing rooftop solar power generation, one for on-site consumption and the other for connection to the national grid, along with some notes. Self-consumption solar power generation (consumed only on-site without selling power) is considered a priority measure in PDP8. On the other hand, under the proposed decree, when connecting to the national grid, surplus power cannot be sold to others and no income can be earned from the sale of electricity. In addition, in order to minimize the load on the grid, it is necessary to install equipment such as a battery energy storage system (BESS), which combines storage batteries and a power control system. The early finalization and approval of the draft decree is awaited to promote the introduction of solar power generation in Viet Nam.

(6) Climate Change Trends in Viet Nam related to Conference of the Parties (COP)

At the 26th Conference of the Parties (COP26) in 2021, Vietnamese Prime Minister Pham Minh Chinh announced that Viet Nam would achieve carbon neutrality by 2050.

At COP28 in 2023, Vietnamese government did not announce any new commitments, but stressed the need for the international community to work together to address climate change issues. In his speech, Prime Minister Pham Minh Chinh also introduced the following three measures taken from COP26 to the present to achieve carbon neutrality by 2050.

- 1) Enacting the National Climate Change Strategy, Green Growth Strategy, PDP8 and planning for renewable energy development, etc.
- 2) Announcement of the plan to introduce funds on the Just Energy Transition Partnership (JETP)
- 3) Establishing legal framework for oil and gas, land, and electricity

JETP has decided to disburse the first 15.5 billion USD (2.15 trillion yen) from public and private funds over the next 3-5 years to support Vietnam's green transition. In particular, it aims to support development and improve the investment environment in the areas of wind power, solar power, power transmission, energy efficiency, energy storage, electric vehicles (EVs), and human resource development.

In addition, the Vietnamese government has pledged to participate in the Global Cooling Pledge announced at COP28. The pledge, endorsed by 63 countries including Japan, aims to reduce GHG emissions from cooling equipment by at least 68% by 2050 compared to 2022 levels.

(7) Trends in the Domestic Carbon Market in Viet Nam

The Vietnamese government issued Regulation on Greenhouse Gas Emission Reduction, Ozone Layer Protection and Development of the Domestic Carbon Market (Decree No. 06/2022/ND-CP) on January 7, 2022. This decree establishes regulations for the management and operation of carbon markets, with the intention of piloting a carbon credit exchange by 2025 and formally introducing it in 2028.

(8) Updates Vietnamese Circular regarding JCM

At the 8th Japan-Vietnam Environmental Policy Dialogue held in January 2024, it was confirmed that the two countries will continue to cooperate in various related fields including climate change measures through utilizing JCM and other measures. On the other hands, in Viet Nam, MONRE has stipulated detailed procedures and guidelines for the formation and implementation of JCM projects in Circular No. 17 of MONRE (Circular No. 17/2015/TTBTNMT, dated April 6, 2015) under the Vietnam-Japan Cooperation Framework. MONRE is in the process of revising the Circular, and the draft Circular as of 2023 includes revisions related to the baseline emissions assessment method, extension of the JCM credit period, and other issues. It is necessary to care about the status of future revisions of the Circular based on matters discussed between the two countries.

(9) Other Policies

Legal System and Current Countermeasures for Waste Management in Viet Nam

According to the International Union for Conservation of Nature (IUCN) report of the monitoring and assessment program on plastic waste in Viet Nam shoreline in 2020, 80 tons of plastic bags are released in Hanoi and Ho Chi Minh City. Notably, the amount of plastic waste and plastic bags nationwide accounts for about 8-12% of domestic solid waste. On average, one person uses and discards 1 plastic bag/day, and more than 31.4 billion plastic bags are discarded each year, of which only 17% are reused.

Ho Chi Minh City generates about 9,500 tons of domestic waste daily. The huge amount of the above-mentioned solid waste is mainly treated by landfill, accounting for 69%. While incineration, composting, and recycling accounted for only 31%, of which plastic recycling accounted for only 1%.

Ho Chi Minh City has implemented several initiatives to promote plastic bottle collection and recycling. According to the Ho Chi Minh City environmental status report in 2021, some achievements in the management, collection and treatment of plastic waste in Ho Chi Minh City below:

- Aquaculture: plastic waste collection rate is 70% - 90%, the plastic waste classification rate is 40% - 50%, and the plastic waste reuse rate is more than 70%.
- Fishing: plastic waste collection rate from 30% - 50%, plastic waste recycling rate 30%.
- Scrap is sold to individuals/organizations who buy or give it to collectors.
- The classification of industrial solid waste at source is now done at the manufacturing factory/plant. Some components can be reused and recovered materials right at the factory, such as plastic, paper, metal, etc. Others are collected, stored, and transported to recycling and treatment plants.
- After making full use of recyclable and reusable components, normal industrial solid waste with the remaining inert substance will be treated by contracted units with the collection and treatment function.
- By the end of 2021, 100% of supermarkets, commercial centers, etc., have used environmentally friendly packaging to replace non-biodegradable plastic bags; small traders in residential markets reduced their use by 50%.
- Striving 2030, by using non-degradable plastic bags in packaging and storing products for customers., the city minimizes the use of single-use plastic products.

Regulations and activities at the central level

At the central level, the government has set up regulations and policies to reduce plastic waste, including restricting single-use plastics.

- Law No. 72/2020/QH14 dated November 17, 2020, Law on Environmental Protection: Article 73. Reduction, reuse, recycling, and treatment of plastic waste, preventing and controlling ocean plastic waste pollution.
- Decree No. 08/2022/ND-CP dated January 10, 2022. Article 64. Roadmap for restricting production and import of single-use plastic products, non-biodegradable plastic packaging, and products and goods containing microplastics

Regulations and activities at the municipality level

At the municipality level, Ho Chi Minh City has taken steps to increase public awareness of plastic waste management through education and outreach programs and the development of recycling facilities and collection systems.

- Action plan for Ocean Plastic Waste Management of the fishing industry for the period of 2020 - 2030 in Ho Chi Minh City (Attached to Decision No. 4306/QD-UBND dated December 24, 2021, of the City People's Committee)
- Plan for increase Plastic Waste Management, reduction, reuse, recycling, and treatment in Ho Chi Minh City, period of 2022 - 2025, vision 2030 (Attached to Decision No. 1667/QD-UBND dated May 19, 2022, of the City People's Committee)

Regulations and activities at the community level

At the community level, various initiatives, such as community-based recycling programs and public-private partnerships, are underway to encourage residents to participate in plastic bottle collection and recycling. Some communities also offer incentives, such as discounts on utility bills, for those who regularly recycle. Several documents have been prepared related to propaganda and classification of domestic solid waste, such as guidelines for sorting, collecting, transporting and handling solid waste management, leaflets and posters on classification of daily-life solid waste.

It is worth noting that despite these efforts, plastic waste management continues to be a challenge in Ho Chi Minh City, and there is a need for further action to collect and recycle plastic bottles effectively.

MOT Action Plan for Climate Change (2021-2025)

The Ministry of Transport (MOT) formulated the Action Plan for active response to climate change, enhancement of natural resources management and environmental protection pursuant to Resolution No. 452/QD-BGTVT approved on 24 March 2021. The Action Plan is a 5-year plan from 2021 to 2025 and it specifies implementation of the guidelines, policies and instructions by the Government on the natural resources, as well as environment work in the transport sector for development in a sustainable and environmentally friendly manner.

The Action Plan lists the following solutions to the challenges of the transportation sector.

- i. Improvement of awareness of organizations and individuals in response to climate change
- ii. Improvement of resilience to climate change for the transport infrastructure
- iii. Improvement of management capability of GHG emissions
- iv. Strengthening economical and efficient energy use
- v. Efficient management and utilization of natural resources
- vi. Reinforcement of environmental protection in development and maintenance of transportation infrastructure

vii. Controlling emission of the exhaust gas by transportation

viii. Promotion of green transportation in the private sector

Regarding iv, the Action Plan describes in detail the strategy for decarbonization. For example, it plans d) to improve the capacity and service quality of public passenger transport in the cities; to accelerate investment into highway transport such as Mass Rapid Transit (MRT) and Bus Rapid Transit (BRT) in Hanoi and Ho Chi Minh City; to prioritize investment and operation of energy-saving and environmental-friendly buses and taxis, such as hybrid vehicles, vehicles using Compressed Natural Gas (CNG), Liquefied Petroleum Gas (LPG); electric vehicles, etc. and e) to strengthen application of renewable energy, energy-saving technologies such as solar battery and LED lighting for lighting and traffic signals in the transport infrastructure investment projects and maintenance works.

2.2.2 Actions to Climate Change by HCMC

(1) Climate Change Action Plan (CCAP)

In 2021, HCMC regulated Climate Change Action Plan from 2021 to 2030 with a vision to 2050 (CCAP 2021-2030). CCAP shows that HCMC strives to reduce emissions 10% by 2030 and moving towards a low carbon economy, this figure will be 30% if there is international support. The overview of CCAP is shown in Table 2-5.

The period of 2021-2025 focus on formulating mechanisms and policies to cope with climate change and implementing solutions, tasks and priority projects, and in the period of 2026-2030, it plans to strengthen coordination and integration of tasks and improve the capability of each sector, community and ecosystems to increase resilience to climate change.

CCAP declare that HCMC improves efficient use of energy and other resources under socio-economic development to contribute to national GHG reduction target and aims at development of low-carbon society. Important sectors for promotion of climate change countermeasures, designated in CCAP are “Agriculture”, “Industry”, “Construction Industry and Urban Planning”, “Transportation Industry”, “Culture and Tourism Industry”, “Medical Industry”, “Natural Resources and Environment Industry” and “Energy sector”. However, specific solutions in the eight priority sectors are not decided in CCAP, so companies and organizations in each sector need to formulate and implement actions.

Table 2-5 Overview of CCAP

| Name of Plan | Climate Change Action Plan until 2015 | Climate Change Action Plan 2017-2020 with vision to 2030 | Climate Change Action Plan 2021-2030 with vision to 2050 |
|----------------------------|---|--|--|
| Date of enforcement | 15 May, 2013 | 17 March, 2017 | 8 September, 2021 |
| Objectives | To upgrade mechanisms and policies to manage, | To develop solutions to strengthen the capacity to respond to climate change | In the period 2021-2025 focus on perfecting mechanisms and policies to |

| | | | |
|-----------------------|--|---|--|
| | <p>administer and guide the implementation of CCAP</p> <p>To consolidate and strengthen management capacity and strengthen linkages among departments and branches in HCMC to respond to climate change</p> <p>To evaluate the level and impacts of climate change in Ho Chi Minh City and the degree of climate change impacts on the fields and industries</p> <p>To raise public awareness about climate change</p> <p>To identify tasks and projects that prioritize climate change adaptation and mitigation.</p> | <p>of Ho Chi Minh City when implementing socio-economic development planning and plans</p> <p>To contribute to the national goal of reducing greenhouse gas emissions by improving the efficiency of energy and resource use in socio-economic development activities of Ho Chi Minh City, towards low-carbon social development</p> <p>To improve the efficiency of the state management system in response to climate change, contributing to promoting sustainable socio-economic development.</p> | <p>cope with climate change; implement solutions, tasks and priority projects to enhance the capacity to cope with climate change and minimize the damage caused by climate change; increased resilience and adaptive capacity of the community, raising awareness to be ready to adjust to climate change. The period 2026-2030, with a vision to 2050, the city will strengthen coordination and integration activities in implementing solutions, tasks and improve the capacity of sectors, community and ecosystems to increase resilience to climate change.</p> |
| Target sectors | <p>Urban Planning, Energy, Transportation, Industry, Water management, Waste management, Construction, Safety, Agriculture, Tourism/Culture/Public awareness”</p> | | <p>Agriculture, Industry, Construction Industry and Urban Planning, Transportation Industry, Culture and Tourism Industry, Medical Industry, Natural Resources and Environment Industry, Energy sector</p> |

Source: Prepared by Nippon Koei based on Climate Change Action Plan until 2013, Climate Change Action Plan 2017-2020 with vision to 2030 and Climate Change Action Plan 2021-2030 with vision to 2050

CCAP identifies 10 priority projects from 2021 to 2030, and one of the projects in the energy sector is installation of rooftop solar power system for administrative building of Thu Duc City People’s Committee. The priority projects are shown in the table below.

