MOEJ

# Final Report

## City to City Collaboration for Zero-carbon Society in FY2023

## Zero Carbon Development in Quezon City for the Realization of Carbon Neutral Society

March 2024

Oriental Consultants Co., Ltd.
Osaka City

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# Tables and Figures

# List of Abbreviations

| Abbreviation | Meaning |
|---|---|
| ADB | Asian Development Bank |
| BEMS | Building Energy Management System |
| C40 | C40 Cities Climate Leadership Group |
| DOE | Department of Energy |
| EMS | Energy Management System |
| Enhanced QC-LCCAP | Enhanced Quezon City's Local Climate Change Action Plan |
| EV | Electric Vehicle |
| GHG | Greenhouse Gas |
| JCM | Joint Crediting Mechanism |
| NDC | Nationally Determined Contribution |
| PEZA | Philippine Economic Zone Authority |
| SDGs | Sustainable Development Goals |

# Chapter1　Project Overview

## 1.1 Project Background and Objective

According to the report of Working Group III of the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) released in 2022, approximately 70% of global GHG emissions originate from cities, and it is essential to accelerate climate action in cities to achieve the 1.5-degree target set in the Paris Agreement. In Japan, the national and municipal governments are working together to create more than 100 Decarbonization Leading Areas under the Regional Decarbonization Roadmap formulated in June 2021, with the aim of achieving zero-carbon cities, and efforts are underway to expand these initiatives throughout Japan.

In order to realize world-wide decarbonization, it is necessary to accelerate the efforts toward building a sustainable zero-carbon society, especially in areas of rapid economic growth, such as parts of Asia. To this end, international efforts are being strengthened to support urban initiatives to decarbonize cities, which are the places that support socio-economic development.

As an example of such efforts, the Japanese Ministry of the Environment launched the Clean City Partnership Program (C2P2) with JICA in February 2023 centered around city-to-city collaboration in order to address the current challenges faced by cities around the world in a multifaceted manner. This program will provide comprehensive and synergistic support to partner cities to address urban challenges related to climate change, environmental pollution, the circular economy, and nature regeneration (“nature positive”) through further mobilization of technology and funds in collaboration with Japanese municipal governments, private companies, and financial institutions. It will also promote collaboration with other key stakeholders, including G7 and other like-minded countries and international development finance institutions.

In this project, Japanese research institutes, private companies, universities, etc., together with Japanese cities that have experience and expertise in decarbonization, will conduct study projects to support partner cities' efforts to create a zero-carbon society and to introduce facilities and equipment that contribute to the creation of a zero-carbon society.

## 1.2 Project Overview

| | |
|---|---|
| Entrusted Project Name: | City to City Collaboration for Zero-carbon Society in FY2023<br>Zero Carbon Development in Quezon City for the Realization of Carbon Neutral Society |
| Implementation Period: | July 28, 2023 to March 8, 2024 |
| Ordering Party: | Office of Director for International Cooperation for Transition to Decarbonization and Sustainable Infrastructure, Global Environment Bureau, Ministry of the Environment |
| Consignee: | Oriental Consultants Co., Ltd. |

## 1.3 Project Implementation Structure

This project was implemented in collaboration with Osaka City and Quezon City, as well as Team OSAKA network companies and the Osaka Chamber of Commerce and Industry and the Japanese Chamber of Commerce and Industry of the Philippines, which have been actively and continuously working on partnerships with overseas cities.

Both Osaka City and Quezon City have pledged to achieve net zero CO2 emissions by 2050. Quezon City has compiled a roadmap and measures to achieve carbon neutral in its Enhanced Quezon City's Local Climate Change Action Plan 2021-2050 (Enhanced QC-LCCAP) and has set priorities for its efforts.

This project is being implemented as Phase 2 of a three-year plan, and this fiscal year is the second year of the plan. Based on the "Memorandum of Understanding (MOU) between Quezon City and Osaka City for Cooperation in the Development of a Low/Zero Carbon City in Quezon City (hereinafter referred to as "MOU between Quezon City and Osaka City")," which was renewed in August 2021, the project promoted energy management and smart buildings in Quezon City, studied decarbonization initiatives in the transportation sector, shared knowledge on transportation improvements, and collaborated with other support programs..

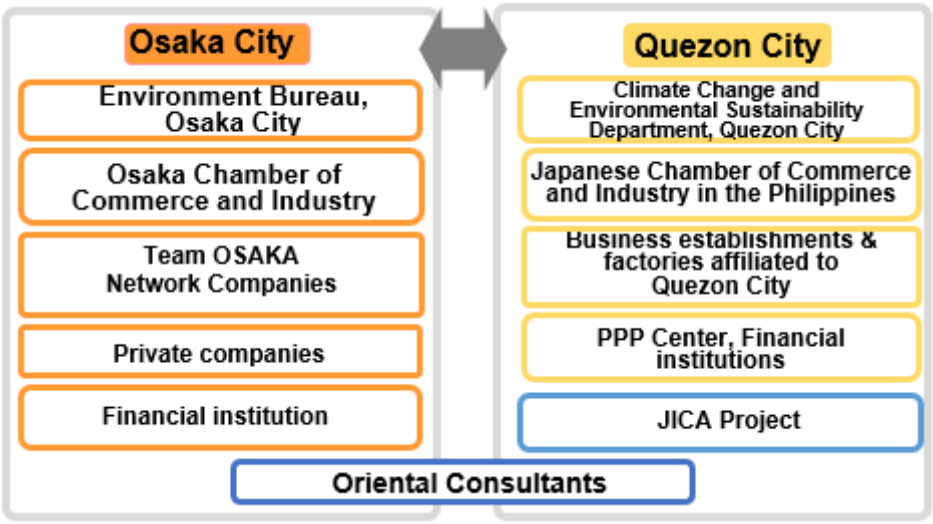



Figure 1-1 Project Implementation Structure

## 1.4 Study Content

This project will support the introduction of initiatives and facilities, and institutional reforms toward the formation of a zero-carbon society based on Osaka City's experience and expertise as a municipality in the Republic of the Philippines (hereinafter referred to as "the Philippines"), a country with remarkable economic growth. Quezon City is the only city in the Philippines that is a member of the C40 (C40 Cities Climate Leadership Group)[1] and can be regarded a leading city in

[1] Founded and composed of the world's 96 cities representing one-twelfth of the world's population and one-quarter of the world's economy. It aims to improve the health, well-being, and economic opportunities of urban citizens by focusing on addressing climate change and promoting urban actions that reduce greenhouse gas emissions and climate risks.

tackling environmental issues.

Currently, the main power source in Quezon City is coal-fired power generation derived from fossil fuels, which is a source of CO2 emissions, and the city is considering the introduction of renewable energy as an alternative power source to reduce its dependence on coal-fired power. According to the Enhanced QC-LCCAP developed in March 2021, the buildings and transportation sectors are the major sources of GHG emissions, accounting for 80% of the total.

Last year, in the first year of Phase 2, we investigated the current status of policies and systems in Quezon City, identified issues, examined technologies and policies suited to local characteristics, and explored the potential for dissemination of Japanese technologies.

Based on these efforts, in the second year of Phase 2 this year, we conducted a study focusing on the following three points:

i. Building sector: Project development of photovoltaic power generation and management systems such as BEMS
ii. Transportation sector: Project development of smart LED streetlight
iii. Development of other potential JCM Model Projects

In addition, given that Quezon City has been organizing and studying measures for sustainable development, the project continued to share knowledge that contributes to building a zero-carbon city through the collaboration based on the MOU between Quezon City and Osaka City. The overview of study for this fiscal year is summarized in Table 1-1 and the schedule in Table 1-2.

Table 1-1 Overview of Study

| Project item | Activities |
|---|---|
| i. Building sector: Project development of photovoltaic power generation and management systems such as BEMS | 1) Examine candidate projects for solar power generation and study the feasibility of such projects based on the needs of Quezon City and the results of the first-year survey<br>2) Calculate the expected amount of CO2 reduction, and develop project plan and project implementation structure<br>3) Study measures to increase feasibility |
| ii. Transportation sector: Project development of smart LED streetlight | 1) Introduce possible technologies, propose projects, and identify issues in the introduction of such technologies<br>2) Examine candidate areas for introduction and feasibility of the project<br>3) Propose measures to improve the feasibility and contribution to multi-benefits |
| iii. Development of other potential JCM Model Projects | 1) Hold mayoral-level policy dialogue: confirm policy for public-private partnerships<br>2) Hold JCM seminar/business matching for Team OSAKA Network, member companies of the Osaka Chamber of Commerce and Industry, and Japanese companies in the region |

Table 1-2 Schedule

| Project Items | FY2023 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| Meeting and Reporting | | | ▲ Kick-off meeting | | | | | ▲ Mid-term report | | ▲ Final report | |
| Study | | | | | | | | | | | |
| i. Building sector: Project development of photovoltaic power generation and management systems such as BEMS | | | ◄ | ► | | | | | | | |
| ii. Transportation sector: Project development of smart LED street light | | | ◄ | ► | | | | | | | |
| iii. Development of other potential JCM Model projects | | | | ◄ | ► | | | | | | |
| Field survey and information sharing | | | | | | ▲ | | ▲ | ▲ | ▲ | |
| Workshop | | | | | | ▲ | | | | | |
| Presentation and coordination of other related meetings | | | | | | | | | | ▲ | |
| Monthly report | | | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| Report | | | | | | ◄ | ► | | | ▲ Submission | |

Implementation Period: July 28, 2023 to March 8, 2024

# Chapter2　Current Status and initiatives of Climate Change Measures in Quezon City, the Philippines

## 2.1 Overview of Quezon City, the Philippines

The government of the Philippines has clearly stated at COP26 that it will strengthen its climate change measures, and in its Nationally Determined Contribution (NDC) submitted to the UNFCCC in 2021, it has set a target of 75% reduction of greenhouse gas emissions in the agriculture, waste, industry, transportation, and energy sectors compared to BAU between 2020 and 2030. This is a higher target than the 2015 NDC's "about 70% reduction compared to BAU by 2030." As for the budget of the Philippines' climate change action program, it accounts for 8.72% of the total 2023 budget. It has been announced that the funding source for the program will be loans from several international financial institutions, including the ADB.

Metropolitan Manila consists of 16 cities and 1 town, including Manila and Quezon, and is the political, economic, cultural, transportation, and information center of the Philippines, forming one of the largest metropolitan areas in the world with a metropolitan population of 13.48 million (according to the 2020 census).

Quezon City is the former capital of the Philippines and is adjacent to the northeast of the capital city of Manila. With its well-planned urban area, traffic congestion is said to be relatively low. Quezon City has the largest area of approximately 166 km² within Metro Manila, with a population of approximately 3 million. With population growth and urbanization, the increase in waste, and soaring electricity prices due to energy shortages, efforts to protect the environment and combat climate change are urgently needed, and the promotion of climate change countermeasures and energy conservation is positioned as a major measure for the city. Quezon City, a member city of C40, has presented its policies in the areas of (1) energy, (2) buildings, (3) transportation, and (4) waste in the Quezon City-Osaka City Director-General Level Policy Dialogue and City to City Collaboration Workshop held in February 2021, in order to realize climate change mitigation actions as an environmentally advanced city representing the Philippines.


Figure 2-1　Location of Quezon City within Metro Manila

Source: NCR-Regional-Development-Plan-2017-2022

## 2.2 GHG Emissions and Challenges in Quezon City

### 2.2.1 Current GHG Emissions

In March 2021, Quezon City formulated the Enhanced Quezon City Local Climate Change Action Plan 2021-2050 (Enhanced QC-LCCAP). According to the Plan, GHG emissions in 2016 amounted to approximately 8 million tCO2. Regarding the proportion of major emission sources, the stationary energy use in buildings (housing, commercial and industrial facilities, etc.) and the manufacturing and construction sectors comprised 60%, followed by land transportation for 21% and waste (landfill disposal sites, open dumping, biological treatment, wastewater, etc.) for 19%. According to the BAU scenario starting from 2016, GHG emissions in Quezon City will increase to 19% in 2020, 85% in 2030 and around double in 2040.

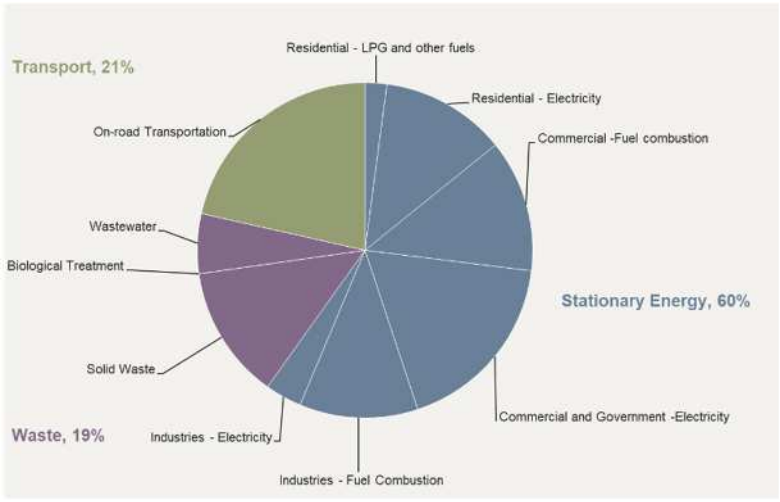



Figure 2-2 Breakdown of GHG Emission Sources in Quezon City

Source: Created based on Enhanced QC-LCCAP

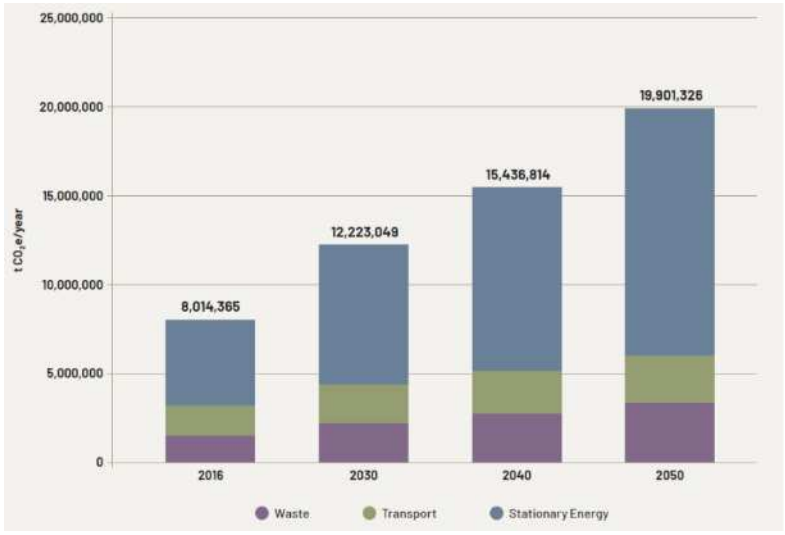



Figure 2-3 GHG Emissions Prediction in the Major Three Sectors in Quezon City by 2050

Source: Enhanced QC-LCCAP

Table 2-1 GHG Emission Sources in Stationary Energy

| Emission sources | Emission (MtCO2) | % |
|---|---|---|
| Residential | 1.14 | 14.2 |
| Commercial/Industrial | 2.46 | 30.7 |
| Manufacturing and construction | 1.20 | 15.0 |

Source: Enhanced QC-LCCAP

The transportation sector accounts for about 21% of total GHG emissions, emitting 1.72 MtCO. The main sources of emissions are diesel and gasoline consumption by jeepneys, tricycles, and private vehicles. Diesel use accounts for 56% of on-road transportation emissions, followed by gasoline (39%), LPG (4%), and kerosene (1%). Note that this only covers road transport within the city limits. Electricity consumption by rail (MRT and LRT) is not included in emissions because it corresponds to confidential information.

### 2.2.2 Challenges

In its long-term energy plan (Philippine Energy Plan (PEP) 2020-2040), the Philippine government aims to increase the share of renewable energy in its power mix to 35% by 2040. The country needs the support of international partners in financing and technology transfer, including allowing 100% foreign investment in renewable energy projects by 2022.

Modeling of GHG emission reduction scenarios for Quezon City identified modal shift as having the highest reduction potential, and further collaboration with the national government and the private sector is required to promote reforms related to the movement of goods and services within the city.