Table 2-6 List of Priority Programs, Tasks and Projects to respond to Climate Change in HCMC in the period of 2021-2030

| # | Tasks/Projects | Unit in charge | Collaboration units | Stage implementation |
|---|--|---|--|----------------------|
| 1 | Restore and protect mangroves and other forest areas of the city | Department of Agriculture and Rural Development | Relevant Departments, agencies and units | 2021-2030 |
| 2 | Pilot installation of water-saving devices in public works and administrative buildings. | Department of Natural Resources and Environment (DONRE) | Relevant Departments, agencies and units | 2021-2030 |

| # | Tasks/Projects | Unit in charge | Collaboration units | Stage implementation |
|----|--|---|--|----------------------|
| 3 | Develop a project to collect and reuse rainwater at some public works. | DONRE | Departments, agencies, units and districts' PC | 2021-2030 |
| 4 | Install rooftop solar power system for administrative building of Thu Duc city People's Committee | Thu Duc city People's Committee | DONRE | 2021-2023 |
| 5 | Project on improving drainage, wastewater and climate change adaptation in Tham Luong - Ben Cat basin (CRUS1) | Urban Infrastructure Construction Investment management board of Ho Chi Minh City | Relevant Departments, agencies and units | 2021-2025 |
| 6 | Improving drainage and wastewater systems and adapting to climate change in the West Saigon Basin (CRUS2) | Urban Infrastructure Construction Investment management board of Ho Chi Minh City | Relevant Departments, agencies and units | 2021-2025 |
| 7 | Urban Flood Integrated Management Project in Ho Chi Minh City (loan from DANIDA - Danish) | Urban Infrastructure Construction Investment management board of Ho Chi Minh City | Relevant Departments, agencies and units | 2021-2025 |
| 8 | Project to improve water environment in Ben Nghe -Tau Hu-Doi-Te canal basin (phase 3) | Urban Infrastructure Construction Investment management board of Ho Chi Minh City | Relevant Departments, agencies and units | 2026-2030 |
| 9 | Developing a phased public bicycle system in the city, connecting the shared bicycle system with other types of public transport such as buses and subways (metro), building areas of low carbon emissions combine pedestrian streets with bicycle traffic routes in the central area. | Department of Transportation | Relevant Departments, agencies and units | 2022-2030 |
| 10 | Building domestic solid waste treatment plants using advanced technology in Ho Chi Minh City. | DONRE | Relevant Departments, agencies and units | 2021-2030 |

Source : Prepared by Nippon Koei based on Climate Change Action Plan 2021-2030

(2) Piloting Carbon Credit Trading in HCMC

On August 1, 2023, the National Assembly of Viet Nam passed a Resolution on the Pilot Implementation of Multiple Policies in HCMC including a trial of financial scheme to reduce

the emission of greenhouse gases based on the mechanism of carbon credit trading and carbon offsets. Prior to the start of credit trading, the Ho Chi Minh City People's Committee will coordinate with the Ministry of Industry and Trade, Ministry of Transport, Ministry of Agriculture and Rural Development, Ministry of Construction, and Ministry of Natural Resources and Environment to determine the reduction and absorption targets for HCMC as a percentage of the Vietnamese national GHG reduction target.

All revenue from the credit transaction will be generated by Ho Chi Minh City, and these will be used for the city's climate change initiatives and programs that contribute to the development of a green, digital, and circular economy. Ho Chi Minh City is currently considering credit trading for streetlight LED replacement projects, rooftop solar installation at public facilities, and Metro Line 1 construction projects.

Since the efforts toward the credit trading demonstration have just started and needs for assistance in the formulation of methodologies, etc. have been confirmed, implementation assistance will be considered for activities in the next fiscal year.

(3) Difficulties in Introducing Rooftop Solar Power Generation in Public Facilities in HCMC

In Viet Nam, there are some legal difficulties in introducing rooftop Photovoltaic power generation (PV) facilities at government agencies and public facilities in the city. When the Vice Chairman of Ho Chi Minh City People's Committee requested the Ministry of Finance for assistance and guidance on the above-mentioned PV system installation, the Ministry of Finance responded as follows based on Decree No. 781/TB-VP (dated November 2, 2021), Article 4.34 and Article 4.54 of No. 15/2017/QH14, No. 11/2017/QD-TTg (dated April 11, 2017), No. 02/2019/QD-TTg (dated January 8, 2019), and No. 13/2020/QD-TTg (dated April 6, 2020).

According to the Ministry of Finance, the Law on Management and Use of Public Property states that "State agencies are entitled to use government buildings, intellectual property rights, application software, databases, and other public property to operate in accordance with the provisions of the Law and related laws. The management and use of revenues from those use shall comply with the provisions of the law". However, the respondents stated that there is no provision for the use of rooftops of government buildings for the installation of PV systems. In addition, the Prime Minister's Decree on Incentive Mechanisms for the Introduction of PV System in Viet Nam stipulates that organizations and individuals holding rooftop PV projects can sell electricity only to the Viet Nam Electricity and authorized customers. There is no provision for the business of PV project to use the rooftops of office buildings. Therefore, the Ministry of Finance recommends not installing the PV facilities on the rooftops for business use.

For these reasons, it is clear that the use of rooftop PV for public facilities in Ho Chi Minh City is currently not feasible because there are no legal regulations regarding the use of rooftop PV for public facilities in Viet Nam. Additionally, it is difficult for PV developers to sell electricity

due to strict legal restrictions in Viet Nam. In the future, when considering the introduction of rooftop PV facilities in Ho Chi Minh City under the JCM model projects, the above-mentioned laws must be taken into account. At least private companies should be considered for the introduction of PV system, not public facilities.

CHAPTER 3 CITY-TO-CITY COLLABORATION FOR ZERO-CARBON SOCIETY

3.1 Background of the City-to-City Collaboration

Osaka City began a collaboration with HCMC with conclusion of MOU on technology exchange with Saigon Water Corporation (SAWACO) in 2009 and has been supporting various environmental activities of HCMC. Whereas HCMC developed the Action Plan for Formulation of Low-carbon Society in HCMC in October 2013, Osaka City and HCMC concluded “MOU on Formulation of Law-carbon City in HCMC” for comprehensive cooperation to realize steady urban development of HCMC. Based on the MOU, the two cities have been implementing City-to-City Collaboration Project since 2013. In March 2022, the two cities updated the MOU for five years with a focus on zero/low carbon to support the implementation of CCAP.

A list of achievements of City-to-City Collaboration between Osaka City and HCMC are shown in Table 3-1.

Table 3-1 Achievements of City-to-City Collaboration project in HCMC

| # | Month/Year | Overview |
|----|---------------------------------|---|
| 1 | December 2009 | Conclusion of MOU on technology exchange with Saigon Water Corporation (SAWACO) |
| 2 | April 2011 | Started JCM City-to-City Collaboration Project (Ongoing) |
| 3 | October 2013 | Conclusion of MOU on Formulation of Law-carbon City in HCMC |
| 4 | November 2015 | Update of MOU on technology exchange with SAWACO |
| 5 | September 2016 | Update of MOU on Formulation of Law-carbon City in HCMC |
| 6 | September 2016 | HCMC Climate Change Action Plan 2017-2020 and Prospects until 2030 |
| 7 | June 2018 | Start to support on introducing a “hybrid rainfall forecasting system” for South Regional Hydro Meteorological Center (SRHMC) by Meteorological Engineering Center |
| 8 | December 2018 | Update of MOU on technology exchange with SAWACO |
| 9 | September 2019- January 2020 | Support for implementation of HCMC’s CCAP through JCM model project formulation |
| 10 | November 2019 | Conducted the Mayor-level Policy Dialogue for Low-carbon Society between Osaka City and HCMC in Osaka City |
| 11 | November 2019 | “Introduction of high-efficiency air conditioner (Variable Refrigeration Flow, VRF) and air-cooled chiller to hotels and office buildings” was adopted as JCM model project |
| 12 | July 2020 | “Introduction of High Efficiency Boiler System to Food Factory” was adopted as JCM model project |
| 13 | July 2020 | “Introduction of High Efficiency Air-conditioning System to Hotel in Ho Chi Minh City” was adopted as JCM model project |
| 14 | January 2020 | “Project Collaboration Agreement toward Improving Accuracy of Rainfall Prediction for Ho Chi Minh City” was concluded between Osaka City and SRHMC |
| 15 | March 2021 | Updated “MOU on formulation of law-/zero-carbon city in HCMC” |
| 16 | September 2021 | “Introduction of High Efficiency LED Lighting with Dimming and Tunable Function to Office Building in Ho Chi Minh City” was adopted as JCM model project |

| # | Month/Year | Overview |
|----|----------------|--|
| 17 | September 2021 | “Introduction of High Efficiency Chiller and High Efficiency LED Lighting with Dimming Function to Shopping Center” was adopted as JCM model project |
| 18 | September 2021 | “Introduction of 9.8 MW Rooftop Solar Power System in Industrial Park” was adopted as JCM model project |
| 19 | July 2022 | “Introduction of 0.4MW Rooftop Solar Power System to Aluminum Wheel Manufacturing Factory” was adopted as JCM Eco lease project |
| 20 | October 2023 | Conducted deputy mayor level Policy Dialogue at HCMC |

Source: Prepared by Nippon Koei

3.2 Implementation Strategies for City-to-City Collaboration

Based on the HCMC CCAP, this project promoted "City-to-City Collaboration activities" and "JCM project formation activities" through policy dialogue between the two cities. Specifically, based on the past four years of achievements, activities were conducted based on the following implementation strategies.

(1) Institution Building and Strengthening of Initiatives for CCAP Implementation

Through the policy dialogue and technical workshops in line with the MOU between the two cities, Ho Chi Minh City's environmental issues and Osaka City's efforts shares to support the implementation of the CCAP. In addition, the Project identifies the issues in Ho Chi Minh City related to the introduction of environmental infrastructure at an early stage, and presents various options to strengthen support for DONRE and related organizations in Ho Chi Minh City.

(2) Building a Foundation through Environmental Education

In face-to-face discussions between the two cities last fiscal year, it was confirmed that Ho Chi Minh City recognizes the importance of environmental education and understanding at the household level first, in to introduce city-level environmental measures and environmental infrastructure. In this fiscal year, the Project shares specific examples of environmental education initiatives in Osaka City, and through public awareness, consider support that promote the introduction of environmental infrastructure in the future.

(3) Survey and Introducing Support on New Technologies

Conduct on-site surveys in new fields such as "Fluorocarbons recovery and destruction," "Waste," and "DX utilization," to identify projects and study new business models.

3.3 Results of City-to-City Collaboration in FY2023

3.3.1 Overview of City-to-City Collaboration Activities in FY2023

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

Table 3-2 Overview of City-to-City Collaboration activities in FY2023

| Contents | Schedule | Description |
|--|--|---|
| Online kick-off meeting to Ministry of the Environment, Japan (MOEJ) | 10 July 2023 | Reported the planned City-to-City Collaboration activities for this year. MOEJ commented that the Project has several JCM project formulation and that expects further project formulation in this year. |
| Online JPRSI City-to-City Collaboration seminar | 27 July 2023 | Participated in a panel discussion and introduced the results of City-to-City Collaboration between HCMC and Osaka City as a "case study of continuous introduction of environmental infrastructure" at the JPRSI 2nd seminar (theme: City-to-City Collaboration). |
| 1 st field survey | 22 – 29 August 2023 | Nippon Koei (1 person) traveled to HCMC. Kicked off with HCMC and member companies, held carbon neutral seminars, and collected local information. |
| Carbon neutral seminars | 24 August 2023 (Hanoi City) 25 August 2023 (Ho Chi Minh City) | In collaboration with Yuasa Trading, a member company in this City-to-City Collaboration project, carbon neutral seminars for Vietnamese companies were held in two cities. Approximately 50 people attended in Hanoi and 120 people attended in Ho Chi Minh City. |
| 2 nd field survey | 23 – 28 October 2023 | Osaka City (2 persons including Director General of Environment Bureau), MOEJ (in charge of City-to-City Collaboration: 1 person), and Nippon Koei (2 persons) traveled to HCMC. Technical workshops, policy dialogue, meeting with local companies and site visits were conducted. |
| Technical workshop (face-to-face) | 26 October 2023 | A face-to-face technical workshop was held in Ho Chi Minh City. Participating companies presented their technologies and services and JCM case studies in the workshop. Approximately 50 people attended. After the workshop, there were several inquiries from participants. |
| Policy dialogue (face-to-face) | 27 October 2023 | The two cities actively exchanged views on Ho Chi Minh City's environmental measures and progress on its Climate Action Plan (CCAP), and Osaka's climate change measures, introduction of renewable energy, waste disposal, and environmental education. The two cities also agreed to continue their cooperation toward becoming carbon neutral by 2050. |
| Online interim report meeting to MOEJ | 8 November 2023 | An interim report on this year's activities was presented, and opinions were exchanged on the merits of forming JCM projects through the City-to-City Collaboration and the needs of local companies. |
| 3 rd field survey | 14 – 20 January 2024 | Nippon Koei (1 persons) traveled to HCMC. Discussions were held with DONRE for the next |

| Contents | Schedule | Description |
|---|---------------------|---|
| | | fiscal year, and JCM seminars were conducted. |
| JCM seminar (face-to-face) | 16 January 2024 | A JCM seminar was held for SACA (Ho Chi Minh City Association of Construction and Construction Materials) with the introduction of companies participating in the workshop held on October 26, 2023. |
| Online final report meeting to MOEJ | 6 February 2024 | The final report of this fiscal year's activities was presented. Osaka City reported that it has been building a good relationship with Ho Chi Minh City through policy dialogues and other activities. Osaka City also reported that they plan to continue considering support for environmental education and carbon neutrality declarations, as requested by DONRE, in the next fiscal year. |
| Seminar on City-to-City Collaboration for Zero Carbon Society | 26-27 February 2024 | Participated in the Seminar on City-to-City Collaboration for Zero Carbon Society organized by the MOEJ and exchanged information with related parties. |

Source: Prepared by Nippon Koei

3.3.2 Activities related to Institutional Support

The following seven activities related to institutional support were conducted under the City-to-City Collaboration in this fiscal year.

(1) Policy Dialogue

The Policy Dialogue between HCMC and Osaka City was held on October 27, 2023 to support the implementation of the "Ho Chi Minh City Climate Action Plan (CCAP)" based on their "Memorandum of Understanding for the Formation of a Low/Zero Carbon City". The policy dialogue was held at the HCMC People's Committee office in conjunction with the online meeting. From Osaka City, Deputy Mayor, Mr. Takahashi participated online, while the Director of the Environment Bureau and one officer in charge of City-to-City Collaboration participated at the venue. From Ho Chi Minh City, the Deputy Chairman of the People's Committee, the Deputy Director of DONRE, the Department of Foreign Affairs (DOFA), the Department of Industry and Trade (DOIT), and the Industrial Park and Export Control Board (HEPZA) participated.

During this policy dialogue, specific initiatives for decarbonization in both cities were introduced, and opinions were actively exchanged. It was also confirmed that the two cities will further promote cooperation toward carbon neutrality in 2050.

Osaka City presented an overview of the city and its activities toward decarbonization. Osaka City reported that the City is aiming to achieve carbon neutrality by 2050 and to reduce GHG emissions by 50% from the fiscal 2013 level as its 2030 target. As specific efforts, the measures shown in 2.1.3 were introduced. Also, HCMC introduced the activities of the Ho Chi Minh City Climate Change Action Plan (CCAP) and activities related to the pilot operation of carbon credit trading. Ho Chi Minh City has set a goal to reduce GHG emissions by 10% (30% with international support) by 2030 and is pursuing 115 activities. GHG inventories have been

prepared three times in the past, in 2013, 2016, and 2018. The energy sector is the main source of GHG emission inventories in 2018, accounting for 57.4% of the total. With per capita CO₂ emissions in Ho Chi Minh City twice the national average in Viet Nam (3.4 t-CO₂/capita nationally, 6.2 t-CO₂/capita in Ho Chi Minh City in 2016), the city's efforts to decarbonize are important for the country. In addition, as its latest activity, Ho Chi Minh City is focusing on the pilot operation of a carbon credit trading market ahead of the national government, specifically considering the crediting of (1) LED streetlights (estimated reduction: 42,770 t-CO₂/year), (2) installation of rooftop solar panels on public facilities (estimated reduction: 14,532 t-CO₂/year), and (3) construction of Metro Line 1 (estimated reduction: 52,002 t-CO₂/year). In response, Nippon Koei introduced examples of carbon credit schemes in cities, and explained that it would be possible to provide support for the formulation of methodologies, etc., through the City-to-City Collaboration in the future.

An exchange of views between the two cities took place during the latter half of the policy dialogue. HCMC commented that Osaka City's GHG emission reduction plans were very specific. In particular, there was much interest in the project to introduce rooftop solar power generation based on FIT and waste disposal, and Osaka City shared details.

During the above discussion, HCMC DONRE expressed its expectations for Osaka City to further cooperate with their experience, knowledge, and network in its future initiatives. In addition, they expressed their willingness to hold policy dialogue on a regular basis in the future, aiming to formulate concrete projects through the sharing of Osaka City's knowledge. It is expected that continued policy dialogue in the next fiscal year and beyond will lead to further support for implementation through improvement of the CCAP content, and to the concrete implementation of current initiatives.

The program content of the policy dialogue is as follows. See Attachment for the presentation materials.

Table 3-3 Agenda of Policy Dialogue

| # | Local time | Agenda | Presentation organization |
|---|-------------|---|---|
| 1 | 9:30-9:50 | Opening Remarks | Deputy Mayor of Osaka City Vice Chairman, HCMC People's Committee Deputy Director, HCMC DONRE |
| 2 | 9:50-9:55 | Photo Session | — |
| 3 | 9:55-10:20 | Introduction of Ho Chi Minh City's CCAP activities and GHG emission reduction activities through piloting carbon credit trading | HCMC DONRE |
| 4 | 10:20-10:45 | Osaka City's overview and efforts towards a Decarbonized Society- | Osaka City, Environment Bureau |
| 5 | 10:45-11:05 | Introduction of case studies of carbon credit schemes in cities | Nippon Koei |

| # | Local time | Agenda | Presentation organization |
|---|-------------|-----------------|---------------------------|
| 6 | 11:05-11:25 | Discussion | — |
| 7 | 11:25-11:30 | Closing Remarks | HCMC DONRE |

Source: Prepared by Nippon Koei



Opening Remarks from the Deputy Mayor of Osaka City



Opening Remarks from Deputy Director of HCMC DONRE



Opening Remarks from Vice Chairman of HCMC People's Committee

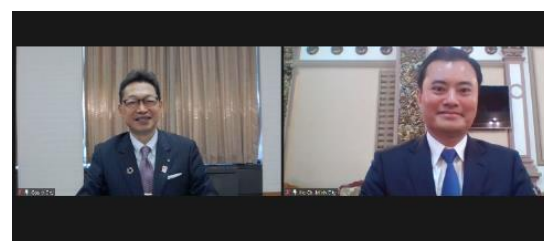


Photo
 (Deputy Mayor of Osaka City, Vice Chairman of HCMC People's Committee)

Figure 3-1 Photos of Online Policy Dialogue between HCMC and Osaka City

(2) Support on Implementation of HCMC's CCAP 2021-2030

In accordance with MOU, Osaka City agreed to share experience and lesson learned regarding climate change action and support implementation of HCMC's CCAP 2021-2030 through formulation of JCM model projects.

According to the updated MOU, more specific low/zero-carbon activities and projects were described as follows,

- Proceeding with development of human resources, an organization and a system in order to manage the progress toward the steady implementation of the CCAP
- Sharing professional skills and knowledge in order to smoothly implement measures, research and assessment of greenhouse gas emissions toward the achievement of goals listed in the CCAP for 2020-2030

- Realizing a low/zero-carbon society by generating new projects including the installation of solar power generation system in public facilities, the promotion of smart MICE and the creation of large scale low/zero-carbon projects such as JCM
- Improving other environmental issues such as water treatment, waste management and public relations for climate change through sharing information and knowledge.

Based on the presentation materials of HCMC at the policy dialogue, the latest city targets and activity goals were confirmed regarding CCAP as below.