## 2.3 Climate Change Measures in the Philippines

### 2.3.1 Overview of Climate Change Measures

The Philippines is one of the most vulnerable countries to climate change and is exposed to multiple disaster risks such as typhoons, floods, droughts, and landslides. The government is promoting mitigation activities to build adaptive capacity to climate change, prevent global warming, and conduct sustainable development, and has developed the National Framework Strategy on Climate Change (NFSCC) covering the period up to 2022 in 2010. Renewable energy, energy conservation, sustainable infrastructure, and waste management are identified as pillars of climate change mitigation measures in this strategy. Three cross-cutting strategies are defined: 1) capacity building; 2) knowledge management and information, education, and communication; and 3) research and development (R&D) and technology transfer. Furthermore, in 2011, a National Climate Change Action Plan (NCCAP) was formulated to concretize the action program based on the national strategy, which states the need to strengthen sustainable energy development.

In the Nationally Determined Contribution (NDC) submitted by the Philippines to the United Nations Framework Convention on Climate Change (UNFCCC) in 2021, the Philippines has stated a GHG emission reduction target of 75% (2.71% unconditional, 72.29% conditional) compared to BAU between 2020 and 2030.

Table 2-2　NDC of the Philippines

| | |
|---|---|
| GHG emissions reduction target | Peak GHG emissions by 2030, with a combined 75% reduction from agriculture, waste, industrial, transportation, and energy sectors compared to BAU between 2020 and 2030<br>Domestic efforts only (unconditional）: 2.71%<br>Including international support (conditional): 72.29% |
| Mitigation measures | Strengthen the resilience and adaptive capacity of the country, including through enhanced access to climate finance, technology development and transfer, and capacity building, especially on the implementation of the<br>policies and measures on and the uptake of circular economy and sustainable consumption and production practices |
| Adaptation measures | Undertake adaptation measures across but not limited to, the sectors of agriculture, forestry, coastal and marine ecosystems and biodiversity, health, and human security, to preempt, reduce and address residual loss and damage<br><br>Pursue forest protection, forest restoration and reforestation, and access to results-based finance in forest conservation |

Source: NDC[2]

The Philippine Department of Budget and Management has announced that approximately 543.4 billion PHP (approx. 1.4 trillion yen), or 9.4% of the total proposed budget for 2024, has been allocated for climate change mitigation and adaptation[3].

### 2.3.2 Other Relevant Policies for Climate Change Action

#### （1） National Climate Change Action Plan　2011-2018

The National Climate Change Action Plan outlines specific programs and strategies for climate change adaptation and mitigation, anchored in food security, adequate water security, ecosystem and environmental stability, human security, climate-responsive industries and services, sustainable energy, knowledge, and capacity development.

#### （2） Philippine Development Plan 2023-2028

The Philippine Development Plan aims to reduce poverty by creating more jobs and putting the economy back on a high growth path, and to maintain GDP growth at about 6~8% until 2028. Climate change measures include improving the resilience of communities and organizations to climate change and disaster risks, restoring ecosystems, and transitioning to a low-carbon economy.

#### （3） Philippine Energy Plan 2018-2040

It is an energy sector plan developed by the Department of Energy to realize the Philippines' 25-year long-term vision known as “AmBisyon Natin 2040,” which aims to expand clean and self-

[2]https://unfccc.int/sites/default/files/NDC/2022-06/Philippines%20-%20NDC.pdf
[3]https://legacy.senate.gov.ph/publications/SEPO/Dimensions%20of%20the%20Proposed%202024%20NG%20Budget_final.pdf

sufficient energy, increase efficiency in energy use, provide energy services at reasonable prices, and ensure a balance between economic growth promotion and environmental protection.

（4） Philippine National Security Policy 2023-2028

It was formulated in August 2023 to effectively address security threats in a rapidly changing and increasingly uncertain world. From the perspective of energy security, the plan calls for the provision of dependable, resilient, clean, and accessible energy resources at reasonable prices, diversification of the energy mix, protection of energy infrastructure, and promotion of energy conservation, among others.

### 2.3.3 Actions to Address Climate Change

（1） Renewable Energy

According to the Philippines' National Renewable Energy Plan (NREP) 2020-2040, the Philippines will generate 35% of its electricity from renewable sources by 2030 and 50% by 2040. The plan also aims to lower the cost of renewable energy and make it more accessible to the public. In 2020, the share of renewable energy in the Philippines was about 35% of total energy, of which 16% came from wind and solar power, and 18% from biofuel and waste power. 18% was from biofuels and waste.

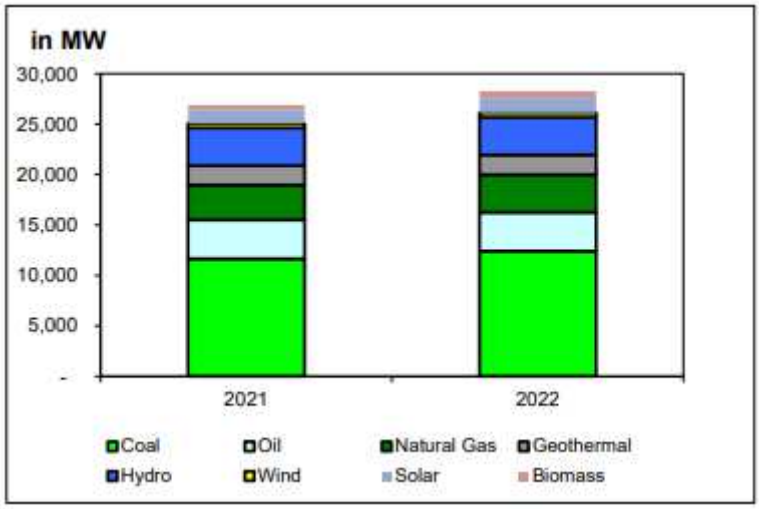



Figure 2-4 Installed Generating Capacity by Source

Source: Department of Energy, the Philippines[4]

（2） Deregulation of Foreign Investment in Renewable Energy Projects

In November 2022, the Ministry of Energy deregulated and allowed 100% foreign ownership in projects for the development and utilization of solar, wind, and hydroelectric power generation[5], thus strengthening the promotion of renewable energy to achieve long-term goals by attracting foreign investment.

[4] https://www.doe.gov.ph/sites/default/files/pdf/energy_statistics/20230725_2021-2022%20key%20energy%20stat_pocket%20size.pdf
[5] https://www.doe.gov.ph/sites/default/files/pdf/issuances/dc2022-11-0034.pdf

## 2.4 Efforts on Climate Change in Quezon City

### 2.4.1 Enhanced Quezon City's Local Climate Change Action Plan 2021-2050

As mentioned above, Quezon City is an environmentally advanced city representing the Philippines, including participation in the C40, and in order to realize climate change mitigation actions, based on the National Climate Change Action Plan (NCCAP) of the Philippines, in March 2021, the “Enhanced Quezon City's Local Climate Change Action Plan 2021-2050 (Enhanced QC-LCCAP)” was formulated in cooperation with the C40. The plan sets a path for an “ambitious action scenario” that aims to reduce CO2 emissions by 30% by 2030 compared to BAU with 2016 as the base year and to achieve carbon neutrality by 2050. This scenario aims to peak out emission in 2030 and achieve net zero emissions by 2050, as shown by the green line in Figure 2-5.

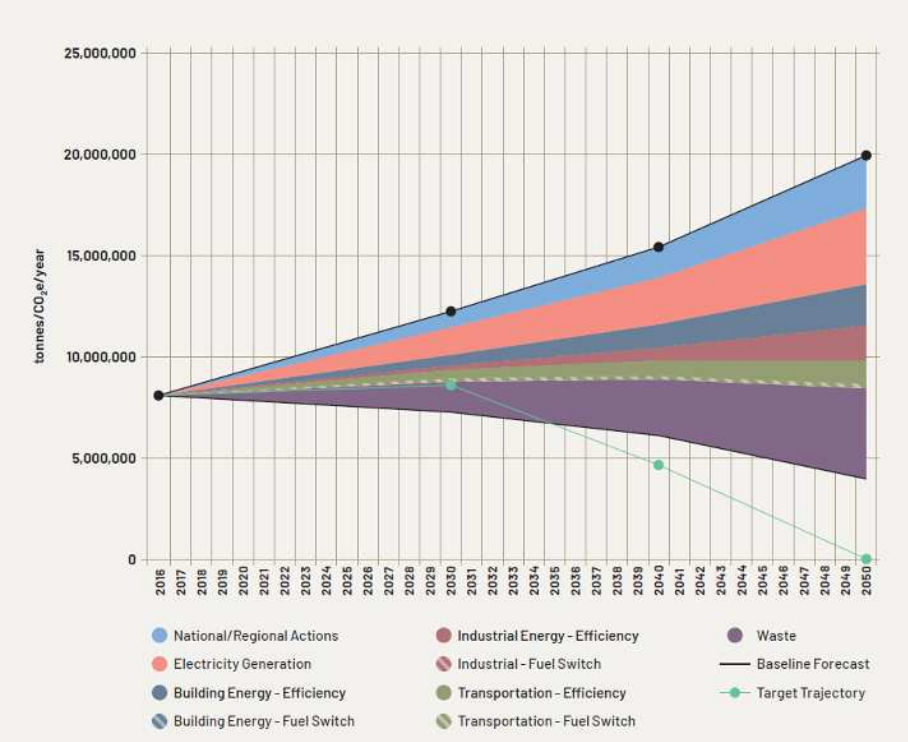



Figure 2-5 Emissions Reduction Targets of Quezon City by 2030 and 2050

Source: Enhanced QC-LCCAP

As specific actions, Quezon City has committed to innovative initiatives in the energy and construction, transportation, and waste sectors. As part of moves to expand the scope of introducing renewable energy, the predicted contributions to emissions reduction in each sector based on their target are as follows: up to 63% by 2050 in energy and construction sectors; 31.8% by 2030 and 27.9% by 2050 in the waste sector. The transportation sector is expected to reduce emissions by 11 and 9% by 2030 and 2050, respectively.

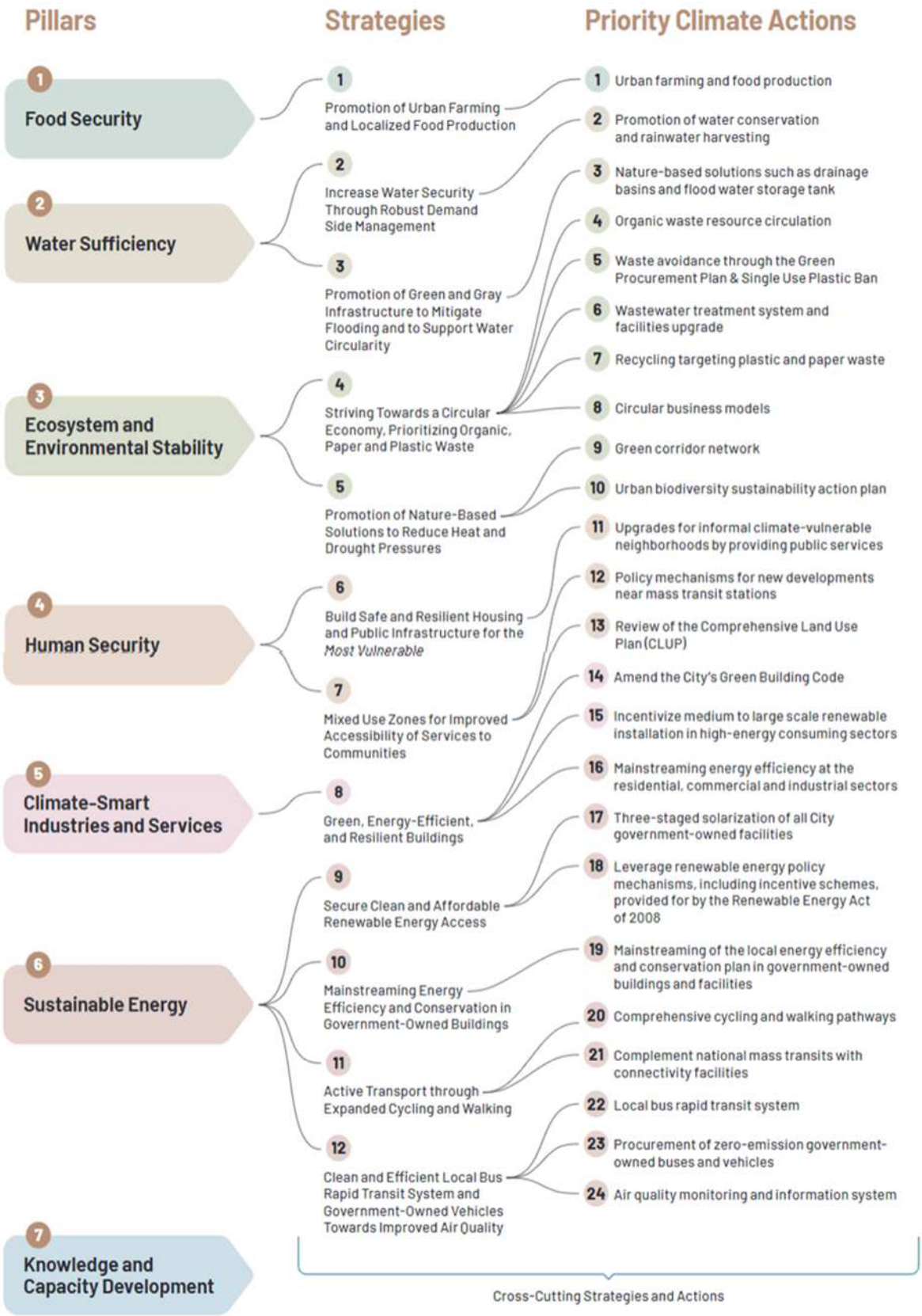
Table 2-3 Transformative Actions in Key Sectors

| Sector | Transformative Actions |
|---|---|
| **Energy and Building** | • Meet national Renewable Energy targets (contingent on the achievement of national targets)<br>• Scale-up solarization in government-owned, commercial, and residential buildings (national and local)<br>• Develop and implement the enhanced Local Green Building Code |
| **Transportation** | • Mode shift to walking and biking<br>• Mode shift to mass public transport<br>• Modernization of public utility vehicles (PUVs) and private cars |
| **Waste** | • Enhanced comprehensive solid waste management program<br>• Managing and processing of organic waste<br>• Enhanced wastewater management |

Source: Enhanced QC-LCCAP

To achieve the above vision, Enhanced QC-LCCAP has developed 7 pillars, 12 strategies and 24 priority climate actions.

Table 2-4 Enhanced Quezon City Local Climate Change Action Plan 2021-2050




Source: Enhanced QC-LCCAP

In the Mayor-level Policy Dialogue held in October 2023, the following initiatives were identified as particularly high priorities: (4) striving towards a circular economy, prioritizing organic, paper, and plastic waste; (8) green, energy-efficient, and resilient buildings; (9) secure clean and affordable renewable energy access; (10) mainstreaming energy-efficiency and conservation in government-owned buildings; (11) active transport through expanded cycling and walking, and (12) clean and efficient local bus rapid transit system and government-owned vehicles towards improved air quality (see Appendix 5-1).

### 2.4.2 Initiatives on Solar PV Generation in Quezon City

Quezon City has identified sustainable energy as the sixth among the seven pillars in the Climate Change Action Plan 2021-2050 (Enhanced QC-LCCAP) and has set milestones towards the implementation of Solar PV systems as one of its initiatives. The plan is based on the priority initiatives in "①Solarization of all city-owned facilities in 3 phases" and "②Utilization of policy mechanisms, including incentives from the renewable energy policy (Renewable Energy Act of 2008)."

Table 2-5　Milestones and Initiatives in Introduction of Solar PV generation

| MILESTONES AND INITIATIVES | | | |
|---|---|---|---|
| **2021-2022** | **2023-2025** | **2026-2030** | **2031-2050** |
| Solarization of 50 schools and 3 public hospitals<br>Identify city-owned buildings for retrofitting | Solarization of publicly-owned sports facilities (29 covered basketball courts)<br>Deliver Solar Energy Mentorship Program among city officials and private stakeholders<br>Promote City Investment Priorities Plan including public-private partnership schemes | Solarization of all public schools (total of 154)<br>Solarization of key government buildings: Quezon City Museum Hall of Justice Quezon City Convention Center | All new city-owned buildings will be designed and constructed to have renewable energy sources (i.e. solar PV) |

Source：Enhanced QC-LCCAP

According to a hearing survey conducted by the Quezon City Climate Change and Environmental Sustainability Office, In line with the initiatives of "①solarization of all city-owned facilities in 3 phases", the target has been set to introduce solar power by 2030 to all city-owned buildings that can be efficient and feasible, with an inventory of over 1,000 facilities (including rooftop spaces) being identified.　In addition, the implementation is roughly divided into 3 phases (Table 2-6), with prioritization of introduction of Solar PV generation underway. Specific timelines for each phase are still under consideration.

Also, with regard to "②utilization of policy mechanisms, including renewable energy policy incentives（Renewable Energy Act of 2008)," specific scheme arrangements have not been made at present, and discussions are ongoing.

Table 2-6 Introduction Phase and Target of Solar PV generation

| Phase | Target |
|---|---|
| 1 | ・ Rooftops of 50 public schools surveyed by C40 (5 schools will soon be bidding for equipment procurement) |
| 2 | ・ Rooftops of 6 locations in Quezon City Hall (net metering in process)<br>・ Rooftops of 3 hospitals in the city (QC General Hospital, Novaliches District Hospital, Rosario Maclang Bautista General Hospital)<br>・ Rooftops of public schools in the city not included in the C40 survey |
| 3 | ・ Other city-owned facilities |

Source: Prepared by Research Group

In Quezon City, partial revisions to the Green Building Code are being made to promote the adoption of energy saving, including Solar PV generation.

### 2.4.3 Support from C40 in Quezon City

As a member of the C40, Quezon City, as an environmentally advanced city, receives various forms of support from the group for climate change mitigation. In March 2021, C40 supported the development of the Quezon City Climate Change Action Plan 2021-2050, as well as assisted in the establishment of GHG inventories and the design of action plans for Quezon City. It also set up forums for exchanging ideas on best practices between the C40 member cities around the world and experts.

#### （1） Feasibility Study (FS) for Introduction of Solar PV Generation in City Public Schools

In Quezon City, the C40 Cities Finance Facility (CFF) is conducting a feasibility study (FS) for the installation of Solar PV facilities in public schools in the city. The challenge for developing countries in implementing measures toward carbon neutrality is insufficient financing plans, and the CFF addresses this challenge by supporting the development of infrastructure projects that can be financed. The study is being conducted jointly with CFF and the German Development Corporation (GIZ). Subsequently, based on this study, Quezon City has established a Technical Working Group (TWG) to promote the introduction of Solar PV generation in the city.

The FS surveyed 50 of the 146 public schools in Quezon City, which are expected to reduce 1,966 tCO2 per year by installing up to 3MW of solar power. Due to the impact of the COVID-19 pandemic and resulting school closures, implementation has been delayed, but preparations are underway to procure bids for equipment to install solar power for the 5 schools in the yellow column out of the 50 schools surveyed (Table 2-7). Competitive bidding is scheduled to take place soon. Additionally, Quezon City has already experimentally introduced solar power to 2 schools, Commonwealth High School, and Balara Elementary School, both of which are currently in operation.

Table 2-7　FS Candidate List for Installing Solarization in City Public Schools

| District 1 | District 2 | District 3 | District 4 | District 5 | District 6 | Additional |
|---|---|---|---|---|---|---|
| San Francisco Elementary School | Pres. Corazon Aquino Elem. School | Camp Gen. E. Aguinaldo High School | Krus na Ligas Elem. School | Lagro High School | Ismael Mathay Sr. High School | North Fairview ES |
| Project 6 Elementary School | Holy Spirit Elementary School | Quirino High School | San Vicente Elem. School | Novaliches High School | Culiat High School | Sauyo HS |
| Masambong Elementary School | Commonwealth Elem. School | T. Alonzo Elementary School | P. Bernardo High School | San Agustin Elementary School | Culiat Elementary School | West Fairview ES |
| D. Tuazon Elementary School | Holy Spirit National High School | Juan Sumulong High School | Betty Go Belmonte Elem. School | Doña Rosario Elementary School | Tandang Sora Elementary School | GSIS ES |
| Ramon Magsaysay Elementary School | Justice Cecilia Muñoz Palma High School | Pura V. Kalaw Elementary School | Manuel A. Roxas High School | San Bartolome High School | New Era High School | Maligaya ES |
| NOH for Crippled Children – BENEFICIARY | Holy Spirit National High Sch. Annex | Carlos P. Garcia High School | Tomas Morato Elem. School | Kaligayahan Elementary School | Placido Del Mundo Elem. School | |
| Dr. Josefa Jara Martinez High School | Batasan Hills National High School | | Diosdado Macapagal Elem. School | Bagbag Elementary School | Pasong Tamo Elementary School | |
| Judge Juan Luna High School | Judge Feliciano Belmonte High School | | Quezon City High School | NOH Sta. Lucia SHS – BENEFICIARY | | |

（2） Creation of Net Metering Handbook

C40 also provides support for the promotion of net metering. Net metering is a system where surplus electricity generated from distributed Solar PV systems can be sold back to the utility provider at a specified price, after subtracting the amount consumed from the total electricity generated. In the Philippines, the concept of net metering was introduced through the Renewable Energy Act of 2008 (RA 9513), targeting small-scale systems of 100 kW or less.

It is a non-financial strategy aimed at promoting the use of renewable energy domestically. This is designed as an incentive scheme to encourage electricity consumers to participate in renewable energy generation, thereby fulfilling a portion of their electricity needs. The Energy Regulatory Commission's (ERC) Resolution 09 Series of 2013, “Rules Enabling Renewable Energy Net Metering Program,” initiated net metering activities. Subsequently, to enhance the dissemination of information about the Net Metering Program, the Department of Energy (DOE) of the Philippines, with support from the C40 of which Quezon City is a member, published the GUIDEBOOK ON NET METERING IN THE PHILIPPINES in 2013 (Figure 2-6). The guidebook includes guidelines and procedures from meter installation to maintenance, as well as

information on economic considerations when introducing net metering.


Figure 2-6　GUIDEBOOK ON NET METERING IN THE PHILIPPINES

Source：Department of Energy, the Philippines

### 2.4.4 Photos of Facilities Where Solar PV Generation Has Been Installed and Will Be Installed


Figure 2-7　Solar Power Installed at Commonwealth High School (Left) and Culiat High School Scheduled for Future Installation (Right)

Source：Google Map

Figure 2-8　Part of Rooftop in Quezon City Hall

# Chapter3　Feasibility Study for Developing JCM Model Projects

As described in the previous chapter, efforts are being made to promote the introduction of solar power systems for buildings in Quezon City, following the “Enhanced QC-LCCAP.” In this intercity cooperation project, support is being provided based on the policy of forming JCM Model Projects through discussions with the private sector, which has been conducted through mayor-level policy dialogues under the “Quezon City-Osaka City MOU.” To date, we have introduced the superiority and advanced features of Japanese technologies for the formation of JCM projects for Quezon City, and it is required to form a JCM Model Project to introduce it as a public project in Quezon City.

With a view to expanding to Quezon City, investigations into JCM Model Projects for rooftop solar power systems and surveys targeting Japanese factories as Quezon City-related enterprises (factories) have been conducted. Through this study, support to Quezon City using JCM through this intercity cooperation project shall be materialized as per the flow shown in Figure 3-1.


Figure 3-1　Flow of JCM Model Project Proposals to Contribute to Quezon City Policies

Source: Prepared by Research Group

For contributing to Quezon City's “Enhanced QC-LCCAP” through the formation of JCM Model Projects, a survey and a feasibility study were conducted to identify new JCM project owners and match the needs of Quezon City.

## 3.1 Solar PV Generation and Management Systems of BEMS, etc.

### 3.1.1 Study Overview

The aim is to establish an efficient power distribution system through the introduction of solar PV generation and storage in the Pampanga Economic Zone located in Angeles City, Pampanga Province, 90 km northwest of Quezon City in the northern part of the Manila capital region. This special economic zone is one of the industrial parks directly operated by PEZA (Philippine Economic Zone Authority), and it intends

to promptly achieve results and realize an advanced model to be the first in the industrial estate in the Philippines, aiming to contribute to the country's renewable energy adoption goals of "reaching a renewable energy share in the power mix to 35% by 2030 and 50% by 2040." The initial plan is to develop a business model within the economic zone. By installing solar panels on more than 30 factories of resident companies within the special zone in the future, the total power generation capacity will exceed 2,400 kilowatts, which is expected to reduce CO2 emissions by 1,200 tons annually.

The generated electricity will be sold and supplied by solar PV generation operators to PEZA (Philippine Economic Zone Authority), and PEZA aims to form an economically viable decarbonization business model by selling electricity at lower prices through the existing local distribution company, Angeles Electric Corporation.

Table 3-1 Overview of PEZA

| | |
|---|---|
| Name | Philippine Economic Zone Authority |
| Establishment | February 21, 1995 |
| Location | Manila, Philippines |
| Overview | The government agency under the Philippine Department of Trade and Industry is responsible for receiving and consulting on investment applications from foreign companies. As an administrative agency, it also grants various incentives such as tax exemptions and conducts overseas investment promotion activities for managing and supervising the Philippine economic zones. |

Source: Prepared by Research Group

### 3.1.2 Overview of the Facilities and Technologies to Be Installed

We propose the EMS (Energy Management System for operational optimization through visualization of power usage and facility control) package, equipped with solar PV generation facilities and storage batteries. Normally, cost-effective, and clean power is supplied as an alternative to commercial electricity from the power grid, and EMS can monitor the system operational status for efficiency improvement. In emergencies, the product technologies will control the power supply to specific facilities, thereby preventing functional shutdowns in factories as well as facilities.

In the Philippines' power supply facing serious issues such as high electricity prices compared to other countries, chronic power shortages and blackouts, and disaster prevention measures for typhoons and other such events, the utilization of renewable energy and battery storage through EMS projects contributes to achieving resilience in the country's power infrastructure and reducing CO2 emissions.

The proposed facilities and technologies have a proven record in construction, operation, and management of mega solar PV power stations across Japan, not only in the power plant operation, but also in development of electricity retailing to sell the power generated in-house to third parties.

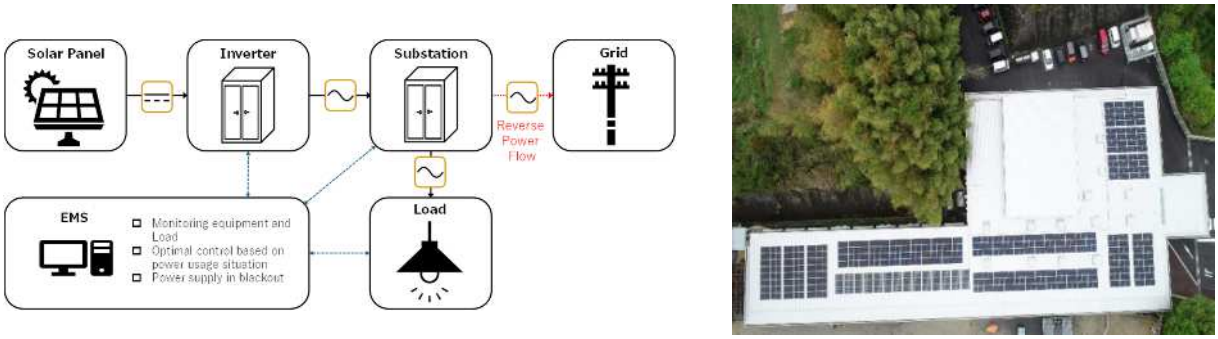



Figure 3-2 Facilities and Technologies to Be Installed

Source: Advantec Philippines

### 3.1.3 Review for Developing JCM Model Project

The introduction of these facilities and technologies was proposed to Quezon City as the JCM project. In the solar PV generation deployment plan for Quezon City, specific proposals based on concrete achievements are required to address considerations for facilities which could be targeted in each phase (refer to Table 2-6) such as “other schools” mainly in Phase 2 and “office buildings, factories, roofed courts, sports facilities,” in Phase 3.

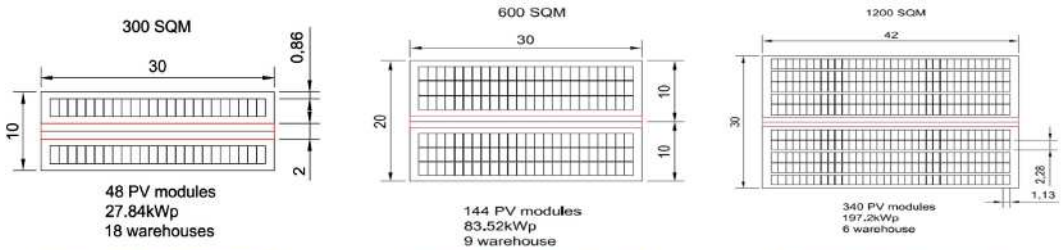
In the proposal about the construction project of an efficient power distribution system through the introduction of solar PV and energy storage in the PEZA-owned Pampanga Economic Zone, the MOU was signed in October 2023 as part of the JICA private sector partnership project for the feasibility study on installation of solar PV generation system and selling electricity. Through discussions with JICA, it is expected to lead to prospective developments following the post-JICA project by promoting considerations for the JCM business project within the intercity cooperation initiative.

As for this proposal, the items listed in the table below have been reviewed, aiming to establish a model project in public works and lead to a proposal to Quezon City by implementing the JCM business project within the intercity cooperation initiative.

Table 3-2 Review Items for JCM Model Project

| Review Items | Review Contents |
|---|---|
| Output | The total output of the 12 occupant companies is estimated to be approximately 3,000KWP. |
| Annual Electricity Generation | The total annual power generation of the 12 occupant companies is estimated to be approximately 3,500,000KWH based on the expected energy yield based on plant scales of 300 $m^2$, 600 $m^2$, and 1,200 $m^2$ (refer to the figure below). |
| Selling Price of Electricity | Compared to the electricity price in the Philippines of 12 PHP (Philippine pesos) /kwh, the sales price from PEZA is expected to be 9-10 PHP/kwh. |
| CO2 Reduction | Refer to [GHG reduction] in "Estimated GHG Reduction" to be stated later. |
| Cost Effectiveness | Refer to [Cost Effectiveness] in "Estimated GHG Reduction" to be stated later. It falls below the JCM application requirement of 4,000yen/CO2t. |
| Contract Period | Since the contract is scheduled for 15 years, it will be closer to the 17-year monitoring period that is commonly set based on the legal lifespan of solar PV generation, which will reduce the burden during the monitoring period. |
| Return on Investment Year | Considering an estimated duration of around 4 to 5 years, it fulfills the requirement of at least 3 years stipulated in the JCM Facility Subsidy Program. |
| Introduction Timeline | As described later in "Timeline," the bidding is scheduled around February to March in 2024, aligning with the stage of project implementation, which also meets the requirement for JCM application in public works. |

Source: Prepared by Research Group




| Month | Energy Yield kWh |
|---|---|
| January | 3464.7 |
| February | 3544.8 |
| March | 4062.9 |
| April | 3962.2 |
| May | 3747.2 |
| June | 3220.4 |
| July | 3024.9 |
| August | 2855.1 |
| September | 3094.1 |
| October | 3370.6 |
| November | 3255.5 |
| December | 3292 |
| Yearly | 40,894 |

| Month | Energy Yield kWh |
|---|---|
| January | 10394.1 |
| February | 10634.5 |
| March | 12188.8 |
| April | 11886.6 |
| May | 11241.7 |
| June | 9661.3 |
| July | 9074.6 |
| August | 8565.2 |
| September | 9282.4 |
| October | 10111.9 |
| November | 9766.5 |
| December | 9875.9 |
| Yearly | 122,684 |

| Month | Energy Yield kWh |
|---|---|
| January | 24541.5 |
| February | 25109.2 |
| March | 28779.2 |
| April | 28065.7 |
| May | 26542.8 |
| June | 22811.4 |
| July | 21426.2 |
| August | 20223.3 |
| September | 21916.9 |
| October | 23875.3 |
| November | 23059.8 |
| December | 23318.2 |
| Yearly | 289,670 |

Figure 3-3 Energy Yield Prediction in Plant Scales of 300 $m^2$, 600 $m^2$, 1,200 $m^2$

Source: Advantec Philippines

### 3.1.4 Development of JCM Model Project

#### （1） Candidate Sites

This special economic zone is one of the industrial parks directly operated by PEZA, with a total site area of 24,000 m2. Currently, there are a total of 23 resident companies, including Japanese and local businesses. The northern part is planned for future development, with an expected increase in residents.


Figure 3-4　Location Map of Pampanga Economic Zone

Source: Prepared by Research Group

As a result of interviews with the 30 firms located in the special economic zone, there is a plan to install rooftop solar panels free of charge for the 12 resident companies who requested and agreed to the offer. Among the 12 occupants, there are 3 Japanese firms, and the rest are local businesses. Considering the initial candidate firms as of the end of January 2024, it is assumed that the total number of applicants is expected to be around 15 companies, including those in the process of adjustment.