Table 3-4 Target and activity goals regarding CCAP

| # | Targets | Activity goals |
|---|--------------------------|---|
| 1 | HCMC | Reduce emissions by 10% by 2030 and transition to a low-carbon economy through sustainable development (30% reduction in emissions with international support). Integrate priority actions for adaptation and mitigation into sectoral and urban planning, actively implement Viet Nam's commitments with the international community to address climate change, international cooperation, and attract support and private investment. |
| 2 | Industry | To manage GHG emissions from industrial manufacturing plants in Ho Chi Minh City. Convert industrial production to clean new technologies to reduce greenhouse gas (GHG) emissions. Promote and educate companies on climate change response. |
| 3 | Transportation | Promote the application of environmentally friendly technologies and encourage the use of renewable energy sources and clean energy in transportation. Promote and educate organizations and individuals about climate change response in transportation. |
| 4 | Energy | Ensure energy security and improve power sector facilities. Incorporate elements to address climate change and contribute to environmental protection in the development and implementation of programs for the economical and efficient use of energy in the city. |
| 5 | Solid waste | Minimize solid waste at source. -Limit landfills to conserve land resources. Applying greenhouse gas (GHG) gas emission reduction to reclamation (recycling) technologies in wastewater and waste collection and treatment. |
| 6 | GHG emissions reductions | Greenhouse gas (GHG) emission inventory preparation for 2016 and 2018. Development of a climate change implementation plan for the Paris Agreement. -Research and propose solutions to manage greenhouse gas (GHG) emissions from industrial manufacturing plants and buildings in Ho Chi Minh City. Capacity building for companies promulgated by the Prime Minister (listed as high emitters). |

Source: Presentation material of DONRE, HCMC

(3) Technical Workshop in HCMC

On October 26, 2023, a technical workshop was held at HCMC to introduce decarbonization technologies. The workshop was attended by the Osaka City, Ho Chi Minh City (DONRE, DOC, and DOT), and the MOEJ. In addition, the Vietnam Chamber of Commerce and Industry in Ho Chi Minh City (VCCI-HCM), the Japanese Chamber of Commerce and Industry Ho Chi Minh City (JCCH) and the Clean Energy Association publicized the workshop to their member companies, there were 50 participants.

A wide range of decarbonization and DX technologies from six companies participating in the City-to-City Collaboration Project were presented. Among the technologies introduced by

Japanese companies, Osaka Gas (SOGEC)'s fuel conversion business to natural gas, Yuasa Trading's one-stop solution business to achieve carbon neutrality, Endo Lighting Vietnam's high-efficiency LED lighting technology, and Sumitomo Mitsui Trust Panasonic Finance's JCM eco-lease business, JCH's high-efficiency air conditioning technology, and Space Shift's DX technology were explained. Several consultations on JCM were received after the workshop.

The program content of the technical workshop is Table 3-5.

Table 3-5 Program of the Technical Workshop

| # | Time (Viet Nam) | Agenda | Speakers |
|---|-----------------|--|--|
| 1 | 14:00-14:10 | Opening Remarks | HCMC DONRE |
| 2 | 14:10-14:25 | Group photo | — |
| 3 | 14:25-14:35 | Introduction of JCM scheme and City-to-City Collaboration Projects | Nippon Koei |
| 4 | 14:35-15:35 | Introduction of JCM achievements and decarbonization technologies and services by Japanese companies | Japanese partner companies - Osaka Gas/ SOGEC - Yuasa Trading - ENDO Lighting Viet Nam - SMTFPC/BSL - JCH - Space Shift Inc. |
| 5 | 15:35-15:50 | Q&A | All |
| 6 | 15:50-16:00 | Closing Remarks | Osaka City, Environment Bureau |

Source: Prepared by Nippon Koei



Opening remarks of HCMC DONRE



Workshop venue in HCMC



Group photo



Opening remarks of Osaka City

Figure 3-2 Photos of Technical Workshop in HCMC

(4) Carbon neutral seminars

Yuasa Trading regularly organizes carbon neutral seminars to introduce services that contribute to decarbonization and to formulate JCM projects. In collaboration with Yuasa Trading, carbon neutral seminars for Vietnamese companies were held in Hanoi on August 24, 2023 and in Ho Chi Minh City on August 25, 2023. In the seminar, the trend of carbon neutrality in Viet Nam and Yuasa Trading's carbon neutral technologies were introduced. Approximately 50 participants in Hanoi and 120 participants in Ho Chi Minh City showed a high level of interest in this topic among Vietnamese companies. In addition, the Vietnam Chamber of Commerce and Industry (VCCI) publicized this seminar, which attracted a large number of visitors. The Project will continue to plan seminars utilizing the network of City-to-City Collaboration, aiming to formulate new JCM projects in the future. The program content of the seminar are Table 3-6 and Table 3-7.

Table 3-6 Program of Carbon neutral seminars in Hanoi

| # | Time (Viet Nam) | Agenda | Speakers |
|---|-----------------|---|-------------------|
| 1 | 14:00-14:10 | Opening Remarks Company Introduction | Yuasa Trading |
| 2 | 14:10-15:10 | Part 1: Introduction of the latest trends toward achieving carbon neutrality and JCM case studies | Yuasa Trading |
| 3 | 15:30-16:10 | Part 2: Introduction of Economic and Carbon Neutral Trends in Viet Nam | External Lecturer |
| 4 | 16:10-16:20 | Q&A session | — |
| 5 | 16:20-16:40 | Introduction of energy-saving equipment | Yuasa Trading |

Source: Prepared by Nippon Koei

Table 3-7 Program of Carbon neutral seminars in HCMC

| # | Time (Viet Nam) | Agenda | Speakers |
|---|-----------------|---|---------------|
| 1 | 14:00-14:10 | Opening Remarks • Company Introduction | Yuasa Trading |
| 2 | 14:10-15:10 | Part 1: Introduction of the latest trends toward achieving carbon neutrality and JCM case studies | Yuasa Trading |
| 3 | 15:30-15:55 | Part 2: Introduction of Carbon Neutral Trends in Viet Nam | Nippon Koei |
| 4 | 15:55-16:20 | Q&A session | — |
| 5 | 16:20-16:45 | Introduction of energy-saving equipment | Yuasa Trading |

Source: Prepared by Nippon Koei



Carbon neutral seminar (Hanoi)



Carbon neutral seminar (Hanoi)



Carbon neutral seminar (HCMC)



Carbon neutral seminar (HCMC)

Figure 3-3 Carbon Neutral Seminar (photo)

(5) Sharing of Knowledge and Promotion of Initiatives for Environmental Education

In discussions between the two cities last year, Ho Chi Minh City requested that Osaka City share its knowledge on environmental education, and this year's policy dialogue included a specific introduction of Osaka City's environmental education initiatives for elementary and junior high school students. Osaka City has been emphasizing environmental education and environmental learning for the future generation and has created a supplementary material

called "Osaka Environmental Studies." The supplementary material covers five areas: biodiversity, circulation, global warming, energy, and urban environmental conservation. The supplementary material is edited by teachers of science, social studies, and general education at elementary and junior high schools in Osaka City, and the content is revised annually. They contain the latest information unique to Osaka City and are currently used in about 90% of schools. In Ho Chi Minh City, environmental education is also being provided to schools, and the two cities commented that they would like to continue exchanging information as a common effort. In response to a request from DONRE, the sections of educational materials for 3rd and 4th grade elementary school students in Osaka City related to waste materials were translated into Vietnamese and shared with Ho Chi Minh City as a sample during the third field survey. Ho Chi Minh City will share the sample with the HCMC Department of Education as well to discuss topics of interest. In the following fiscal year, the Project plans to discuss how to incorporate this into environmental education on the Ho Chi Minh City side.



Figure 3-4 Osaka City Environmental Education Materials (sample Vietnamese translation)

(6) Consideration of Multiple Benefit and DX for Project Formulation

In this fiscal year, the multiple benefit and DX introduction were considered through project formulation.

Remote support tool for field survey

As a trial, a tool developed by a Japanese IT company was used outdoors and indoors in the HCMC to display the equipment such as solar panels in virtual space on a tablet. It plans to continue to consider utilizing this tool in the next year's visits to Industrial Parks and factories,

since the digital design data (CAD) of the equipment in which local partners are interested can be imported in advance and conduct a field trial.


Proposal related to Decarbonization and Environment Projects Using DX in HCMC

With the support of a Japanese company which develops algorithm of methodology of satellite image analysis, example of DX usage and technical proposals based on the expected demand of the HCMC were presented at the technical workshop. In addition, the interview survey was conducted to the related Vietnamese companies and institutions for consideration of further collaboration. The detailed results of the survey are described in chapter 4.5.

(7) Seminar on City-to-City Collaboration for Zero Carbon Society

MOEJ hosted the seminar on City-to-City Collaboration for Zero Carbon Society on February 26 and 27, 2024, inviting partner cities to Japan. The seminar was held on the occasion of the 10th anniversary of the City-to-City Collaboration Project and aimed to promote zero carbon society through three sessions: (1) high-level session, (2) mutual learning session, and (3) site visit to a decarbonization leading area. Ho Chi Minh City DONRE and Osaka City participated in the seminar. The Project supported for the invitation procedures to Japan, and Figure 3-5 was prepared as seminar materials.

FY2023 C3P Project Overview



| Japanese City | Partner City | Implementation Body |
|---------------|------------------|-----------------------|
| Osaka City | Ho Chi Minh City | Nippon Koei Co., Ltd. |

Project title

Promotion of Carbon Neutrality based on Climate Change Policies in Ho Chi Minh City and Thu Duc City

Project objectives

The objective of this Project is to support policy formulation and efforts to implement the “HCMC Climate Change Action Plan (CCAP)” through policy dialogue, workshops and formulation of JCM projects.


Planned activities in FY2023

- Implementing policy dialogue and technical workshops
- Sharing know-how and promoting environmental education
- Support for expansion of JCM projects to other areas
- Study on multi-benefits and DX utilization

Major achievements in FY2023 & previous years

- 7 JCM projects were selected by MOEJ
- Organized policy dialogue, technical workshops, and JCM seminar
- Shared environmental materials from Osaka City to HCMC

Policy Dialogue 27 Oct 2023



Technical Workshop 26 Oct 2023




Figure 3-5 City-to-City Collaboration Seminar material (Project Overview)

CHAPTER 4 JCM MODEL PROJECTS FORMULATION STUDY

4.1 Activities for Project Formulation

The main proposed technology of this fiscal year for project formulation was listed in figure 4-1 and the details shown from next pages. Regarding the proposed energy saving technology and renewable energy technology for formulating JCM model projects from previous years, participating Japanese companies conducted individual business negotiations on their own with potential partner companies. The project teams also conducted visiting new companies and factories to confirm needs of the above sector. In addition, usage of DX in the decarbonization sector was considered and through the interview survey of related organization and companies, their potential and interests were confirmed. A candidate project introducing waste heat recovery system was found through the survey, it plans to discover partner Vietnamese company and formulate new project in the next fiscal year.