Figure 3-5　Location Map of Candidate Firms for Solar System Installation

Source: Advantec Philippines

（2） Business Model Proposal

The ESP (Energy-Service-Provider) plans to offer services such as electricity cost reduction through a partial utilization of renewable energy in the retail power business and peak-cutting[6]efforts by installing self-consumption type solar systems, aiming to realize complex and comprehensive energy solutions ranging from research/plan creation to operational support including financing. In the future, the aim is to provide optimal total services by combining energy management such as IOT-based air conditioning control.

In this project, Japanese solar PV system operator Advantec Philippines will install solar panels free of charge on the roofs of interested resident companies within the Pampanga Economic Zone. The generated electricity will be sold from Company A to PEZA. PEZA also intends to outsource the local distribution company, Angeles Electric Corporation, to sell the power at lower prices, creating a win-win business model contributing to reducing electricity costs and CO2 emissions.

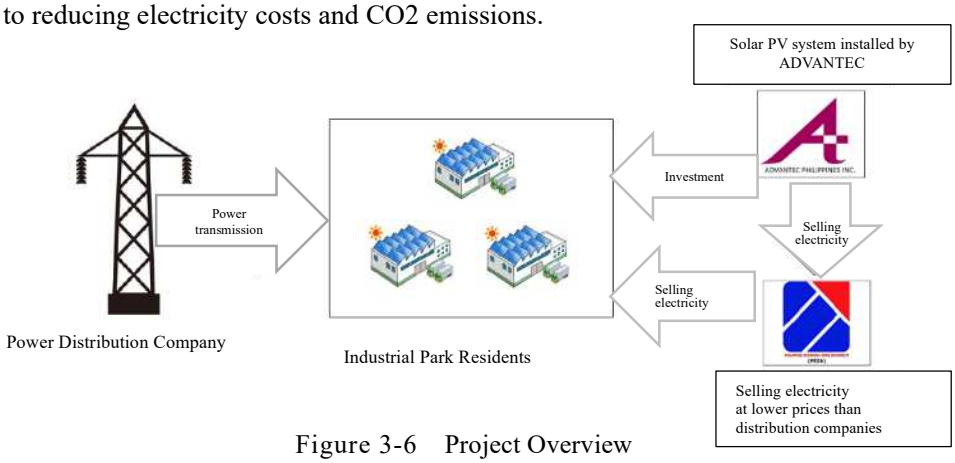



Figure 3-6 Project Overview

Source: Advantec Philippines

（3） Execution Framework

Advantec will serve as the representative operator and form an international consortium with PEZA.

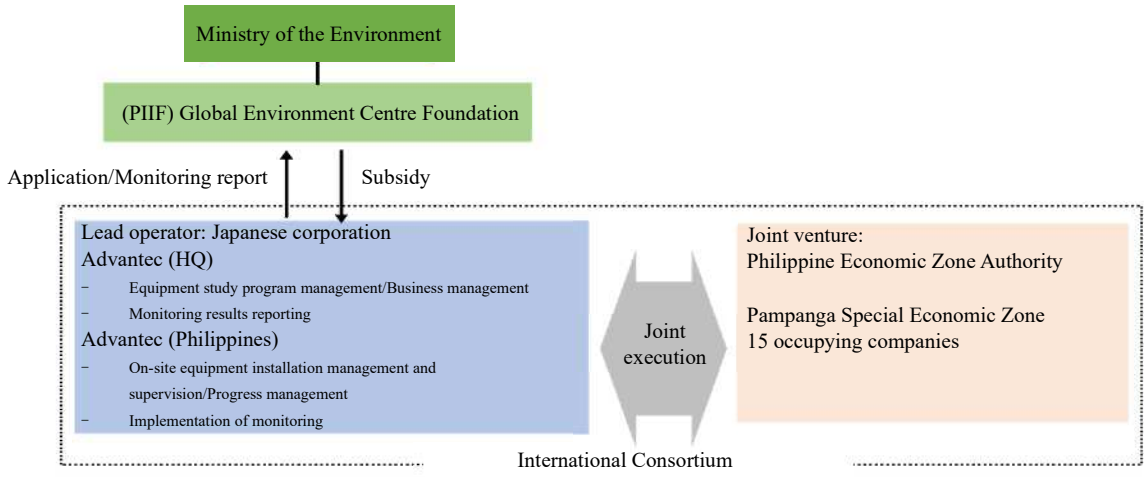



Figure 3-7 JCM Model Project Execution Framework (Draft)

Source: Prepared by Research Group

[6] It refers to the “cut (reduction)” of electricity consumption (electricity purchase amount) during the times of highest power usage (peak hours) by utilizing electricity generated from solar power.

## （4） Estimate of GHG Emissions Reduction

The CO2 reduction effect of solar PV generation projects is referenced against the grid electricity supplied by the distribution company, which would be CO2 emissions in the case where the electricity generated by the solar power generation system is supplied by the grid power.

【GHG Reduction】

CO2 reduction from solar PV generation projects = (amount of electricity generated by solar PV generation projects) × (emission factor)

**2,789 tCO2/year**

= Reference CO2 emissions － Project CO2 emissions

- Reference CO2 emissions
  = Project power generation 3,500 [MWh/year] × emission factor 0.507 [tCO2/MWh] ※1
  = 1,774 [tCO2/year]
- Project CO2 emissions
  = 0 [tCO2/year]

※1) Refer to “FY2023 JCM Model Project List of Electricity CO2 Emission Factors (tCO2/MWh)” and “Appendix 5 The Philippines.”

【Cost Effectiveness】

Cost effectiveness (yen/t-CO2) = {Initial investment cost (yen) ×Subsidy rate (%)}
÷ {Annual CO2 reduction (tCO2/year) ×Legal service life (years)}

**1,471 (yen/t-CO2)**

= {230,000,000 (yen) ※2 × 30 (%) ※3} ÷ {1,774 (tCO2/year) ×17 (years)}

= 2,287yen (yen/tCO2)

※2) 1 PHP = Assuming 3.00 yen

※3) Subsidy rate of 30% based on the results of solar PV generation projects in the Philippines
Refer to “FY2023 JCM Facility Subsidy Program Attachment 3 Classification of Similar Technologies Adoption Results in Each Partner Country.”

## （5） Timeline

This will become a public project by PEZA, so it shall be implemented in accordance with the bidding and contract periods. As the main source of materials will be China, delays in procurement delivery may affect the overall schedule. local workers are planned to be employed other than construction supervisors and electrical engineers, and therefore construction period is set to be longer including technical guidance for them to ensure safety and quality assurance.

Table 3-3　Public Works Bidding, Application for JCM Model Project and Construction Timeline

| | FY23 | | | FY24 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| FY23 intercity cooperation project | | | | | | | | | | | | | | | |
| FY24 intercity cooperation project | | | | | | | | | | | | | | | |
| Application period for JCM subsidy | | | | | | | | | | | | | | | |
| Bidding | | | | | | | | | | | | | | | |
| Winning bid | | | | | | | | | | | | | | | |
| Contract signing | | | | | | | | | | | | | | | |
| Preparation of JCM application | | | | | | | | | | | | | | | |
| Submission of JCM application | | | | | | | | | | | | | | | |
| Acceptance notice (2 months later) | | | | | | | | | | | | | | | |
| Subsidy launch | | | | | | | | | | | | | | | |
| Fund-raising | | | | | | | | | | | | | | | |
| Construction launch/completion | | | | | | | | | | | | | | | |
| Test run | | | | | | | | | | | | | | | |
| Electricity sales launch | | | | | | | | | | | | | | | |

Source: Prepared by Research Group

### (6) Remaining Challenges and Future Actions/Policies

Advantec, the company planning to apply for JCM, is aware of the power supply status within the economic zone and the installation conditions for rooftop solar PV (roof and building strength) in the feasibility study (FS) of the Pampanga Economic Zone based on the MOU with PEZA. As more refined proposals can be presented based on the information obtained even at the bidding phase, it can be said that the likelihood of winning this project is high.

On the other hand, it is necessary to adjust the bidding and execution periods in accordance with PEZA's requests, so consultation with PEZA is required to ensure that the implementation timing of this project aligns with the JCM application. In addition, in relation to PEZA, consultation with the Global Environment Centre Foundation (GEC) is scheduled during the upcoming JCM application preparation phase to see if it is possible to have a local subsidiary Advantec Philippines as the representative operator of the JCM application.

After realization of the project, the establishment of the JCM Model Project for solar PV generation and electricity sales in industrial parks is expected to lead to the “decarbonization domino effect” through the lateral expansion to the following candidate projects.

Table 3-4 Candidate Projects

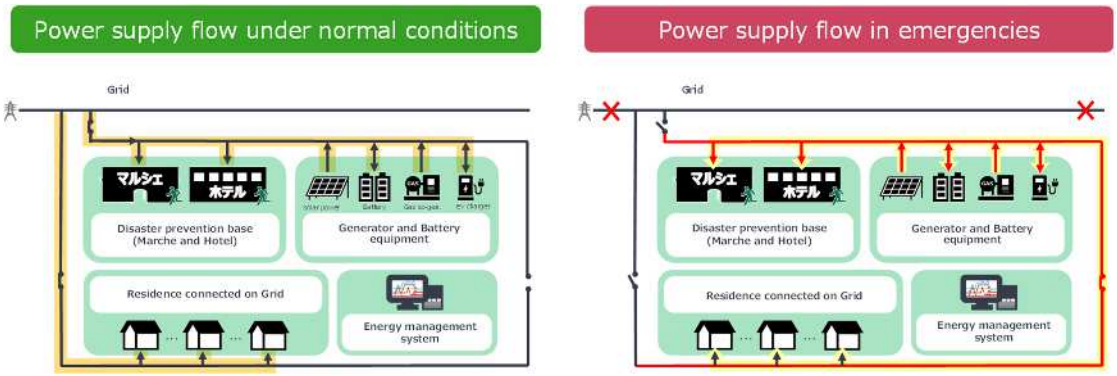
| Candidate Projects | Period | Contents |
|---|---|---|
| Electricity Sales Business by Solar PV Generation in PEZA-owned Cavite Economic Zone | After January 2025 | Requested by PEZA Director General based on achievements of Pampanga Economic Zone. 100MW scale. |
| Davao Solar PV Generation Construction | After April 2024 | Lease 50,000 $m^2$ of private land in Davao Del Sur region for a 20-year contract to build a 5.5 MW power plant (land arrangements completed). The electricity is planned to be sold to the local distribution company in Davao. Negotiations are currently underway towards contract signing. |
| Davao Solar PV Generation Construction | After April 2025 | Lease 380,000 $m^2$ of private land (previously owned by a Japanese company) in Davao Del Sur region for a 20-year contract to build a 5.5 MW power plant. The electricity is scheduled to be sold through the management company within the PEZA premises. Plan a smart city with a focus on keywords such as electricity, energy saving, and decarbonization, while also supporting the attraction of Japanese companies. |

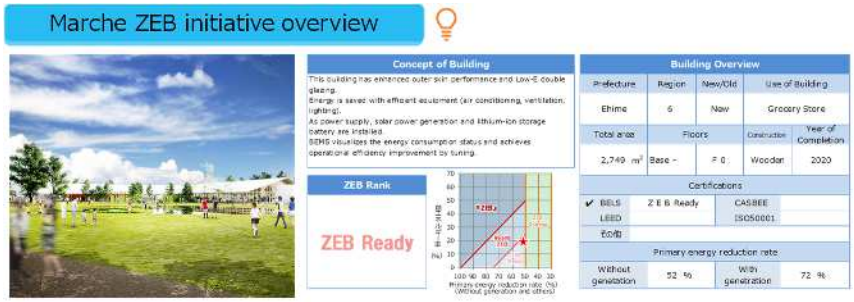
Source: Prepared by Research Group

In addition, the establishment of this JCM business model will materialize proposals for Phase 2 and Phase 3 (refer to Table 2-6) in the Quezon City solar PV generation project.

Advantec possesses not only solar PV generation systems but also optimization technologies for energy usage through EMS, and therefore it aims to monitor and optimize the use of electricity and provide further energy reduction as well.

In Japan, it has built a smart city with 100% renewable energy with the energy backup system for up to 72 hours of power supply in case of emergency. The commercial facility “Itomachi Marche” was certified as “ZEB Ready” with 50% net zero energy, and “Itomachi Hotel 0” was the first hotel in Japan to achieve “ZEB” with 100% net zero energy (refer to the figure below). The citywide initiatives could be presented for Quezon City based on “Enhanced QC-LCCAP.”




Comparative data with other company (annual forecast)

**Expected to achieve approx. 50% reduction in usage compared to other stores**

| STORE NAME | | Monthly Usage [kWh] | Area [㎡] | Usage/Unit [kWh/㎡] | Comparison Reduction Rate | Comparison Usage Rate |
|---|---|---|---|---|---|---|
| MARCHE | | 67,153 | 1,600 | 42.0 | 50.3% | - |
| Certain Supermarket | STORE A | 95,452 | 1,080 | 88.4 | - | 210.6% |
| | STORE B | 105,577 | 1,292 | 81.7 | - | 194.7% |
| | STORE C | 106,374 | 1,275 | 83.4 | - | 198.8% |

Introduction of initiatives for zero energy

## ITOMACHI HOTEL 0

In terms of energy consumption by building use, hotels use the second highest amount of electricity per floor area after restaurants, and reducing electricity use in hotels to virtually zero has great potential to accelerate a decarbonized society. The increase in the number of zero-energy hotels will enable the delivery of sustainable tourism and lodging experiences to many more people in the coming era, creating human enjoyment without burdening the natural environment.


**First hotel in Japan to receive "ZEB" certification**

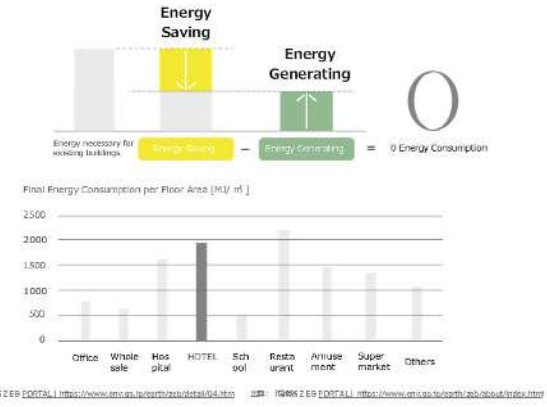



Figure 3-8 Energy Backup System and ZEB Ready in a Smart City in Japan

Source: Advantec CO., LTD.

## 3.2 Study on Introduction of Rooftop Solar PV Facilities for Japanese-affiliated Factories

### 3.2.1 Study Overview

#### （1） Current Challenges

In the Philippines, the introduction of rooftop solar PV systems is already widespread[7]. Table 3-5 shows the JCM projects. This shows that 5 projects are in operation and registered, 1 project is in operation and unregistered, and 6 projects are in the process of facility installation and unregistered. Many of the projects already approved are in the form of laying on the roofs of manufacturing plants for self-consumption. Projects in the process of installation/unregistered include not only factories but also the use of roofs in commercial facilities, etc.

Table 3-5 JCM Project Performance on Introduction of Rooftop Solar PV facilities in the Philippines

| Project Name | Lead Operator | GHG Reduction (tCO2/year) | Project Adoption FY | Progress Status |
|---|---|---|---|---|
| Introduction of a 1.53MW rooftop solar PV system for an automotive parts factory | Tokyo Century Corporation | 1,061 | 2017 | In Operation Registered |
| Introduction of a 1.2MW rooftop solar PV system for a refrigerated warehouse | Same as above | 798 | 2017 | In Operation Registered |
| Introduction of a 1MW rooftop solar PV system for a vehicle assembly factory | Toyota Motor Corporation | 731 | 2017 | In Operation Registered |
| Introduction of a 4MW rooftop solar PV system for a tire factory | Sharp Energy Solutions Corporation | 2,772 | 2018 | In Operation Registered |
| Collaboration with a distribution company for a 9.6MW solar PV generation project | Tokyo Century Corporation | 6,418 | 2019 | In Operation Unregistered |
| Electricity supply project through the installation of a 9MW solar PV generation system for ceramic and cement factories | Marubeni Corporation | 6,751 | 2022 | Facility installation in progress Unregistered |
| Introduction of a 0.8MW solar PV generation system for aluminum products, packaging materials, and automotive parts factories (JCM Eco-Lease Project) | Tokyo Century Corporation | 544 | 2022 | Facility installation in progress Unregistered |
| A 27MW solar PV generation project in the Dagohoy area of Bohol Island | Kyuden International Corporation | 20,564 | 2023 | Facility installation in progress Unregistered |
| A 10MW solar PV generation project in the San Jose area of Luzon Island | Same as above | 6,846 | 2023 | Facility installation in progress Unregistered |

[7] Looking at the breakdown of newly added renewable energy facility capacity from 2008 to 2018 by sector, solar PV generation accounted for 41.6% of the total, which is overwhelmingly dominant.
"Regional Analysis Report: Philippine Renewable Energy Industry Policy as of April 28, 2021" Created by JETRO from "Philippine Energy Plan 2018-2040" (Department of Energy (DOE), Philippines)

| Project Name | Lead Operator | GHG Reduction (tCO2/year) | Project Adoption FY | Progress Status |
|---|---|---|---|---|
| Collaboration with a distribution company for a 7MW solar PV generation project | Tokyo Century Corporation | 4,731 | 2023 | Facility installation in progress Unregistered |
| Introduction of a 1.2MW rooftop solar PV system for an electronics assembly plant (JCM Eco-Lease Project) | Same as above | 697 | 2023 | Facility installation in progress Unregistered |

Source：Global Environment Centre Foundation (GEC)

As stated before, the background to this situation lies in the Renewable Portfolio Standards (RPS) system, which mandates electric utilities in the Philippines to procure a certain percentage of their power from renewable energy sources[8]. The goal is to further increase the share to 35% by 2030 and to 50% by 2040, of which 284 MW will be additionally installed in solar PV generation to reach the target of 1,528 MW[9].

Based on the above situation of the spread of solar PV generation projects in the Philippines, interviews were conducted with several Japanese companies regarding information on JCM projects for roof-mounted solar PV generation projects. From these interviews, challenges were identified based on information obtained from 2 Japanese financial service providers and 1 equipment importer/sales/installation company. The results are presented in Table 3-6. According to the findings from these interviews, the following 3 points were identified as challenges for the composition of JCM projects.

① The representative operator of the JCM project must be a Japanese company.

② Unable to resell solar PV generation facility.

③ Consideration of combination with battery storage facility

Table 3-6 Interviews with Japanese Companies on the JCM Rooftop Solar PV Projects

| | Company A | Company B | Company C |
|---|---|---|---|
| Business content | • Financial service (leasing) business | • Financial service (leasing) business | • Equipment imports, sales, and construction operator |
| Interest in JCM | • Yes | • Yes (However, it is difficult to introduce leasing for rooftop solar PV equipment.) | • Yes |
| Feasibility of potential JCM Projects | • Yes | • No (However, information provision from clients is possible.) | • Yes |
| Outline of specific projects | • Installation of rooftop solar PV (approx. 0.7MW) on self-owned warehouses and facilities | — | • Introduction of rooftop solar PV facilities for Japanese manufacturing companies located in PEZA |
| Challenges in implementing JCM projects | • In the Philippines, a local subsidiary, 40% of which is owned by the Japanese | • It conducts JCM eco-lease business for solar PV generation outside the | • Solar PV generation is being considered for 120-140 factories in |

[8] The DOE Circular DC2017-12-0015, DC2018-08-0024 “Promulgating the Rules and Guidelines Governing the Establishment of the Renewable Portfolio Standards for On-Grid Areas”

[9] JETRO “Market Research on Renewable Energy Sector in the Philippines (from Manila, Philippines)” as of October 27, 2023

| | Company A | Company B | Company C |
|---|---|---|---|
| | headquarters, operates the business. Since the representative operator of a JCM project must be a Japanese company, it is necessary to confirm the intention of the Japanese headquarters (parent company) for the formation of a JCM project. | Philippines. At present, solar PV facilities cannot be resold in the Philippines, making it less suitable as a target for leasing operations. Currently, the project is being put on hold due to the parent company's intention.<br>• Future actions will continue to be considered. | PEZA (including about 20 Japanese-affiliated factories). In these groups of factories, there are differences in the scale of operations among companies, resulting in a lack of synchronization in their progress (which may not necessarily lead to equal benefits from solar PV generation).<br>• Projects that have already progressed to the point of nearing contract signing cannot be suspended due to JCM implementation, thus making JCM business projects impractical.<br>• Among them, the X project (combination of rooftop solar PV projects at Japanese factories and battery storage facilities) in the metropolitan area of the Philippines involves expanding existing solar PV facilities, making it a candidate for consideration for JCM business projects. (But there is a need to confirm the intention of the head office.) |

Source : Prepared by Research Group

### （2） Review Items for JCM Model Project

The following are items to be reviewed for the development of the JCM Model Project for each of the issues identified in the previous section.

#### 1） Participation of Japanese Parent Company

Both Company A and Company B in the financial leasing industry stated above are highly interested in JCM. However, since both companies cannot make decisions at their local subsidiaries, it will take time to confirm the intentions of their parent companies. Therefore, the formation of an international consortium and the fact that the Japanese parent company would be the representative operator could not be confirmed at the hearing. Regarding the introduction of solar PV generation projects for equipment factories, which are potential candidates for JCM projects led by facility operator Company C, Japanese-affiliated factories (local subsidiaries) are also taking time to confirm their intentions with the Japanese parent companies regarding JCM implementation, so responses towards JCM implementation have not been

obtained at this point.

It is required for local subsidiaries to understand the benefits and procedures of JCM and to obtain understanding participation of the Japanese parent company in JCM projects from the initial stages of project formation. Continued careful follow-up is required for the formation of JCM projects.

#### 2） Methods for Electricity Consumers to Purchase Solar PV Facilities after the Lease Expires

Comments from financial service providers indicated that leasing operations for solar PV facilities are not common in the Philippines. The reasons are as follows.

- The current leasing business model is predominantly focused on automobile leasing.
  In the case of automobile leasing, the residual value can be set after the lease term ends, enabling fund recovery through resale.
- However, for solar PV facilities, it is currently unclear whether electricity consumers (such as factories) can purchase the entire equipment setting at market value after the lease expires. Therefore, the leasing model used in automobile leasing operations cannot be applied.

In response to this, the equipment manufacturers are considering arrangements such as facilitating funding through local leasing companies rather than Japanese financial service providers.

#### 3） Combination with Battery Storage Facility

As described earlier, the introduction of JCM for solar PV generation projects in the Philippines, including those under installation process, currently stands at 11 projects. Therefore, the maximum equipment subsidy rate for future projects is capped at 30%. On the other hand, systems utilizing battery storage have not yet been adopted, so it can be expected that the equipment subsidy rate could reach a maximum of 50%. Factories in the Philippines operate 24 hours a day, almost without exception, relying on grid electricity purchases or self-generation through diesel generators for nighttime power.

At present, none of the operators are considering installing storage battery facilities due to their high cost. However, those lower prices can be anticipated in the future. Therefore, by incorporating battery storage facilities with solar PV generation, it can be expected to maximize the scale of installation at each site. Additionally, by combining with battery exchange systems for mobility such as electric bikes, there is potential for effective utilization of solar PV generation.

### 3.2.2 Overview of the Facilities and Technologies to Be Installed

Regarding rooftop solar PV (for self-consumption) for the solar installation project for equipment factories (Japanese-affiliated plants: design, manufacturing, and assembly of metal components for electronic devices, OA equipment, automotive parts, and in-vehicle equipment) that Company C is considering, Table 3-7 shows an overview of installed equipment/technologies that was obtained from interviews with Company C.

Table 3-7　Overview of Introduced Facilities and Technologies for Introduction of Solar PV Generation Projects for Equipment Factories

| | Overview |
|---|---|
| Installed facilities | • Introduction of solar panels manufactured by Kyocera (manufactured under OEM by a Chinese manufacturer) with an output of 800kW/h.<br>• Introduction of power converters from a Chinese manufacturer through a major Japanese trading company (due to their low cost).<br>• The details of the battery storage facilities are still unclear.<br>• Introduction of mounting structures and fences manufactured by a major Chinese compar<br>• Construction planned by a mid-sized Japanese general contractor. |
| Installed technologies | • High-efficiency solar PV generation<br>• Storing surplus solar power for self-consumption during night-time and cloudy weather |

Source : Prepared by Research Group

### 3.2.3 Review for Developing JCM Model Project

#### （1） Candidate Sites

This project is located within the Manila metropolitan area (Batangas County, Lipa City).

#### （2） Business Model Proposal

The basic premise of this project is for Company D to purchase solar PV generation equipment and utilize the generated electricity for self-consumption. (However, it should be noted that conventional grid power is already connected at present).

#### （3） Execution Framework

Figure 3-9 shows the execution framework envisioned for this project. However, this chart is based on the findings from Company C's interviews and similar previous cases in the Philippines. In the actual framework building, an agreement from the Japanese factory, which is the client, will be required.

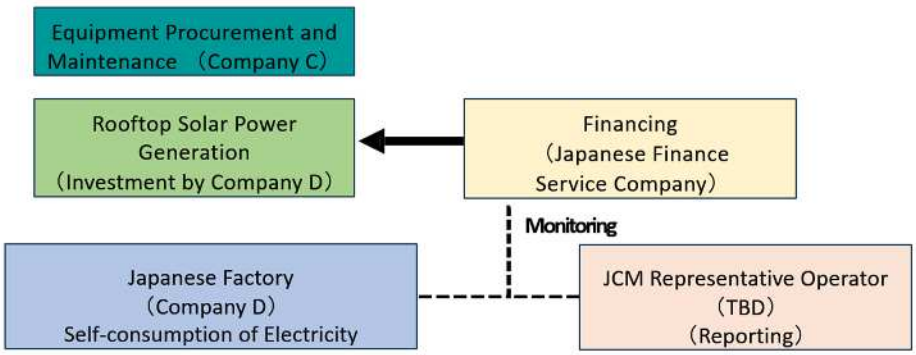



Figure 3-1　JCM Execution Framework (Draft)

Source : Prepared by Research Group

### （4） Estimate of GHG Emissions Reduction

As mentioned earlier, JCM projects for rooftop solar PV in the Philippines have already proven results, and the MRV methodology is established as Installation of solar PV System, Ver. 01.0 (February 2, 2020). Following this methodology, the expected GHG reduction from this project was estimated as shown in Table 3-8. As a result, the GHG reduction was projected to be 800 (tCO2/year). Company C possesses numerous similar project data. Therefore, if these projects, primarily located within the Manila metropolitan area, are converted to JCM projects in the future, it can be expected to further increase the GHG reduction.

Table 3-8　Estimated GHG Reduction in Solar Pawer Generation Projects for Equipment Factories

| | Basis of calculation |
|---|---|
| Emission factor（EF） | • If connected only to the internal grid connected to the household generator, Emission factors for diesel generators are calculated by applying the most efficient thermal efficiency. The efficiency level of 49% above the world-leading diesel generator value of 0.533 tCO2/MWh is applied. |
| Power generation（EG：MWh） | • Assumed to be 0.8MW/h, 6h/d, 200d/y） |
| Rooftop Solar PV (MWh/p) during period（MWh/p） | • 800MW/h/p |
| Emission reduction amount during period (Erp) | • 426.4tCO2/p |

Source：Prepared by Research Group

### （5） Timeline

Table 3-9 shows the estimated timeline for JCM adoption in this project. Basic design and a business profitability study have already been conducted for this project.

If Company C can reach an agreement with the Japanese factory, who is the client, regarding details for JCM project and equipment installation including the JCM execution framework, then it will be possible to apply for JCM subsidy program. Therefore, it is considered that equipment installation could take place as early as within the fiscal year 2024.

Table 3-9　JCM Project Timeline (Draft)

| | FY2024 | | | | | | | | | | | | FY2025 | | | | | | | | | | | | FY2026～ | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 |
| Basic Design | Done | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Business Profitability Study | Done | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JCM Subsidy Application | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| JCM Subsidy Approval | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Facility Installation Contract | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Construction, etc. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Facility Operation and Monitoring | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Source：Prepared by Research Group

### （6） Remaining Challenges and Future Actions/Policies

While the basic design for this project has been completed, the detailed business profitability study including fundraising are still ongoing, and the basic agreement between Company C and a Japanese factory to the client is yet to be reached.

Regarding the JCM project, since the introduction of battery storage is being considered, establishing MRV (methodology) and providing support for the organizational framework building will be needed to accurately calculate the GHG reduction effectiveness.

Therefore, continuous follow-up will be required for the JCM implementation of this project even beyond the fiscal year 2024.

## 3.3 Development of New JCM Model Project

In addition to considering the above-mentioned JCM project for rooftop solar PV in the building sector, which is of high interest to Quezon City, a survey was conducted to match Japanese technologies with the needs of Quezon City for the feasibility of new JCM projects for contributing to the Quezon City “Enhanced QC-LCCAP.”

In October 2023, along with the mayor-level policy dialogue between Quezon City and Osaka City, the event of “Green Business Needs Presentation (further event details described later in Chapter 5)” was held. The event was attended by 141 companies (115 online participants and 26 onsite participants) with the cooperation of the Japanese Chamber of Commerce and Industry of the Philippines as well as the Osaka Chamber of Commerce and Industry. From these Japanese companies, those with a willingness to participate in JCM projects were selected, and the possibility of technology adoption was considered. For technologies deemed highly feasible, business model proposals and estimated GHG emissions reduction were calculated. Specific proposals for Quezon City as well as challenges and review items for the next fiscal year were organized.

### 3.3.1 Selection of Japanese Technologies and Representative Company

#### （1） Survey

Attendees from the Green Business Needs Seminar were surveyed, and companies and project candidates interested in JCM Model Project were identified. The result of survey is shown on the following page.

The following is a summary of responses. The total number of responses was 72.

Table 3-10　Summary of Green Business Needs Seminar Survey

| No. | Questions | Choices | Responses | | Insights |
|---|---|---|---|---|---|
| | | | Number | % | |
| 1 | Seminar satisfaction level | Very useful (Satisfied) | 15 | 21% | “Generally satisfied” accounts for 64% of responses, followed by “Satisfied” at 21%, “Somewhat dissatisfied” at 11%, and “Dissatisfied” at 0%. |
| | | Somewhat useful (Generally satisfied) | 46 | 64% | |
| | | Not very useful (Somewhat dissatisfied) | 11 | 15% | |
| | | Not useful at all (Dissatisfied) | 0 | 0% | |
| 2 | About interest in decarbonization and environmental technology initiatives (multiple choices allowed) | Transportation | 12 | 17% | “Other” is the highest at 46%, followed by “Building” at 38%, and “Transportation” at 17%. |
| | | Building | 27 | 38% | |
| | | Other | 33 | 46% | |
| 3 | About support schemes you are interested in (multiple choices allowed) | JCM Model Project | 38 | 38% | “JETRO/JICA Private Sector Cooperation Program, etc.” is the highest at 44%, followed by “JCM Model Project” at 38%, “Nothing in particular” at 16%, and “Other” at 3%. |
| | | JETRO/JICA private sector cooperation program, etc. | 44 | 44% | |
| | | Nothing in particular | 16 | 16% | |
| | | Other | 3 | 3% | |
| 4 | What kind of technology utilization are you considering for decarbonization efforts? | - | - | - | |
| 5 | Challenges and issues in decarbonization efforts | - | - | - | |
| 6 | Applicability to future business strategies | Applicable. We want to utilize the information obtained today to expand our overseas business. | 8 | 10% | “Applicable/We want to continue gathering relevant information” is the highest at 65%, followed by “Applicable/We want to consider revising our company's overseas business” at 14%, while “Applicable/We want to expand our overseas business” and “Not applicable” are both at 10%. |
| | | Applicable. We want to continue gathering relevant information, including the information obtained today, for our overseas business development. | 51 | 65% | |
| | | Applicable. We want to utilize the information obtained today to consider revising our company's overseas business. | 11 | 14% | |
| | | Not applicable. | 8 | 10% | |
| 7 | Needs for future decarbonization efforts, etc. | Renewable energy (solar PV generation utilizing the roofs of factories and vacant land at business sites for self-consumption) | 27 | 15% | “Self-consumption solar PV generation utilizing rooftop and vacant land” is the highest at 15%, followed by “Utilization of JCM Model Project and other support schemes” at 11%. “Production of biogas fuel using agricultural residues” and “Recycling of waste plastics” are both at 9%, while “Electrification of automobiles” is at 8%. |
| | | Renewable energy (solar PV generation with no initial investment through rental or leasing) | 11 | 6% | |
| | | Renewable energy (Small-scale hydroelectric power generation utilizing wastewater from factories or business premises) | 9 | 5% | |
| | | Biomass utilization (Production of biogas fuel using agricultural residues) | 15 | 9% | |
| | | Biomass utilization (District heating project utilizing agricultural residues) | 10 | 6% | |
| | | Decarbonization of fossil fuels (CO2 reduction by gas cogeneration) | 9 | 5% | |
| | | Decarbonization of fossil fuels (CO2 capture and storage) | 10 | 6% | |
| | | Decarbonization of fossil fuels (Production of synthetic gas using carbon dioxide) | 3 | 2% | |
| | | Electrification of automobiles | 14 | 8% | |

| | | | | | |
|---|---|---|---|---|---|
| | | Energy saving & recycling (Introduction of BEMS) | 9 | 5% | |
| | | Energy saving & recycling introduction of high-efficiency large-scale air conditioning system) | 7 | 4% | |
| | | Energy saving & recycling (Optimization of operation through AI) | 5 | 3% | |
| | | Energy saving & recycling (Recycling of waste plastics) | 16 | 9% | |
| | | Utilization of JCM Model Project and other support schemes | 20 | 11% | |
| | | Nothing in particular | 4 | 2% | |
| | About anticipated needs in decarbonization efforts (Other) | - | - | - | |
| 8 | Any other comments or feedback | - | - | - | |

Source：Prepared by Research Group

（2） Selection of Participating Companies

The evaluation was conducted using the following criteria to select operators with high potential for participation in JCM projects from among those who responded to the questionnaire survey. As a result, it was evaluated that 3 companies have a high potential for business participation, including Asano Taiseikiso Engineering Co., Ltd. (hereinafter referred to as ATK), a smart facility and lighting manufacturing company, and an agricultural machinery and biomass-related equipment manufacturing company.