Table 4-1 Outline of proposed technology

| # | Study contents | Outline |
|---|---|--|
| 1 | Introduction of LED Lighting with Dimming Function | <ul style="list-style-type: none"> - Support on discussion between participating Japanese company with Vietnamese company for application of JCM model projects. - No change of specification of the proposed LED lighting and implementation structure, the discovery of new project was conducted based on the previous survey results. |
| 2 | Solar Power Generation in the Industrial Parks | <ul style="list-style-type: none"> - No change of solar power system and implementation structure from previous JCM model projects, introduction of proposed system to Industrial Parks and factories was mainly conducted based on the previous survey results. - The detailed calculation for project formulation should be done after discovering partner company with consideration of specification of battery and EMS in the next fiscal year. |
| 3 | Formulation of Fluorocarbon Recovery and Destruction in the factory | <ul style="list-style-type: none"> - Support on application document of Fluorocarbon Recovery and Destruction JCM project based on the previous survey results. |
| 4 | Consideration of usage of DX technology to JCM model projects | <ul style="list-style-type: none"> - Consider to decarbonization and environment solutions using satellite image and discover several Vietnamese company and organizations with collaborate to next fiscal year. |
| 5 | Introduction of waste heat recovery system in the existing factory | <ul style="list-style-type: none"> - Discuss with Vietnamese company which has interest in waste heat recovery system in own factory. The detailed specification and applicability of JCM model projects will be confirmed in the survey in the next fiscal year. - Due to under discussion, the detail result of survey was not described in this chapter. |

Source: Prepared by Nippon Koei

4.2 JCM Model Project Formulation for Installation of Energy-saving Equipment (LED Lighting with Dimming Function)

4.2.1 Outline of the Study

Study for JCM model projects formulation for installation of dimmable and highly efficient LED lightings to buildings, commercial facilities, factories, etc. in HCMC and Thu Duc City was carried out. Studied technology is dimmable and highly efficient for LED lighting sold by Endo Lighting Viet Nam who is Vietnamese subsidiary of lighting equipment manufacturer, Endo Lighting Corporation based in Osaka City.

Having collected information in Viet Nam during the previous fiscal year, this year, surveying specific facilities and interviews with companies that are candidates for partner participants in the JCM Model Project in preparation for their applications were conducted.

Study contents are as follows.

Table 4-2 Study contents for installation of high efficiency LED Lighting with dimming function

| # | Study contents | Outline |
|---|--|---|
| 1 | Consideration of specification of installed technologies | Study of existing equipment and consideration of installed technologies were implemented. |
| 2 | Project plan and evaluation | Project cost, energy-saving effect, payback period and CO2 emission reduction were considered. |
| 3 | Consideration of international consortium and implementation structure | International consortium and implementation structure were considered for application for JCM model projects. |

Source: Prepared by Nippon Koei

4.2.2 Information Collection of LED Lighting in Viet Nam

In accordance with collected data, overall lighting market in Viet Nam drastically increased from VND 5,275 billion in 2015 to VND 9,066 billion in 2020 and share of LED lighting sharply rose from 37.7% in 2015 to 60.4% in 2020. Market scale of “Commercial and service facility” including candidate building of the study is VND 3,626 billion in 2020 and 65% of total is occupied by LED lighting.

4.2.3 Specification of Installed Technologies

Tunable LEDZ, dimmable and highly efficient LED lighting of Endo Lighting has one of the most efficient LED lighting firms in Japan. Table 4-3 shows the comparison among LED lightings sold in Viet Nam by three manufacturers. Efficiency of Tunable LEDZ is 160 lm/W which is much better than around 110 lm/W of products of a local manufacturer, Company C and of European manufacturer, Company D.

In addition, by combining with wireless control system, Smart LEDZ, dimming (function to tune brightness of lightings) and toning (function to change color of lightings to meet preference of users and purpose) can be controlled automatically, which realizes further energy saving.



Source : Endo Lighting

**Figure 4-1 Dimmable LED lighting
“Tunable LEDZ” of Company A**

Table 4-3 Comparison of LED lighting

| Supplier (Base country) | Tunable LEDZ | C (Vietnamese) | D(Dutch) |
|-------------------------|--------------|----------------|----------|
| Length (mm) | 1,200 | 1,210 | 1,195 |
| Color temperature (K) | 5,000 | 3,000 | 4,000 |
| Luminous (lm) | 6,025 | 7,600 | 3,370 |
| Power consumption (W) | 37.8 | 72 | 30 |
| Efficiency (lm/W) | 159.4 | 105.5 | 112.3 |

Source: Prepared by Nippon Koei based on information of the three manufacturers

Tunable LEDZ is dimmable by scheduling operation and manual operation, which lead to large amount of energy saving. Tunable LEDZ can be controlled one by one with different dimming rate even if they are installed in the same space, and this enables keeping the same brightness in the space without difference of dark and bright positions. This leads to improvement of value of the office because this point is important for office workers from the perspective of indoor working environment.

4.2.4 Project Plan and Evaluation

To apply for JCM model project in FY2021, GHG emission reduction, subsidy amount, cost-effectiveness and payback period were calculated. The result of the trial calculation is shown in Table 4-4 and Table 4-5. Since JCM methodology of interior LED lighting has not been developed in Viet Nam, calculation was carried out based on approved methodology in

Indonesia “AM_ID005: Installation of LED Lighting for Grocery Store”. However, this methodology cannot take dimming effects into account, thus formula below was utilized to calculate annual electricity consumption and GHG reduction.

$$\begin{aligned} &(\text{PRJ annual GHG reduction}) = (\text{PRJ annual electricity consumption}) \times (\text{Emission factor}) \\ &(\text{REF annual GHG reduction}) \\ &= (\text{REF annual electricity consumption}) \times (\text{Emission factor}) \times (\text{PRJ efficiency}) \times (\text{REF efficiency}) \\ &(\text{PRJ annual electricity consumption}) = (\text{Operation hour}) \times (\text{No. of LED}) \times (\text{Lighting input}) \times (\text{Dimming rate}) \\ &(\text{REF annual electricity consumption}) = (\text{Operation hour}) \times (\text{No. of LED}) \times (\text{Lighting input}) \\ &\text{PRJ: Project} \quad \text{REF: Reference} \end{aligned}$$

Table 4-4 Trial calculation of GHG reduction and cost-effectiveness

| # | Item | Figure | Unit | Remarks |
|----|------------------------------------|--------|-----------|--|
| a) | Operation hour | 3,120 | h/year | =13h/day x 240day (Condition) |
| b) | Number of lightings | 2,800 | - | Condition |
| c) | Input | 37.8 | W | Figure from catalogue |
| d) | Lighting rate | 60 | % | Study by Company B |
| e) | PJT annual electricity consumption | 198 | MWh | =a) x b) x c) x d) |
| f) | REF annual electricity consumption | 330 | MWh | =a) x b) x c) |
| g) | Luminous flux | 6,025 | lm | Figure from catalogue |
| h) | PJT efficiency | 159.4 | lm/w | = g) / c) |
| i) | REF efficiency | 110.0 | lm/w | AM_ID005 |
| j) | Emission Factor | 0.7221 | tCO2/MWh | GEC guideline for FY2023 JCM model project |
| k) | PJT GHG emission | 180.9 | tCO2/year | = d) x h) (AM_ID005) |
| l) | REF GHG emission | 436.9 | tCO2/year | = f) x h) / i) x j) (AM_ID005) |
| m) | Annual GHG reduction | 256 | tCO2/year | = j) - i) |
| n) | Project period | 12 | year | legal lifetime |
| o) | Total GHG reduction | 3,072 | tCO2 | = k) x l) |
| p) | Subsidy amount | XXXXXX | JPY | Subsidy rate XX% |
| q) | Cost-effectiveness | 3,999 | JPY/tCO2 | = n) / m) |

Source: Prepared by Nippon Koei

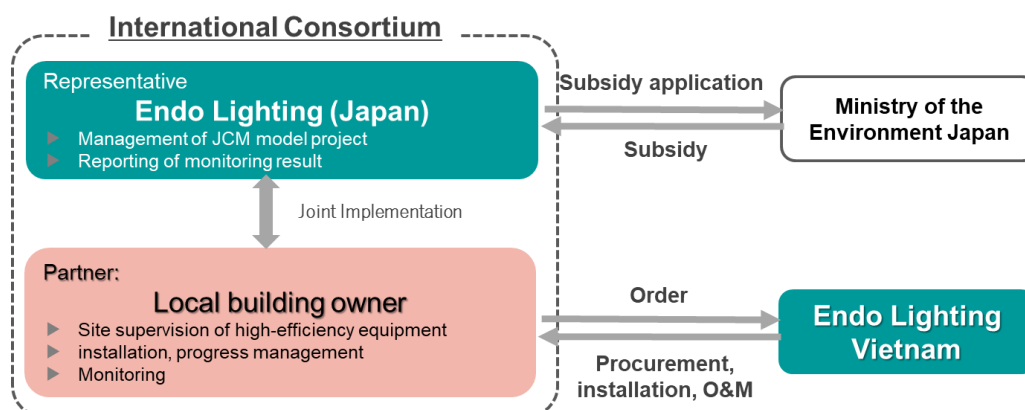
As a result of the trial calculation above, it was found that project for installation of dimmable and highly efficient LED lighting of Endo Lighting has a high potential to be applied for JCM model project.

4.2.5 Consideration of International Consortium and Implementation Structure

Two of the international consortiums and implementation structures below can be assumed for application for JCM model projects.

One is Endo Lighting Corporation (Japan) as a representative company, manages this project comprehensively and implement checking and reporting of monitoring results while local building owner, as a partner company, order the LED lighting to Endo Lighting Viet Nam and owns them. Endo Lighting Viet Nam is in charge of procurement, installation and operation and maintenance.

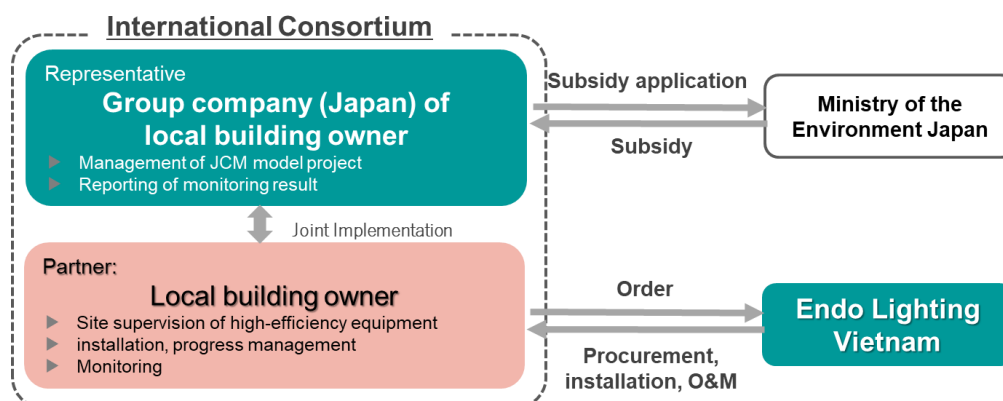
Note: Since the products will be purchased from ENDO Lighting, the representative participant, profit exclusion will be applied to the subsidy amount based on the rules of the JCM Model Project (Figure 4-2).



Source: Prepared by Nippon Koei

Figure 4-2 International consortium and implementation structure of JCM model project for introduction of dimmable and highly efficient LED lighting (1)

The other one is Local building owner and their group company based in Japan to form an international consortium and buy LED lightings from Endo Lighting Viet Nam. Endo Lighting Viet Nam is in charge of procurement, installation and operation and maintenance (Figure 4-3).



Source: Prepared by Nippon Koei

Figure 4-3 International consortium and implementation structure of JCM model project for introduction of dimmable and highly efficient LED lighting (2)

4.2.6 MRV Planning

The methodology for dimmable LED is currently under development in the JCM Model Project adopted in previous years. The measurement data (monitoring data) required for the calculation of GHG emission reductions will be LED-derived electricity consumption, and dimming rates will be normally operated based on planned values. The implementation structure of MRV assumes the flow of measurement and record management by the partner participant, and reporting to the Japanese company of the representative participant.