【Evaluation Criteria】
- ✓ Presence of bases in Osaka Prefecture and the Philippines
- ✓ Interest in participating in JCM projects
- ✓ Suitability of company-owned technology for JCM projects (related to decarbonization, tangible services)
- ✓ Past achievements in JCM projects and overseas business

The hearings were conducted with the 3 companies selected from the survey. The following is an overview of the results. As a result, ATK was evaluated as having the highest potential for participation.

Table 3-11 Evaluation Results Based on Business Operator Interviews

| Company Name | | ATK | A smart facility and lighting manufacturing operator | An agricultural machinery and biomass-related equipment manufacturing operator |
|---|---|---|---|---|
| Interview Items | Background | The company is expanding the introduction of decarbonization - related facilities in the Asian region and intends to expand into the Philippines. | The company has the past business achievement in the Philippines and intends to further enter the market in the future. | The company has subsidiaries in major Southeast Asian countries and affiliated companies that can collaborate. It hopes to expand its future business in the Philippines. |
| | Technical Overview | ◎<br>Energy savings by the utilization of unused heat (such as factory wastewater heat and geothermal | ◎Collaboration towards creating a smart city by the use of smart LED streetlights and sensors | △<br>Technologies related to water management in agriculture and methane reduction through smart |

| | | | | |
|---|---|---|---|---|
| | | heat) | | agriculture, as well as biomass-related technologies |
| | Target for Technology Implementation | Factories, business premises, etc. | Streetlights around roads and facilities | Farmland |
| | Feasibility of GHG Reduction Calculation | ◎<br>Yes | ◎<br>Yes | ◎<br>Yes |
| | Suitability for JCM Projects | ◎Decarbonization can be achieved by installing equipment and technology in private factories and public facilities. | △<br>Given that the candidate sites are widely spread and in terms of technical content, it would be more appropriate to include them as part of an intercity collaboration project package. | △<br>It primarily aims to develop agricultural methods for decarbonization, and therefore, the suitability for JCM is low. |
| Evaluation | | ◎ | ○ | △ |

Source : Prepared by Research Group

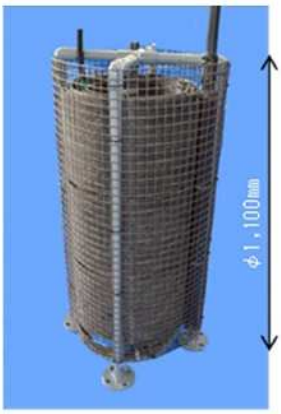
### 3.3.2 Overview of the Facilities and Technologies to Be Installed

Based on results of the hearings, the installation of equipment and technologies from ATK, which were deemed to have high potential for adoption, are outlined below.

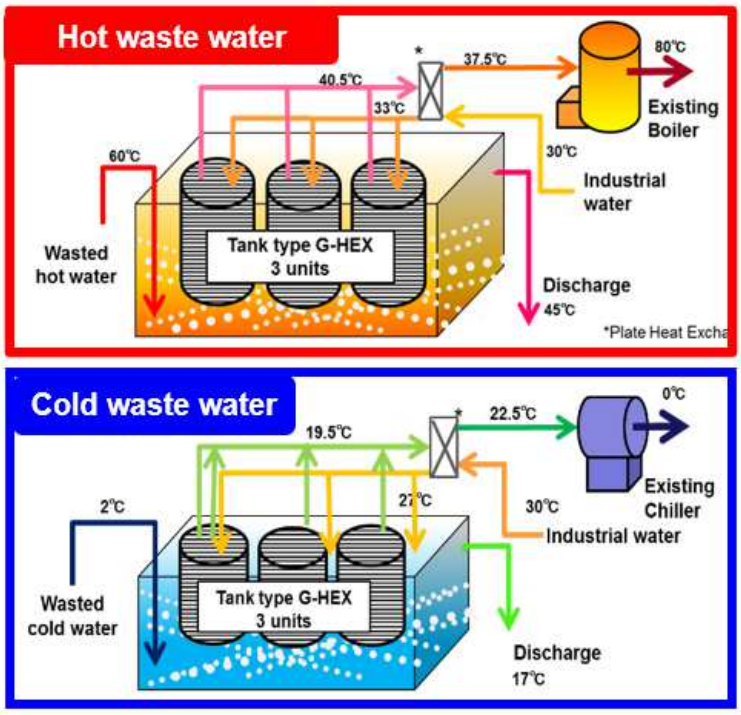
#### （1） Wastewater Heat Recovery System

It primarily involves recovering low-temperature waste heat, such as warm wastewater generated during production processes in food plants, and cooling water after boilers and chillers, which are usually discarded, and reusing it for pre-cooling and pre-heating to reduce energy costs and CO2 emissions. The heat exchanger used in this process is a resin-made heat exchanger called “G-HEX,” known for its durability. The advantage of this technology is its ability to conduct heat exchange even in wastewater with high impurity content or high corrosiveness due to strong acids or alkalis.

Currently, this technology is undergoing pilot testing in the food processing factory in Vietnam.




Resin-made Heat Exchanger
G-HEX




Wastewater Heat Recovery

Figure 3-2　Overview Diagram of Wastewater Heat Recovery System

Source：Asano Taiseikiso Engineering Co., Ltd.

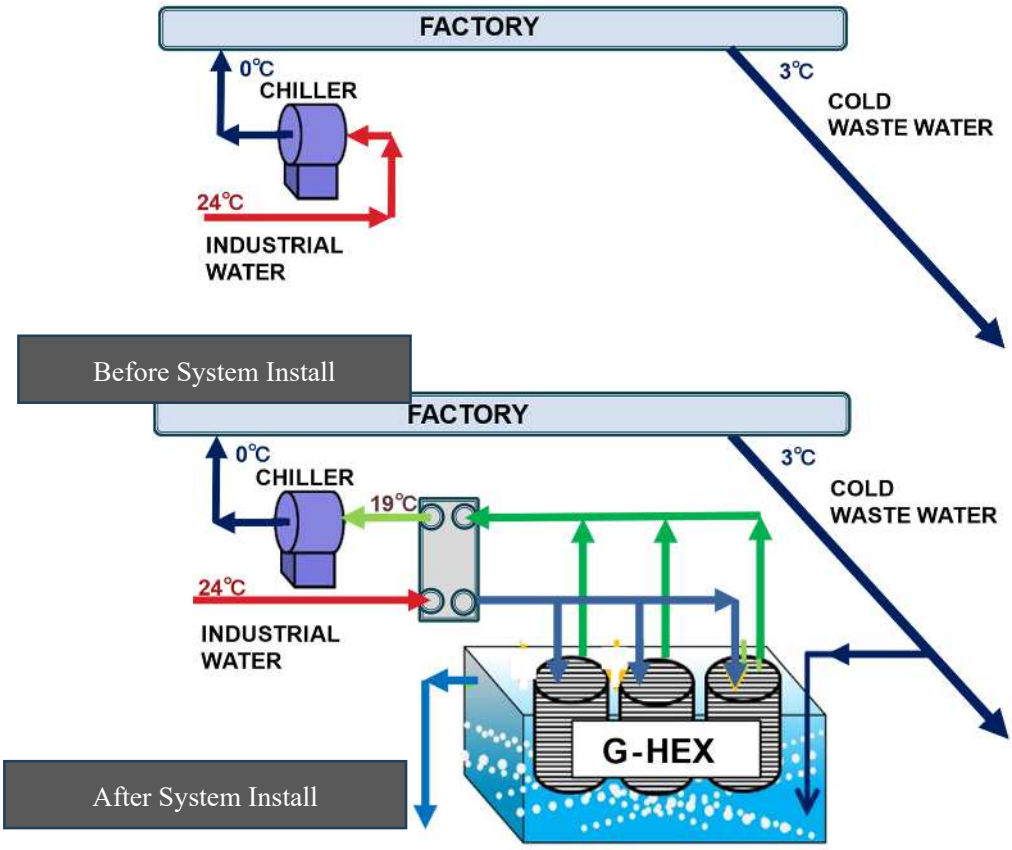
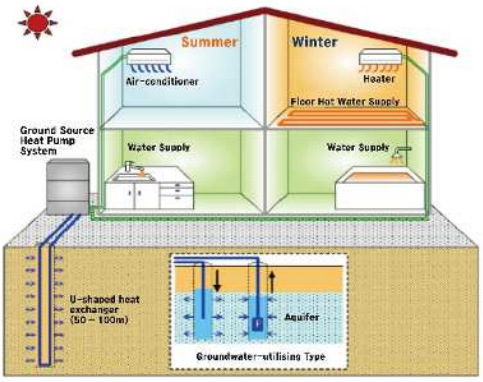



Figure 3-3　Comparison of Systems Before and After Wastewater Heat Recovery System Installation

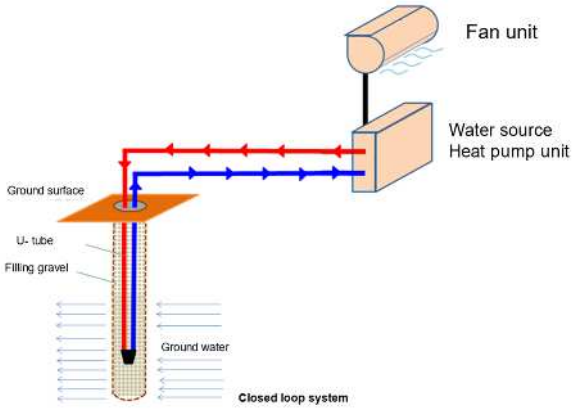
Source：Asano Taiseikiso Engineering Co., Ltd.

（2） Ground Source Heat Pump System

For facilities such as hospitals and schools with the consistent air conditioning demand throughout the year, the heat pump system utilizing ground temperatures will be introduced. The closed-loop type, where water circulates through polyethylene pipes (U-shaped), buried underground for heat exchange, is commonly used.




Conceptual Diagram of Ground Source Heat Pump




Closed Loop Type

Figure 3-4 Ground Source Heat Pump System

Source：Asano Taiseikiso Engineering Co., Ltd.

3.3.3 Review for Developing JCM Model Project

（1） Candidate Sites

The wastewater heat recovery technology is envisioned for factories generating large amounts of wastewater. Since the pilot test is being conducted in a poultry processing factory in Vietnam, similar or larger scale factories are preferable candidates.

The ground source heat utilization technology is best suited for facilities with consistent air conditioning needs throughout the year. Hospitals, school facilities, fire stations, and other public sites are potential locations.

Based on the above idea, the desk research results of facilities deemed feasible for implementation at the current stage are outlined below.

Table 3-12　Assumed Locations for Facility Installation

| Facility Content | Target Industries (Number of Locations) ※Estimated | Insights |
|---|---|---|
| Wastewater Heat Use | 【Inside Quezon City】<br>・ Poultry processing plant (1 location)<br>・ Fruit processing plant (5 locations)<br>・ Organic products processing plant (1 location) | In addition to 1 poultry processing plant with the equipment install results, there are several fruit processing plants located in the city. If a large amount of water is consumed in the fruit washing process, etc., there is a possibility of introducing such equipment. |
| | 【Outside Quezon City】<br>・ Food processing plant (2 locations) | The potential for facility installation is considered in tuna canning factories, as well as in egg production, commercial feed, and other agricultural production facilities. |
| Geothermal Heat Use | ・ Private hospital (3 locations)<br>・ National hospital (1 location)<br>・ Fire station (1 location)<br>・ Hotel (2 locations)<br>・ 24-hour supermarket (1 location) | There are several facilities in the city, both public and private, that are considered to have a constant demand for air conditioning throughout the year. |

Source：Prepared by Research Group

To estimate the effects of facility implementation, the poultry processing factory in Quezon City was chosen as a model case study, using the data provided in Table 3-12. This factory is assumed to have a facility scale equivalent to those where wastewater heat recovery and geothermal heat use systems have been implemented previously.


Figure 3-5　Subject for Business Model Consideration (JCPC Company Factory in Quezon Province)

Source：Google Map

（2） Execution Framework

The execution framework envisioned for the JCM facility subsidy program is shown below. ATK will serve as the representative operator of the international consortium, collaborating with local joint venture partners to install equipment in factories and other local enterprises. It will also conduct maintenance and monitoring activities.

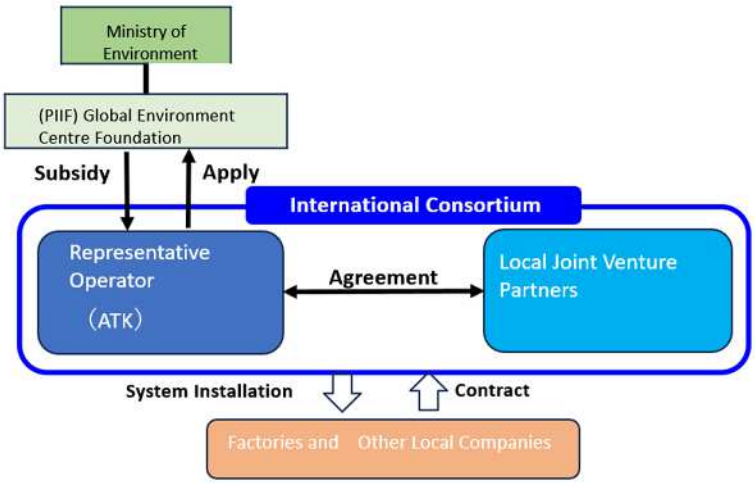



Figure 3-6 Execution Framework (Draft)

Source : Prepared by Research Group

（3） Estimate of GHG Emissions Reduction

1） Wastewater Heat Recovery System (G-HEX)

The building area of the factory is estimated to be approximately 5,400m$^2$. On the other hand, the factory in Vietnam where the demonstration test was conducted has an area of about 6,000m$^2$. Therefore, it is assumed that the conditions regarding wastewater amount are equivalent to those of the factory in Vietnam.

Table 3-13 Assumed Wastewater Conditions

| | | |
|---|---|---|
| Cold wastewater | | |
| wastewater volume | 190 | m$^3$/day |
| wastewater temperature | 3 | °C |
| Hot wastewater | | |
| wastewater volume | 40 | m$^3$/day |
| wastewater temperature | 60 | °C |
| Operating hours | 20 | Hours/day |
| Operating days | 30 | Days/year |

Source : Prepared by Research Group

The quantity of G-HEX heat exchangers in the wastewater heat recovery system was set based on the conditions shown above. Additionally, the inlet temperatures of chiller and boiler were calculated to estimate the reduction in electricity and fuel consumption, respectively. Furthermore, the GHG reduction was

calculated based on the emission coefficients for electricity and fuel (Gas/Diesel Oil).