4.3 JCM Model Project Formulation of Renewable Energy (Solar Power Generation)

4.3.1 Outline of the Study

As a result of previous study, it was found that there is high potential for the introduction of rooftop PV system in Ho Chi Minh City and Thu Duc City. On the other hand, according to information from Ho Chi Minh City, the introduction of rooftop solar power in public facilities is not possible at this time due to restrictions in the current system (for details, see “2.2.2 (3) Difficulties in Introducing Rooftop Solar Power Generation in Public Facilities in HCMC”). Therefore, this year, the following items targeting solar power generation for private companies' own consumption, such as in factories, were studied. (Table 4-5).

Table 4-5 Study contents for JCM model project for Solar power generation

| # | Study contents | Outline |
|---|--|---|
| 1 | Promotion of understanding of JCM subsidy scheme | To promote the understanding of HCMC, outline of JCM scheme and example of JCM for public facility in other country were introduced. |
| 2 | Information collection of candidate facilities for JCM | The outline of buildings and large-scale facilities in HCMC were collected. |
| 3 | Project evaluation | In case of 1MW PV solar generation, project cost, amount of power generation, the payback period of the investment, and the amount of GHG emission reduction were examined. |

Source: Prepared by Nippon Koei

4.3.2 Specification of Installed Technologies

Although technologies to be installed are decided depending on the purpose and scale, the following equipment (PV panel, inverter and monitoring system) is assumed to be introduced (Table 4-6).

Table 4-6 Specification of target equipment

| # | Equipment | Outline |
|---|-------------------|---|
| 1 | PV panel | The PV panel is made by Japanese manufacturer and the specification needs to be suitable for target facility such as shape and weight and to have better power generation efficiency (more than 20%) and durability. |
| 2 | Inverter | The specifications of inverter will be decided according to the compatibility with the solar panel. |
| 3 | Monitoring system | The system needs to measure the amount of generated power for the calculation of GHG emission reduction and to control remotely for getting monitoring data. Optimal specifications for PV panels and other equipment are required. |

Source: Prepared by Nippon Koei

4.3.3 Results of the Study

This year, the field survey was resumed, and the interest in introducing solar power equipment was confirmed by introducing the technology and case studies widely to Ho Chi Minh City officials and local and Japanese companies through the technical workshop. In addition, information on companies and facilities with high energy consumption in the city was organized, and information sharing on the JCM scheme and case studies was conducted through online meetings and e-mails. It was planned to continue discussing the technology and implementation system with companies interested in this technology for application in the following fiscal year and beyond.

4.3.4 Project Plan and Evaluation

With the aim of JCM application later than this fiscal year, project feasibility was evaluated. JCM methodology "VN_AM007_ver 01.0 (Installation of Solar PV System)" was applied for the evaluation. Annual power generation, GHG emission reduction and cost-efficiency was estimated by assuming 1MW of PV system.

Note that, from this year's JCM Model Project subsidy program application guidelines, there are conditions for solar power generation projects in terms of panel efficiency (20% or more) and cost-effectiveness (2,500 yen or less), and the subsidy rate in Viet Nam is capped at 30%, so the business potential of the project must be reconfirmed at the time of application.

Below are the results of the trial calculation for the installation of 1MW-scale solar panels (Table 4-7). It is possible to secure a scale equivalent to 10 to 30 MW by installing multiple rooftop solar panels on the roofs of the companies occupying the industrial park (tenant factories). In addition, since surplus power can be flexibly distributed within the industrial park as private consumption without connection to the grid, efficient and economical use of renewable energy power can be expected without considering power loss. In particular, Ho Chi Minh City, Thu Duc City, and the surrounding provinces have a large number of industrial parks, so the potential is extremely high.

Table 4-7 Trial calculation of project for installation of PV solar system

| Items | Figure | Unit | Remarks |
|--|-----------------|------------------------|---|
| Project cost (rough calculation) | XXXXXX | JPY million | Including PV panels, inverters and EMS etc. |
| Annual power generation by renewable energy | 1,444 | MWh/year | Estimated by a calculation model |
| Annual GHG emission reduction | 991 | tCO ₂ /year | EF (Renewable energy): 0.533 (tCO ₂ /MWh) |
| Cost efficiency | Around 2,500 | JPY/tCO ₂ | Condition of JCM model project application in FY2023 |

Source: Prepared by Nippon Koei

4.3.5 Consideration of International Consortium and Implementation Structure

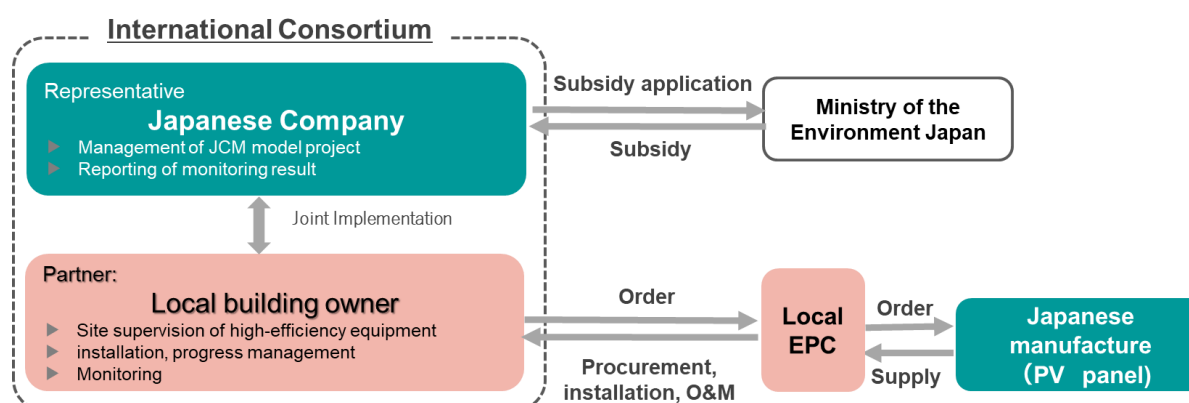
In single facilities, due to limited roof space, the power generation capacity per project is mostly in the range of 0.5 to 1 MW. Since Viet Nam no longer has a feed-in tariff (FIT) system, and Ho Chi Minh City and Thu Duc City has the difficulties in introducing PV system with the assumption of selling electricity under the current system, the implementation structure of the JCM Model Projects were examined based on the assumption of self-consumption.

In particular, based on the results of previous studies, in order to secure maximum GHG emission reductions as a JCM Model Projects in the case of a single project for commercial facilities and factories, it was considered including renewal and energy saving of existing facilities with electricity consumption. Since multiple patterns are possible, a total of four implementation structures were considered for the JCM Model Projects and the Eco leasing projects as shown below (Table 4-8, Figure 4-4-Figure 4-7).

Table 4-8 Expected International consortium (four cases)

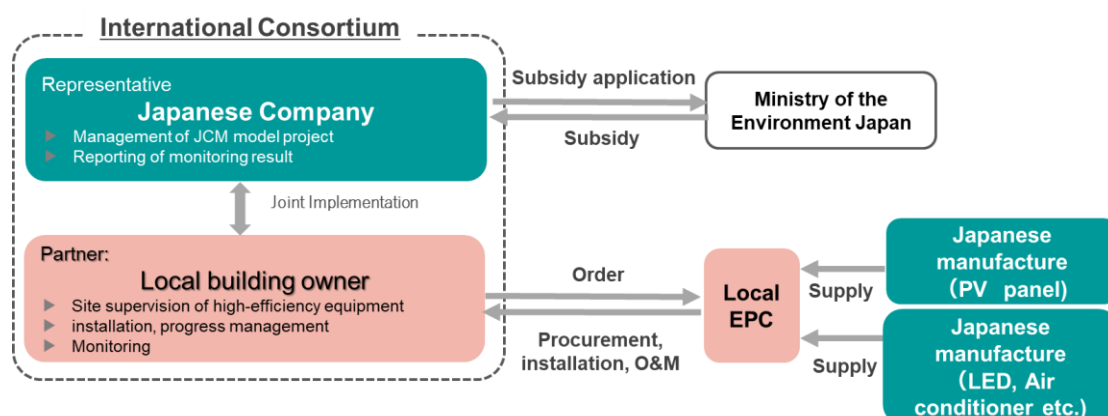
| # | Introducing equipment | Scheme |
|---|--|-------------------------|
| 1 | Solar power generation system in single facility | JCM model project |
| 2 | Solar power generation system & energy saving equipment in single facility | JCM model project |
| 3 | Solar power generation system & energy saving equipment in single facility using leasing service | JCM Eco leasing project |
| 4 | Solar power generation system in multiple facilities (tenant factories) | JCM model project |

Source : Prepared by Nippon Koei



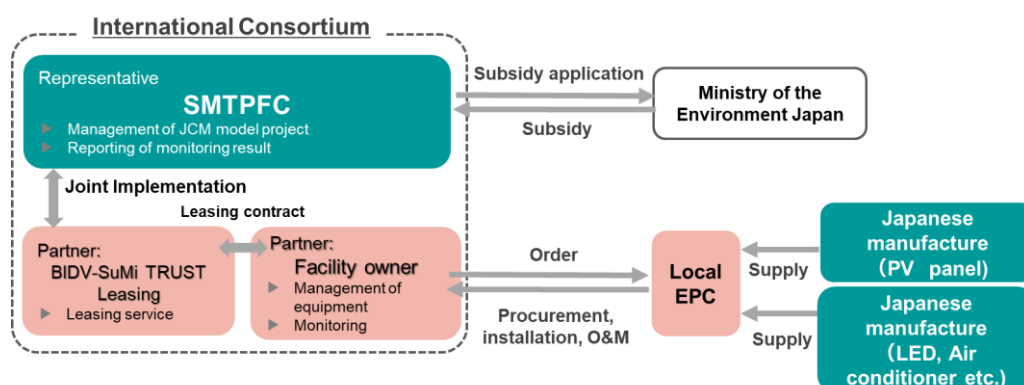
Source: Prepared by Nippon Koei

Figure 4-4 International consortium and implementation structure of JCM model project in public sector (1/4)



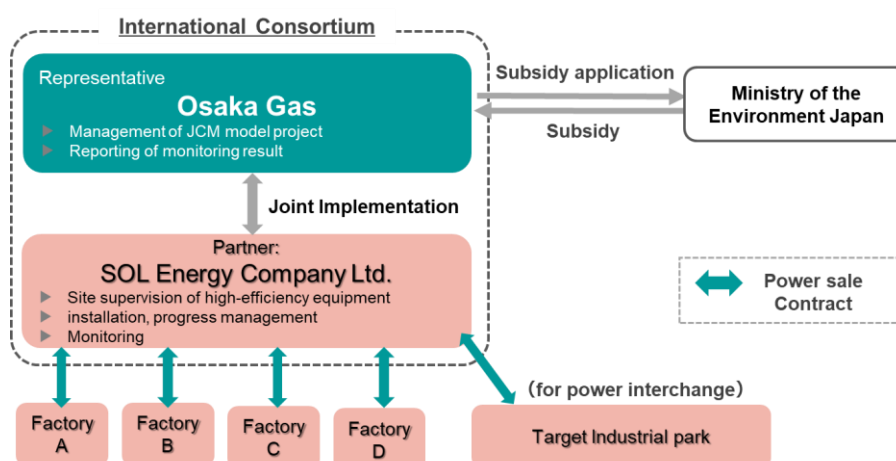
Source: Prepared by Nippon Koei

Figure 4-5 International consortium and implementation structure of JCM model project in public sector (2/4)



Source: Prepared by Nippon Koei

Figure 4-6 International consortium and implementation structure of JCM model project in public sector (3/4)



Source: Prepared by Nippon Koei

Figure 4-7 International consortium and implementation structure of JCM model project in public sector (4/4)

4.3.6 MRV Planning

MRV (Measurement, Reporting and Verification) will be conducted based on the approved methodology (VN_AM007Ver01.0/ Installation of Solar PV System), and the measurement data (monitoring data) required to calculate GHG emission reductions will be the amount of electricity generated, ignoring the generation loss due to electricity sharing. The MRV implementation structure is assumed to be a process in which partner participants (multiple cases are assumed) manage measurements and records, and reports to the Japanese company that is the representative participant.