Table 3-14 Calculation Results (Wastewater Heat Recovery)

| **Cold waste water system** | |
|---|---|
| G-HEX heat exchanger | 6 units |
| Chiller inlet temperature (before installation) | 24 ℃ |
| Chiller inlet temperature (after installation) | 19 ℃ |
| COP of chiller | 2.00 |
| Electricity $CO_2$ emission coefficient* | 0.5979 $tCO_2$/MWh |

| | |
|---|---|
| **Reduction in electricity consumption** | 171 MW/year |
| **Reduction of GHG emissions** | 102 t-$CO_2$/year |

*2023 JCM equipment subsidy project. List of electricity $CO_2$ emission coefficients: Luzon Island, Philippines.

| **Hot waste water system** | |
|---|---|
| G-HEX heat exchanger | 4 units |
| Boiler inlet temperature (before installation) | 30 ℃ |
| Boiler inlet temperature (after installation) | 41 ℃ |
| Boiler efficiency | 0.90 |
| Fuel $CO_2$ emission coefficient** | 2.8560 $tCO_2$/kL |

| | |
|---|---|
| **Reduction in fuel consumption** | 27 KL/year |
| **Reduction of GHG emissions** | 69 t-$CO_2$/year |

**IPCC, calculated from emission coefficients and unit heating value of Gas/Diesel oil.

Source : Prepared by Research Group

Based on the above, the rough estimated results for GHG emission reduction effect, installation costs, and return on investment years are indicated below. Regarding installation costs when utilizing subsidies, it was calculated based on the business performance in the Philippines, assuming a subsidy rate of 30% for half of the installation costs. The CO2 emission coefficient for electricity was adopted at 0.507 tCO2/MWh (“FY23 List of CO2 Emission Coefficients for JCM Model Project,” and “Appendix 5 Philippines”).

This study is based on estimates of the effectiveness derived from cases where similar facilities were installed, which are expected to be of a similar scale to the facilities identified for installation. While there may be challenges in terms of cost-effectiveness, it is anticipated that the cost-effectiveness could improve by selecting specific facilities for installation and conducting further feasibility studies. Additionally, it may be considered to adopt business models such as ESCO operations or leasing arrangements, as necessary.

Table 3-15 Estimated Effects of Facility Introduction

| Cold and Wastewater Heat Recovery System | | Numerical Values | Unit | Notes |
|---|---|---|---|---|
| Reduction in Fuel Consumption | | 171 | MWh/year | Based on Introduction Results |
| CO2 Emission Factor | | 0.507 | tCO2/MWh | |
| CO2 Emission Reduction | | 87 | t-CO2/year | |
| Reduction Amount | | 2,052,000 | PHP/year | Set as 12PHP/kWh |
| | | 6,156,000 | Yen/year | Assuming 1 PHP = 3.00 yen |
| Installation Cost | w/o Subsidy | 17,340,000 | Yen | Based on Introduction Results |
| | 30% Subsidy | 14,739,000 | Yen | Refer to the records of solar PV generation projects in the Philippines for a subsidy rate of 30% in the “FY 2023 JCM Model Project Appendix 3: Classification of Similar Technologies, Adoption Records in each Partner Country.” |
| Legal Durability Years | | 15 | Year | |
| Return on Investment Years | w/o Subsidy | 3 | Year | |
| | 30% Subsidy | 2 | Year | |

| Hot and Wastewater Heat Recovery System | | Numerical Values | Unit | Notes |
|---|---|---|---|---|
| Reductions in Fuel Consumption | | 27 | kL/year | Based on Introduction Results |
| CO2 Emission Factor | | 2.8560 | tCO2/kL | |
| CO2 Emission Reductions | | 77 | t-CO2/year | |
| Reduction Amount | | 1,101,600 | PHP/year | Setting A heavy oil unit price at 40.8 PHP/L |
| | | 3,304,800 | Yen/year | Assuming 1 PHP = 3.00 yen |
| Installation Cost | w/o Subsidy | 10,710,000 | Yen | Based on Introduction Results |
| | 30% Subsidy | 9,103,500 | Yen | Refer to the records of solar PV generation projects in the Philippines for a subsidy rate of 30% in the “FY 2023 JCM Model Project Appendix 3: Classification of Similar Technologies, Adoption Records in each Partner Country.” |
| Legal Durability Years | | 15 | Year | |
| Return on Investment Years | w/o Subsidy | 3 | Year | |
| | 30% Subsidy | 3 | Year | |

Source : Prepared by Research Group

2） Geothermal Heat Use System

Subsequently, the geothermal heat utilization system was examined. Considering the scale of the facility, it is assumed that there are air conditioning systems with cooling capacities of 80kW or more. Then, GHG reductions were calculated assuming the installation of 2 geothermal multi-air conditioners with a cooling capacity of 40 kW.

Table 3-16 Calculation Results (Geothermal Heat Use)

| **Ground Source Heat Pump system (GSHP)** | |
|---|---|
| Geothermal multi air-conditioner | 2 units |
| Cooling capacity | 40.00 kW |
| Cooling power consumption | 7.67 kW |
| COP during cooling | 5.22 |
| Existing air-conditioner | 2 units |
| Cooling capacity | 40.00 kW |
| Cooling power consumption | 15.09 kW |
| COP during cooling | 2.65 |
| Electricity $CO_2$ emission coefficient* | 0.5979 $tCO_2$/MWh |

| | |
|---|---|
| **Reduction in electricity consumption** | 103 MW/year |
| **Reduction of GHG emissions** | 62 t-$CO_2$/year |

*2023 JCM equipment subsidy project. List of electricity $CO_2$ emission coefficients: Luzon Island, Philippines.

Source : Prepared by Research Group

Based on the above, the rough estimated results for GHG emission reduction effect, installation costs, and return on investment years when implementing the geothermal heat use system are presented below. Like the examination of the wastewater heat recovery system mentioned earlier, in geothermal heat utilization as well, the effective estimation was roughly calculated based on cases where the equipment was installed in facilities expected to be of similar scale to the facilities targeted for equipment installation. Although this model calculation focused on 1 facility, there is a possibility that multiple sites may be targeted in the future through on-site investigations and more.

While there are challenges in terms of cost-effectiveness, it is believed that the potential for improving cost-effectiveness exists by selecting specific sites for implementation and advancing feasibility studies. Additionally, it may be considered to adopt business models such as ESCO operations or leasing arrangements, as necessary.

| ■Geothermal Heat Use System | | | |
|---|---|---|---|
| Reduction in Electricity consumption | | 103 | MW/year |
| CO2 Emission Factor | | 0.507 | tCO2/MWh |
| CO2 Emission Reduction | | 52 | t-CO2/year |
| Reduction Amount | | 1,236,000 | PHP/year |
| | | 3,708,000 | Yen/year |
| Installation Cost | w/o Subsidy | 34,200,000 | Yen |

| | | | |
|---|---|---|---|
| | 30% Subsidy | 29,070,000 | |
| Legal Durability Years | | 13 | Year |
| Return on Investment Years | w/o Subsidy | 9 | Year |
| | 30% Subsidy | 8 | year |

Source : Prepared by Research Group

### 3.3.4 Timeline

The anticipated timeline for the JCM Model Project is shown below.

Table 3-17 Project Implementation Timeline

| Year | 2024 | | | | | | | | | 2025 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Feasibility Study | | | | | | | | | | | | | | | | | | | | | |
| Basic Design | | | | | | | | | | | | | | | | | | | | | |
| Detailed Design | | | | | | | | | | | | | | | | | | | | | |

| Year | 2025 | | 2026 | | 2027 | | | | | | | | | | | | 2028 | | 2029 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | 11 | 12 | | | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | | | | |
| Quezon City Budget Request and Approval | | | | | | | | | | | | | | | | | | | | |
| Preparation and Submission of JCM Adoption Decision Application Documents | | | | | | | | | | | | | | | | | | | | |
| JCM Adoption Decision | | | | | | | | | | | | | | | | | | | | |
| Determination of Subsidy Amount, Contract | | | | | | | | | | | | | | | | | | | | |
| Procurement, Construction | | | | | | | | | | | | | | | | | | | | |
| Test Operation, Monitoring | | | | | | | | | | | | | | | | | | | | |

Source : Prepared by Research Group

### 3.3.5 Remaining Challenges and Future Actions/Policies

The wastewater heat recovery technology is not yet introduced in the Philippines, and it is necessary to conduct investigations on the business environment including needs, market, competition, and relevant regulations. Additionally, it is required to raise awareness among promising local businesses about the technical aspects, characteristics, and advantages of the technology.

Since geothermal heat utilization requires boring operations, there are concerns about difficulties in obtaining permits. Therefore, the approach will be to explain to relevant authorities that boring work for this technology will not adversely affect the underground water or soil environment.

In any technology, it is essential to conduct a survey of promising local businesses through interviews to assess their needs and the feasibility of implementation to select suitable sites for equipment installation. A survey form has been prepared for this purpose, as shown on the following page. This survey form will be utilized to conduct further investigations and assess the feasibility of implementation.

## For Hot waste water system

| No. | Question | Answer |
|---|---|---|
| 1 | Hot waste water from the factory (Volume and Temperature) | Liters/day (or $m^3$/day) |
| | | ℃ |
| 2 | Hot water produced by boiler (Volume and Temperature) | Liters/day (or $m^3$/day) |
| | | ℃ |
| 3 | Purpose for using hot water | |
| 4 | Boiler (Manufacture, Model, Capacity etc.) | 1 |
| | | 2 |
| | | 3 |
| | | 4 |
| | | 5 |
| 5 | Working hours of boiler | hours/day |
| 6 | Fuel for Boiler (Kind and Consumption) | (Fuel oil, Diesel, LPG, LNG?) |
| | | Liters/day |
| 7 | Suggested place for the energy saving system. (Approx. 6m x 3m x 2m, near by hot waste water line) | |

## For Cold waste water system

| No. | Question | Answer |
|---|---|---|
| 1 | Cold waste water from the factory (Volume and Temperature) | Liters/day (or $m^3$/day) |
| | | ℃ |
| 2 | Cold water produced by Chiller (Volume and Temperature) | Liters/day (or $m^3$/day) |
| | | ℃ |
| 3 | Purpose for cold water | |
| 4 | Chiller (Manufacture, Model, Capacity etc.) | 1 |
| | | 2 |
| | | 3 |
| | | 4 |
| | | 5 |
| 5 | Working hours of Chiller | hours/day |
| 6 | Electricity consumption (Price and/or MWh) | (PHP/month) |
| | | (MWh/month) |
| 7 | Suggested place for the energy saving system. (Approx. 6m x 3m x 2m, near by cold waste water line) | |

## For Ground Source Heat Pump system (GSHP)

| No. | Question | Answer | | | |
|---|---|---|---|---|---|
| 1 | Air conditioner (Manufacture, Model, Capacity, Number of unit, Working hour etc.) | 1 | x (nos) | x | (hours/day) |
| | | 2 | x (nos) | x | (hours/day) |
| | | 3 | x (nos) | x | (hours/day) |
| | | 4 | x (nos) | x | (hours/day) |
| | | 5 | x (nos) | x | (hours/day) |
| 2 | Electrocity consumption (Price and/or MWh) | | | | (PHP/month) |
| | | | | | (MWh/month) |
| 3 | Suggested place for the Test borehole. (More than. 6m x 3m, near by airconditioner, Outside the building) | | | | |

Figure 3-7 Draft Survey Form

Source : Asano Taiseikiso Engineering Co., Ltd.

# Chapter4　Support for Building Institutions and Planning

This chapter will focus on specific examples of efforts by the City of Osaka, which is in a cooperative relationship with Quezon City toward the realization of the formation of a decarbonized city. In previous years, information was shared on the promotion of LED lighting, sewage digestion gas power generation at sewage treatment plants, anaerobic/aerobic activated sludge (AO) process, and demonstration projects of on-demand buses in Osaka City. The objective is to share with Quezon City examples of decarbonization in Osaka City to contribute to the promotion of policies and capacity building in Quezon City.

## 4.1 Osaka City's Efforts to Achieve Carbon Neutral

### 4.1.1 Overview of Osaka City

The population of Quezon City was 3 million in 2016. It increased annually by 1.17 percent from 2010 to 2015 and it is projected to reach 4 million between 2025 and 2030. The increase is due to the natural increase and relocation from neighboring cities and securing labor force, strengthening the competitive edge and further development of economic activities are expected. In order to maintain continuous growth with the population increase, urban and transportation infrastructure development needs to be promoted. However, the amount of GHG emissions of the transportation sector, caused by jeepneys and autorickshaws and private cars account for approx. 21 percent all total emissions. Measures for automobile traffic in the transportation sector is likely to have a major impact on the emissions reduction.

### 4.1.2 Zero Carbon City Initiatives in Osaka City

#### （1） Osaka City Action Plan on Global Warming

Like Quezon City, Osaka City aims to achieve carbon neutrality by 2050, and is promoting an initiative called “Zero Carbon Osaka.” The city has set a target of reducing greenhouse gas emissions by 50% from the fiscal 2013 level by 2030 and achieved a reduction of about 18% in fiscal 2020.

The “Osaka City Action Plan for Global Warming (Area Policies)” formulated in March 2021 outlines the five “Cities” and measures aimed at achieving “Zero Carbon Osaka” as shown in the table below.

Table 4-1 “Osaka City Action Plan on Global Warming (Area Policies)”

| Image of the “City” we aim for | Measures |
|---|---|
| A city that lives on decarbonized energy | ・Further expansion of renewable energy use<br>・Thorough utilization of unused energy<br>・Use and expand new energy such as hydrogen<br>・Expand the spread of next-generation vehicles |
| A city where decarbonized behavior is pervasive and filled with a decarbonized mindset | ・Change in lifestyle and work style<br>・Promotion of environmental education and awareness<br>・Reducing energy consumption<br>・Energy saving of buildings<br>・Promoting voluntary efforts to decarbonize business activities<br>・Osaka City's initiative |
| Sustainable cities with built-in decarbonization mechanisms | ・Urban development that implements environmental technology<br>・Decarbonization through transportation network improvements and logistics measures<br>・Decarbonization of transportation<br>・Promotion of resource conservation and resource circulation<br>・Efforts towards zero marine plastic waste pollution<br>・Promotion of carbon sink measures |
| A city that leverages diverse ties to lead decarbonization | ・ Promotion of the environment and energy industry and sustainable growth of all businesses<br>・Contribution outside the region based on cooperation between regions<br>・Promotion of cooperation between cities<br>・ Promoting overseas expansion through public-private collaboration |
| A resilient city that is prepared for climate change | ・Improve measures to adapt to climate change<br>・Initiatives towards climate change adaptation in Osaka City<br>・Strengthening resilience by expanding energy infrastructure |

Osaka City is working with citizens and businesses to promote changes in the economic and social system, innovation, and international expansion, as shown in the figure below, in order to develop five “Cities” toward the realization of “Zero Carbon Osaka.” Through mayor-level policy dialogue and discussions in this city-to-city collaboration project, we deepened common understanding between Osaka City and Quezon City and confirmed that sharing Osaka City's initiatives will contribute the promotion and implementation of Enhanced LCCAP.

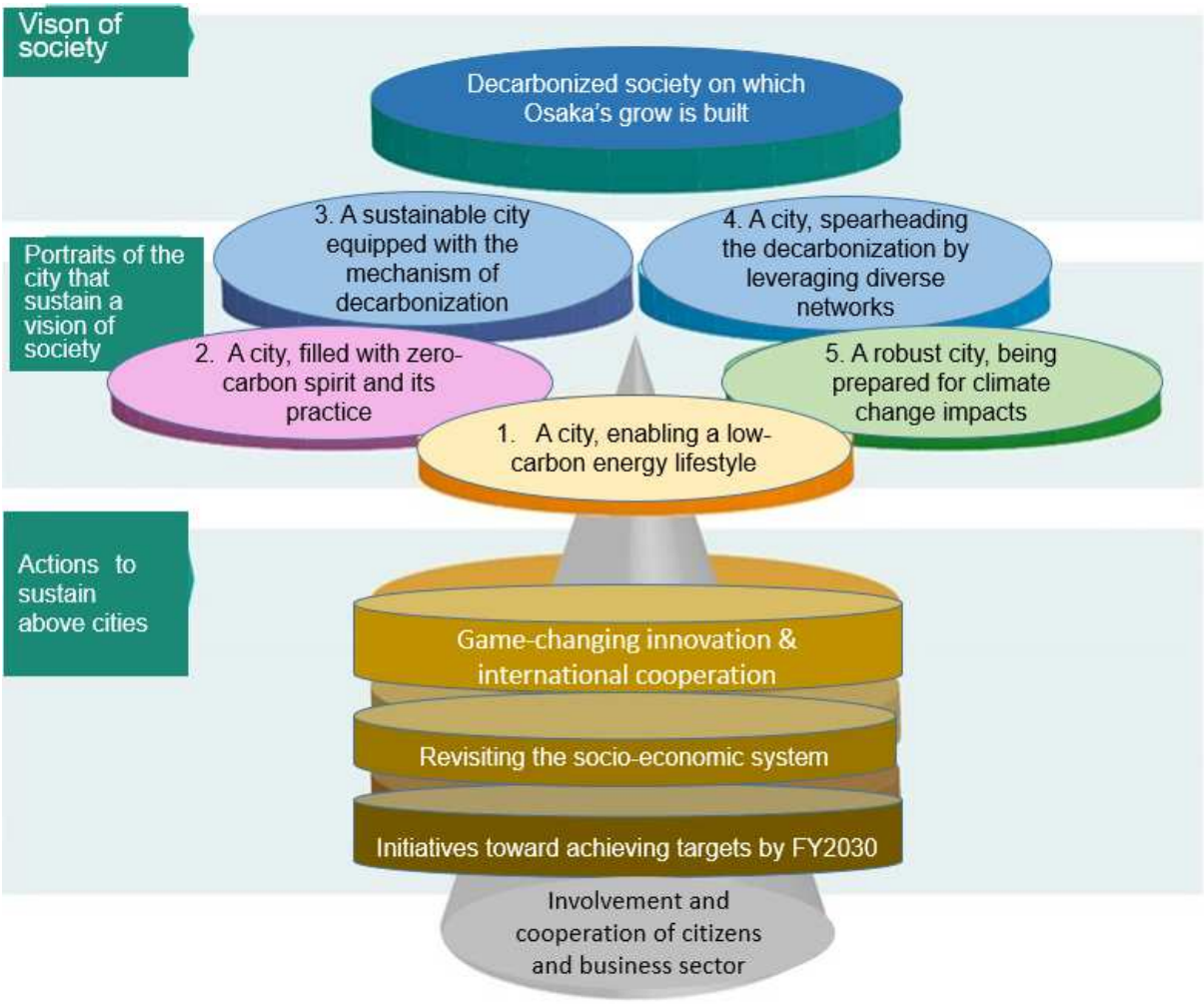



Figure 4-1 Zero Carbon Osaka Scheme

Source: Osaka City Action Plan on Global Warming

Osaka City established a public-private collaboration platform called "Team OSAKA Network" to work with private companies to solve environmental problems overseas. Approximately 160 companies with advanced environmental technologies are participating, and the platform is promoting international collaboration and the overseas expansion of Japanese companies. Through this city-to-city collaboration project, the platform works also to develop business in the environmental field in Quezon City and other parts of the Philippines.