4.3.7 Future Plans for Dissemination of the Project

Among the multiple business cases examined in this study, the one with the most potential for future diffusion and expansion is the project shown in Figure 4-8, which involves the installation of rooftop PV system on multiple factories in an industrial park. It is a versatile business model because the scale can be adjusted with similar equipment specifications, and an environment is being created in which it is easy to explain the project to other industrial parks (management company and tenant factories) based on knowledge and actual data from the JCM Model Projects already underway.

As shown in the following image (Figure 4-8), the spread of PV system to Ho Chi Minh City, Thu Duc City, and surrounding areas is expected to contribute to decarbonization at the city and regional level. It was planned to continue to propose this business model through HEPZA in Ho Chi Minh City in the next fiscal year's City-to-City Collaboration Project, utilizing the JCM Model Projects.

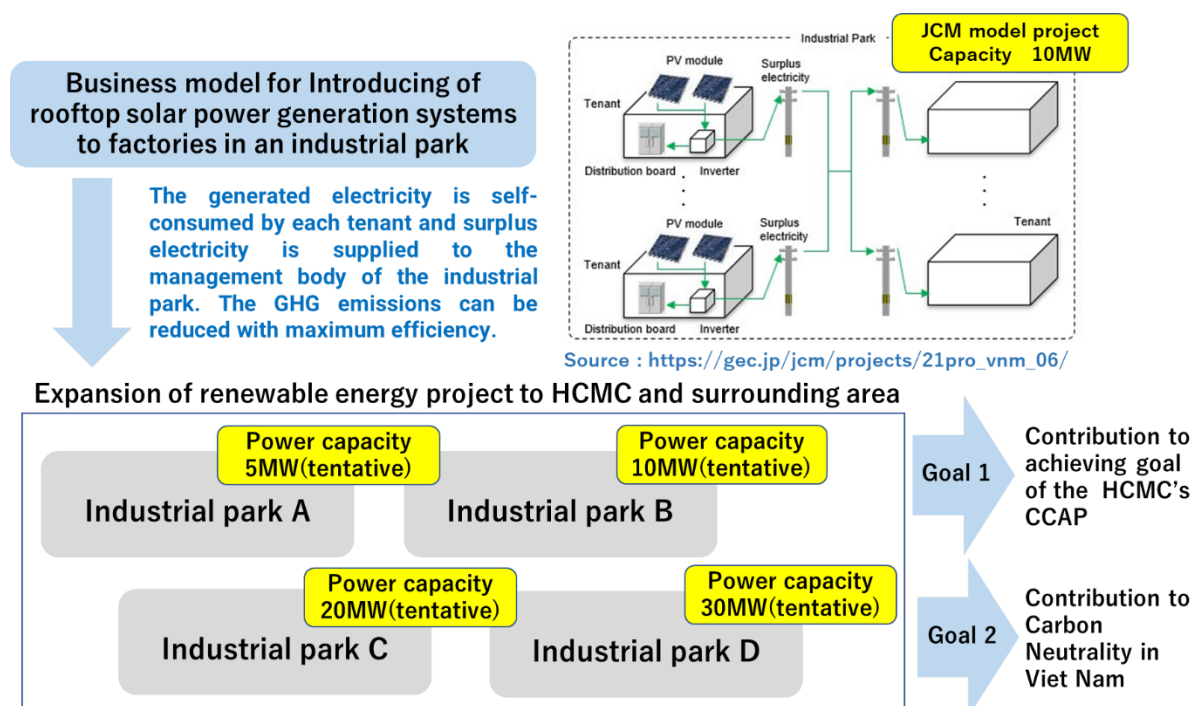


Figure 4-8 Image of dissemination of solar power generation system in industrial parks

4.4 JCM Model Project Formulation of Fluorocarbon Recovery and Destruction

4.4.1 Outline of the Study

In terms of laws and regulations, Viet Nam has ratified the Montreal Protocol, which aims to reduce the production and consumption of ozone-depleting substances, including fluorocarbons. In HCMC, demand for fluorocarbon recovery and destruction is expected to increase in the future as a new field to be supported.

This City-to-City collaboration project has been focusing on the project formulation using JCM scheme to reduce CO₂ emissions, but in this fiscal year, data collection of fluorocarbon recovery and destruction was also conducted to consider the possibility of support by cities and Japanese companies. The study items regarding fluorocarbon are as follows.

- a) Basic information collection related to fluorocarbon recovery and destruction in Viet Nam
- b) Information collection on current systems, related laws and regulations of fluorocarbon recovery
- c) Information collection on the current status of countermeasures and trends of fluorocarbon recovery

4.4.2 Result of the Study

a) Basic Information Collection

The Vietnamese government was one of the first countries to join the Montreal Protocol on Substances that Deplete the Ozone Layer and the Vienna Convention for the Protection of the Ozone Layer in 1994. In implementing the Montreal Protocol, Viet Nam has wholly excluded a number of ozone-depleting substances, such as chlorofluorocarbons (CFCs), Halon, and carbon tetrachloride (CTC), while controlling the import and export of Methyl Bromide and implementing a roadmap to eliminate hydro-chlorofluorocarbons (HCFCs).

b) Current Regulation and related Laws regarding Fluorocarbon Recovery

With the adopted roadmap, Viet Nam will end the consumption and use of hydrofluorocarbons (HFCs), mostly used in refrigeration, air conditioning, insulating foam, and aerosol production propellants, from 2024. According to the Department of Climate Change in Viet Nam, information on current regulations on the control of fluorocarbons will be shared and experience in the management of ozone depleting substances will be exchanged.

Currently, the National Assembly and the Vietnamese government have legal systems that set out an important legal framework to manage ozone-depleting substances and GHG. This includes regulations governing the production, import, export, consumption and disposal of controlled ozone-depleting substances and GHG; clarifying the responsibilities of state management agencies, organizations and individuals involved in the export, import and production of substances that deplete the ozone layer, substances causing the greenhouse effect.

Relevant legal documents on ozone layer protection, including:

- Law on Environmental Protection (*Article 92: Ozone layer protection*)
- Decree No. 06/2022/ND-CP dated January 07, 2022, Decree on mitigation of GHG emissions and protection of ozone layer.
- Decree No. 45/2022/ND-CP dated July 07, 2022, Decree on penalties for penalties for administrative environmental protection offenses. (Article 45: Offences against regulations on GHG emissions mitigation, Article 46: Offences against regulations on ozone layer protection)
- Circular No. 01/2022/TT-BTNMT dated July 07, 2022, providing guidelines for implementation of the Law on Environmental Protection regarding response to climate change

c) Current Status of Countermeasures and Trends of Fluorocarbon Recovery

Regarding supporting businesses to implement technology transformation without using ozone-depleting substances, as of September 2022, the Department of Climate Change has completed implementing subprojects for technology conversion in some fields: manufacturing refrigeration equipment, foam manufacturing, manufactures air conditioners. These companies typically collect used air conditioning units and recover the fluorocarbons for reuse or destruction.

In HCMC, currently, there are no specific regulations regarding the recovery of fluorocarbons from air conditioning systems. The market for these services is still in its early stages. No official information about companies performing fluorine recovery in HCMC exists. Overall, the demand for fluorocarbon recovery in HCMC is expected to increase as environmental awareness grows and regulations become more stringent.

4.4.3 Items for Future Consideration

As a result of the study, it was found that while the legal development at the national level is progressing, policies and initiatives at the city level are to be implemented. Fluorocarbon emissions due to new/renewal equipment are expected to be enormous in HCMC with as the largest city of Viet Nam with large amount of logistic and Thu Duc City which is being developed as a new city. Based on the requirements of these cities, it will be considered necessary support from next year continuously.

4.5 Support on JCM Model Projects Formulation using DX

In this fiscal year, interview survey was newly conducted with the following organizations based in Vietnam and Ho Chi Minh City to discuss the introduction of DX and the formulation of JCM model projects. In addition, the technical workshop provided information of future potential technology such as satellite image analysis (See attachment) related to the environment and decarbonization of Ho Chi Minh City. Interest from related organizations has become higher, and it plans to continue the discussions of this field in the next fiscal year.

(1) Ho Chi Minh City DONRE

The possibility of using satellite technology to solve social issues such as city disasters and environmental issues faced by Ho Chi Minh City including DONRE was introduced. DONRE has not yet used satellite data and is not yet familiar with satellites and AI. Due to the speed of decision making, it will be considered developing business for the private sector in Ho Chi Minh City first. It expects to expand these technologies to the public sector in the future.

(2) Vietnam National Space Center (VNSC)

Vietnam National Space Center (VNSC) plans to launch the LOTUS sat-1 synthetic aperture radar satellite in December 2024, funded by Japanese Official Development Assistance (ODA). This satellite is X band satellite and expected to be used for disaster monitoring or other important events in Viet Nam to contribute to climate change countermeasures. VNSC's Hanoi office has mainly teams on satellite development and analytics teams are based in Ho Chi Minh City. VNSC has already launched three optical satellites (Pico/Nano/Micro). The GIS team has been implemented several R&D projects using these satellite and other satellite such as Sentinel-1, ALOS-2, Landsat, Terra-SAR and so on. The R&D fields are flood monitoring, crop monitoring, forest monitoring, building density monitoring, and some of topics are collaborating with the Japan Aerospace Exploration Agency (JAXA). After the interview, VNSC suggested that focusing on monitoring agriculture, forests (for carbon credits for example) or renewable energy fields for collaboration. To implement the collaboration, it is necessary to discuss looking for available budgets such as international and domestic funds as future consideration.

(3) Private Company (Company V)

Company V was established in November 2000 as one of the leading technology companies in Viet Nam specializing in providing Electrical, Telecom & IT, Medical products. It is also an authorized agent for foreign organizations and partners worldwide for the Vietnamese market. The business of this company covers a variety of industries by providing several solutions involving geospatial technologies such as remote sensing data, satellite data analysis, and UAV

data. It was especially interested in ship monitoring, disaster monitoring, and agriculture monitoring and detailed discussions will be held in the future.

(4) Private Company (Company S)

Company S, a GIS company, is a multi-disciplinary firm of Planners, environmentalists and Information solutions specialists providing consulting services to public, private, and international clients. It was founded in 1999 in New Delhi, India as an urban planning/architectural design company. It established Company P in 2008 based on international experience and diversification in domain of expertise.

It aimed to know about each other's businesses and to make a partnership to deliver GIS solutions in Viet Nam. It is especially interested in building detection by AI and possibility of estimation of height of buildings to calculate GHG emissions. At this time, the development of automatic building detection is underway, but it was agreed to continue discussions with this company.

CHAPTER 5 FUTURE PLAN

5.1 Achievements of the Project in FY2023 and Plan for Further Activities

A major achievement of this fiscal year was holding of a face-to-face policy dialogue and technical workshop between the two cities in October 2023. Through these discussions, information sharing on the latest policies and institutions in both cities and exchange of views on decarbonization initiatives and applied technologies were conducted. In the process of JCM model projects formulation, the Project provided support to participating companies in the developing project plans. Table 5-1 shows the status of achievement of the activities set as this year's target in 1.4 Implementation Strategies above and the activities expected in the next fiscal year (in the third year).

Table 5-1 Achievements of FY2023 and activity plan in next fiscal year

| # | Activities in FY2022 (the first year) | Achievements and further activity |
|--|---|--|
| < Activities through City-to-City Collaboration > | | |
| 1 | Meeting for City-to-City Collaboration and Policy Dialogue | Conducted. It was confirmed that both cities hope to continue conducting the policy dialogue in the next fiscal year. In addition, DONRE has requested technical assistance in methodology and monitoring for the pilot implementation of carbon credits, which will be included in the next year's activities. |
| 2 | Planning and holding of the technical workshop | Conducted. The technical workshop in the next fiscal year is expected to consist of two parts: technical introduction and discussion. |
| 3 | Sharing information and promotion of initiatives related to environmental education | Conducted. Osaka City provided sample environmental education contents in English and Vietnamese. In the next fiscal year, specific support and initiatives will be considered based on the request from Ho Chi Minh City. |
| 4 | Support for horizontal deployment of JCM model projects | Conducted. Supported the formulation of JCM model projects by companies participating in the City-to-City Collaboration. Though the application document was prepared, it was not adopted this year. Continue support in the next fiscal year. |
| 5 | Consideration of multiple benefit and introducing DX | Conducted. A carbon neutral (CN) Seminar was held to meet the needs of Vietnamese companies, and the results of the potential survey of was presented. In the next fiscal year, any new policies or information regarding CN will be shared with the parties concerned. Regarding DX, the consideration of remote survey tools was conducted, and the technologies and case studies were introduced at the technical workshop. |
| 6 | Collecting information and analysis on local environmental regulations such as Fluorocarbon recovery and waste management | Conducted. Information on regulations and current disposal methods related to Fluorocarbon recovery was collected and supported the formulation of a draft project plan. |
| < JCM projects formulation > | | |
| 1 | Finding and developing candidate partners and projects through technical workshops | Supported on identification of candidate projects and plan for formulating of JCM model projects. |
| 2 | Field survey and information | Exchanged information with Vietnamese private |

| | | |
|---|--|--|
| | collection on the latest trends in renewable energy and energy-saving | organizations in Ho Chi Minh City to understand current issues and demands. It plans to continue energy conservation and renewable energy proposals in industrial parks in the next fiscal year. |
| 3 | Examination of business model of Fluorocarbon recovery and destruction | Conducted research on companies and markets involved in Fluorocarbon recovery and supported Japanese companies to formulate project. |
| 4 | Introduction of DX and consideration of its utilization | With the cooperation of DX companies, interviews and surveys were conducted with related organizations, case studies were presented at technical workshops, and technical proposals were made. In addition, the use of DX to study the introduction of equipment in a virtual space and remote on-site survey support tools were considered. |
| 5 | Finding new participating companies by disseminating information of ongoing JCM projects | Through the technical workshop and JCN seminars, meetings with many companies were conducted and made progress in identifying potential partners for the next year's project formulation. |

Source: Prepared by Nippon Koei

5.2 Action Plan of the Project in FY2024

Based on the results of the achievement of activities and demands of HCMC, in the next fiscal year, it is planned to continue this support by adding the following activities.

5.2.1 Identification of Demand of Environmental Education and Necessary Supports

Through the policy dialogue in this year, specific examples of content for environmental education in Osaka City were introduced. The Project proposed to DONRE to study internally on how to utilize the system and plans to materialize activities for the next fiscal year according to the needs.

If Ho Chi Minh City can incorporate the efforts of Osaka City as a reference, the results of the City-to-City Collaboration project activities can be visualized. In addition, by disseminating information on the environment and climate change to the younger generation through environmental education, it is expected to increase interest in the city's efforts and promote citizen participation. In addition, the Project plans to identify activities that can be supported by the City-to-City Collaboration project, and to consider other funding sources for activities that require longer time frames or larger budgets.

5.2.2 Support for Strengthening Networks of Private Companies

VCCI-HCM supported to invite Vietnamese companies to the technical workshop and the JCM seminar this fiscal year. Since many companies participated, it plans to identify companies with a high level of interest in JCM and develop them as potential partners for the next fiscal year. Through the technical workshop, it was also able to collaborate with Ho Chi Minh City Association of Construction and Construction Materials (SACA) and held additional small-

scale JCM seminar with key association members. SACA has strong ties to industrial parks, which is expected to increase the certainty of project formulation.

Table 5-2 is assumed to be the method of collaboration for the next fiscal year, and the benefits of collaboration for both SACA and this project are summarized in Table 5-3.

Table 5-2 Idea for collaborative activity with SACA

| # | Collaboration activity | Expected achievement |
|---|--|--|
| 1 | Promotion of the technical workshop to Vietnamese company and follow-up to participating companies | <ul style="list-style-type: none"> • Create opportunities of business matching • Public awareness in private sector on zero-carbon/environment conservation • Promotion of introduction of zero-carbon/environment technology • Project formulation using JCM scheme |
| 2 | Strengthening functions as a consultation desk for Vietnamese companies | <ul style="list-style-type: none"> • Regarding zero-carbon/environment technology and JCM model projects, the project team responds consultation from Vietnamese company through VCCI, and supports on project formulation and introduction of these technology, if necessary. |

Source: Prepared by Nippon Koei

Table 5-3 Benefits of collaboration with SACA

| # | Target | Benefits of collaboration with SACA |
|---|---|---|
| 1 | Japanese side (Osaka City, Japanese partner companies) | <ul style="list-style-type: none"> • Easier expansion of business in Viet Nam, with the opportunity to introduce Japanese zero-carbon/environment technology and services. • It can be expected to improve corporate value and acquire new customers by introducing equipment which contributes environmental/ zero carbon and investment. • Publicize the charm of Osaka City and unique technologies of partner companies to Vietnamese companies. |
| 2 | Vietnamese side (SACA, HCMC, Thu Duc City, Vietnamese companies and Japanese companies in Viet Nam) | <ul style="list-style-type: none"> • Having knowledge makes it easier consider to introduce energy saving, renewable energy, fuel conversion and other advanced zero-carbon technology to own facility. • Increasing the opportunity of using the JCM by Vietnamese company. • It can be expected to improve corporate value and acquire new customers by introducing equipment which contributes environmental/ zero carbon and investment. • As a result, it leads to zero-carbon and environment conservation in the whole city. |

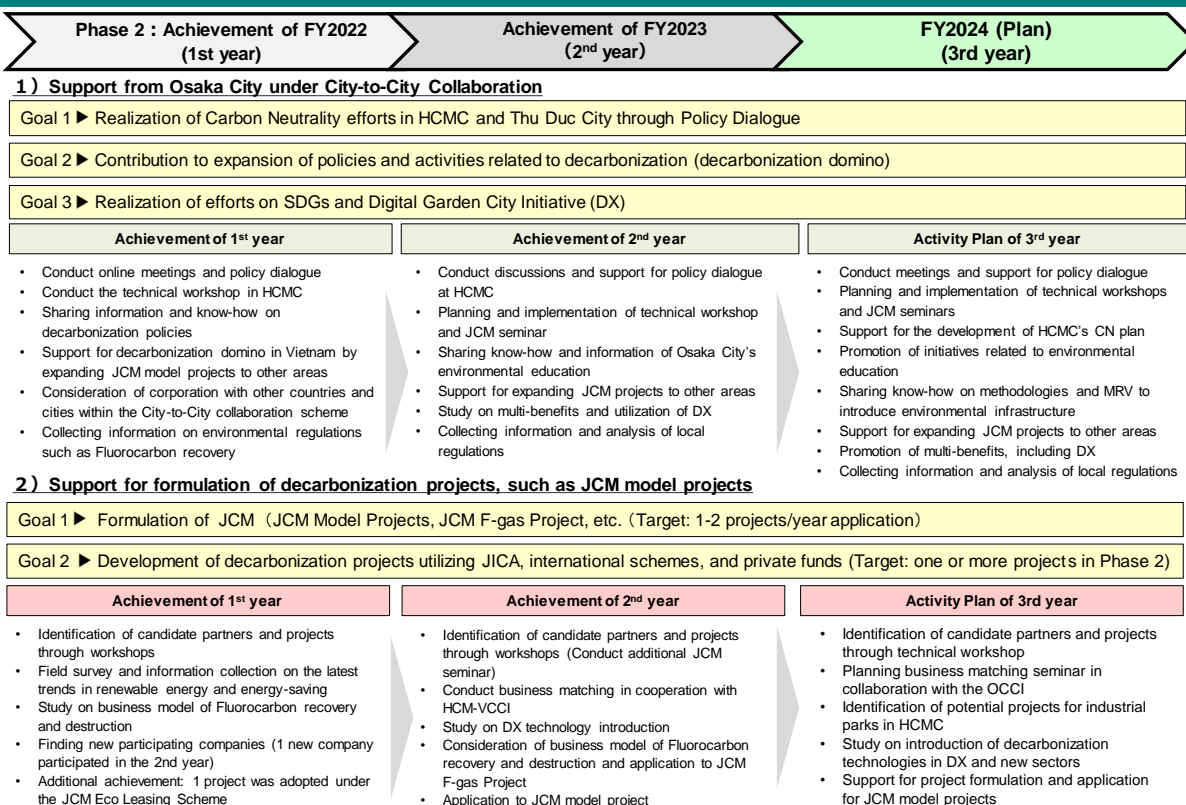
Source: Prepared by Nippon Koei

5.2.3 Plan of Project Activity in FY2024

The implementation plan for project activity and goals in FY2024 was updated based on the summarized achievement of activities in FY2023 shown in Figure 5-1. The contents of support will be further specified through the discussion with Osaka City and partner companies of this project.

Implementation plan of City-to-City Collaboration Project between HCMC and Osaka City

Promotion of Carbon Neutrality based on Climate Change Policies in Ho Chi Minh City and Thu Duc City



Source: Prepared by Nippon Koei

Figure 5-1 Plan of project activities in FY2024