### （2） Osaka City's GHG Emissions Status and Reduction Targets

In fiscal 2021, the total GHG emissions from all office operations conducted by Osaka City government were 848,000 tons, of which carbon dioxide accounted for 92.7%. The main sources of carbon dioxide emissions are approximately 60% from waste incineration and approximately 30% from electricity use. Approximately 60% of electricity usage comes from water and sewage services.

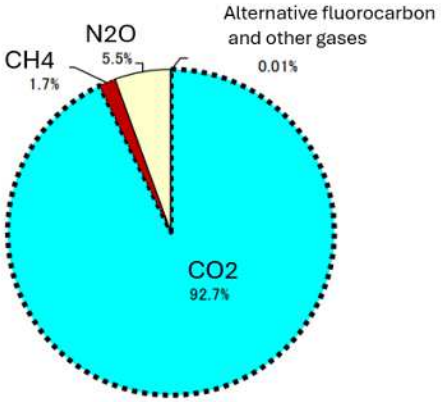



Figure 4-2　GHG Emissions by Type

Source: Osaka City Action Plan on Global Warming

The "Osaka City Action Plan on Global Warming (Administrative Business Policies)" states that, as an emitter that emits approximately 5% of GHG emissions in the city area, Osaka City will take the initiative in implementing the initiatives listed in the table below.

Table 4-2　Measures in "Osaka City Action Plan on Global Warming"

| Policy | Initiative |
|---|---|
| (1) Energy conservation and promotion of CO2 reduction in public facilities | ・Improvement of energy saving performance of city-owned facilities (promotion of ZEB conversion of new buildings, etc.)<br>・Thorough introduction of LED lighting to all city-owned facilities<br>・Expansion of ESCO business implementation<br>・Updating to highly efficient energy-saving equipment<br>・Improvement of daily operation of facilities and equipment<br>・Expanding the use of domestic timber, etc. |
| (2) Promotion of the expansion of renewable energy introduction | ・Expand introduction of renewable energy<br>・More effective use of unused energy |
| (3) Promotion of decarbonization of mobility | ・Introduction of next-generation vehicles to official vehicles<br>・Introduction of EVs, etc. to passenger cars<br>・Consideration and implementation of CO2 emission reductions such as ship electrification |
| (4) Promotion of waste reduction and recycling | ・Reduction of plastic waste<br>・Reduction of the amount of waste incinerated |
| (5) Thorough environmental management by employees | ・Setting initiative goals for each department<br>・Raising awareness through training and promoting environmentally friendly initiatives<br>・Monitoring and measurement to confirm proper operation<br>・Review as necessary |

（3） SDGs Future City Initiatives

SDGs Future Cities is an initiative launched by the Cabinet Office in 2018 that solicits proposals from local governments for initiatives aimed at achieving the SDGs and selects cities across the country that propose outstanding initiatives as “SDGs Future Cities.” Osaka City was selected as an “SDGs Future City” in July 2020, and formulated the “Osaka Prefecture/Osaka City SDGs Future City Plan” in October of the same year. The plan is currently in its second phase (2023-2025) and aims to achieve sustainable growth by promoting initiatives to protect the global environment under the “Growth through Diverse Challenges” initiative. Through this project, both Osaka City and Quezon City share the same direction that they should aim for in creating a zero-carbon city. In order to realize this ideal future image, the SDGs targets, and indicators that Osaka City has set in the field of “Environment” are shown below.

Table 4-3 Osaka City’s Initiatives related to SDGs (Environment)

| Goal & Target No. | KPI | |
|---|---|---|
| 12.2<br>12.4<br>12.5<br>13.1<br>13.2<br>13.3 | Indicator: Amount of GHG emissions | |
| | Current (2019):<br>42.84 million tCO2<br>(FY2013 56.23 million tCO2) | Target: 40% reduction in FY2030 compared to FY2013<br><br>*Current target is based on the Osaka Prefecture Action Plan on Global Warming (Area Policies) |
| 12.2<br>12.4<br>12.5 | Indicator: Emissions, recycling rate, amount of plastic incineration, and effective utilization rate of plastic containers and packaging | |
| | Current:<br>(1) Containers and packaging plastic (2020) emissions: 230,000 tons<br>Recycling rate 30% | Target (FY2025):<br>Emissions: 210,000 tons (14% reduction)<br>Recycling rate 50% (23 points increase) |
| | (2) Plastic (FY2019) Amount of incineration: 480,000 tons<br>Effective utilization rate 88% | Incineration amount: 360,000 tons (25% reduction)<br>Effective utilization rate 94% (6 points increase)<br>*Current goals are based on the “Osaka Prefecture Recycling-oriented Society Promotion Plan”<br>*Values in parentheses are compared to 2019 |
| 14.1<br>14.2 | Indicator: Amount of plastic waste flowing into Osaka Bay | |
| | Current (FY2021):<br>58.8t (amount of plastic flowing into Osaka Bay from Osaka prefecture area) | Target: 50% reduction in FY2030 compared to FY2021<br><br>*Current goals are based on the “Osaka Marine Litter Zero Plan” |

Source: “Osaka Prefecture/Osaka City SDGs Future City Plan Phase 2 (2023-2025)”

Osaka City will hold the 2025 Osaka/Kansai Expo with the theme of “Designing a future society where life is bright” in which the SDGs have been achieved, and the city is moving forward with initiatives to realize the ideal state for 2030 and to become an “SDGs advanced city.”

### 4.1.3 Osaka City's Zero Carbon Measures

In conjunction with Quezon City's efforts to expand the introduction of solar power generation in public facilities, modernize public vehicles, promote energy conservation, and develop a local green building code, Osaka City is promoting the installation of solar panels as a decarbonization measure and introduced the roof rental business, the promotion of decarbonization among bus operators, the use of geothermal heat (aquifer

heat storage), and an environmentally conscious system for buildings.

（1） Roof Rental Projects to Promote the Installation of Solar Panels

Since 2017, Osaka City has been renting out the roofs of municipal elementary and junior high school buildings and gymnasiums to private businesses, with the aim of expanding the spread of renewable energy and securing distributed power sources to ensure a stable supply of energy. In the three years up to 2020, approximately 6.8 megawatts of solar panels were installed on the roofs of 181 schools. Osaka City, the school's owner, allows solar power generation companies to use the rooftops and rooftops, and collects usage fees based on the area of the panels installed. The power generation equipment is owned by the business, and by bearing the costs of installing and maintaining the solar power generation equipment, the business earns income from selling the electricity generated by the power generation equipment. This project is based on the country's feed-in tariff (FIT) scheme and is based on the premise that electricity companies will purchase electricity for 20 years. Of the 422 elementary and junior high schools in Osaka City, the targeted school buildings include schools scheduled for rebuilding or large-scale renovations, schools designated as tsunami evacuation buildings, and schools with special requirements for load capacity, waterproofness, space. A total of 181 schools were selected, excluding schools with concerns of neighborhood residents (such as safety from wind or the effects of reflected sunlight).

Implementing the roof rental business will lead to the expansion of renewable energy and the effective use of assets, and the installation of environmental education television monitors showing the amount of power generated at all 181 schools are also useful for environmental education. Normally, all the electricity generated is sold, but emergency power outlets are installed, and in the event of a disaster or emergency, the electricity can be switched to be used within the school, making it a disaster prevention measure.

In addition, Osaka City introduced panel leasing, on-site PPA, and a group purchasing system as ways to reduce initial costs of solar power generation equipment and received strong interest from Quezon City.


Figure 4-3 TV Monitor for Environmental Learning

Table 4-4　Measures to Promote the Introduction of Solar Power Generation

| Promotion measure | Overview |
|---|---|
| Solar panel lease | ・Owners of buildings and land pay monthly solar panel usage fees, and sell surplus electricity. |
| On-site PPA (Power Purchase Agreement) | ・A solar power generation company installs solar power generation equipment on a customer's building or land to generate electricity, and the owner of the building or land uses the electricity by paying the electricity fee. |
| Group purchase | ・Those who wish to purchase solar panels and storage batteries can purchase at a discounted price by jointly purchasing in bulk. |

Source: Osaka City

（2） Decarbonization of Bus Operators

Osaka City is using the 2025 World Expo as an opportunity to promote decarbonization among bus operators. Approximately 100 EV/FC buses are scheduled to be introduced over the three years from 2022 to 2024 to serve as shuttle buses connecting 10 major railway stations and the Expo venue on various routes accessing the Expo venue. Osaka City subsidize some of the costs necessary for introduction.

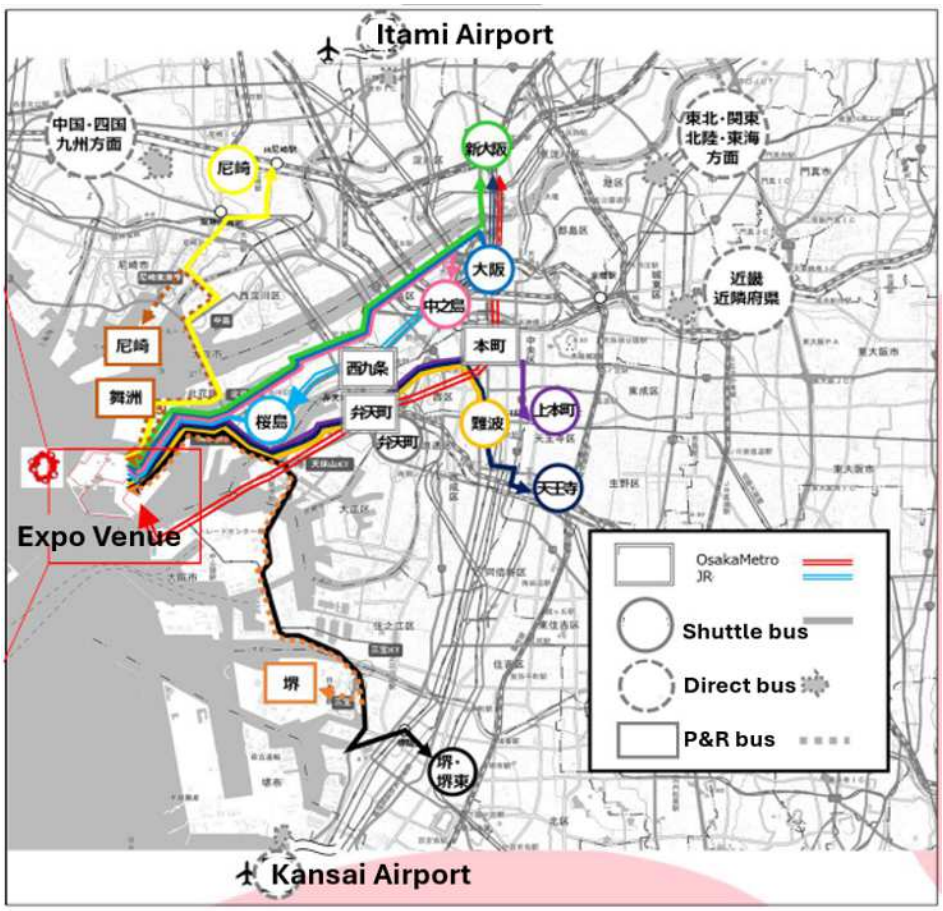



Figure 4-4　Bus Routes to Expo Venue

Source: Osaka City

In addition, Osaka Metro Co., Ltd. (Osaka Metro) is commissioned by the Japan Association for the 2025 World Exposition to operate the “Expo P&R Parking Shuttle Bus” that connects the parking lot outside the Maishima venue and the Yumeshima Expo venue during the exhibition period. Osaka Metro will conduct a large-scale technology demonstration of operation and charging using an energy management system (EMS)

that is integrated with a fleet management system (FMS). It is expected that the Expo will lead to the evolution of mobility.

Quezon City is considering the introduction of E-Bus (Green Bus), switching from fossil fuel-derived diesel oil to EV for the city's BRT buses to be operated from 2020. The City of Quezon City can share knowledge with Osaka City on the progress of the above-mentioned promotion of the introduction of EV buses.

（3） Use of geothermal heat (aquifer thermal storage)

Osaka City is considering the effective use of geothermal heat (aquifer heat storage) because there are many businesses with high demand for heat above ground, and there is abundant groundwater underground. The temperature of groundwater deep underground has a constant temperature change throughout the year, being lower than the outside air temperature in the summer and higher than the outside air temperature in the winter, so this temperature difference can be used to perform efficient heating and cooling. This technology is also scheduled to be introduced at the Osaka Kansai Expo venue.

In this project, geothermal heat utilization technology has newly been proposed, and the above knowledge of Osaka City is expected to be referenced for the development of a JCM Model Project.

（4） Environmental Consideration System for Buildings

Once a building is constructed, it is used for a long period of time, and the cost of saving energy through renovation is higher than when building a new building. Osaka City is promoting various initiatives to ensure compliance with high energy-saving standards and ensure performance during the new construction stage. Osaka City is implementing an environmentally friendly building promotion system based on the ordinance, and CASBEE Osaka Mirai (Comprehensive Built Environment Performance Evaluation System) aims to improve the environmental quality and performance of buildings with a total area of 2,000 square meters or more and reduce the environmental burden. Submission of plans is requested and made available to the public. Furthermore, when constructing a new building over a certain size, even if the building is not covered by the Building Energy Saving Act, it is mandatory to comply with energy saving standards such as insulation performance. It also imposes an obligation to consider installing solar power generation equipment, solar heat utilization equipment, etc. in buildings with a total area of 2,000 square meters or more.

The CASBEE Osaka Mirai will be used as a reference to share knowledge with the City of Quezon City in order to contribute to its ongoing efforts to revise the Green Building Code.

## 4.2 Osaka City as “Decarbonization Leading Areas”

### 4.2.1 Selection as “Decarbonization Leading Areas”

The Japanese government has declared that it aims to realize a zero-carbon society that will reduce overall greenhouse gas emissions to zero by 2050. The government has also announced that it aims to reduce greenhouse gas emissions by 46% in 2030 compared to 2013. In order to achieve these goals, collaborative efforts between the national and local governments are essential, and the national government is aiming to realize regional decarbonization in which local regions play a leading role. Local governments, local

companies, and financial institutions are taking the lead in creating "decarbonization-leading areas," implementing initiative-taking efforts toward decarbonization in accordance with regional characteristics[10]. If a region is selected as a leading decarbonization area, it will be eligible for regional decarbonization transition and renewable energy promotion subsidies.

"Decarbonization Leading Areas" aim to achieve net zero CO2 emissions from electricity consumption in the civil sector (household sector, business, and other sectors) by 2030, with the aim of achieving carbon neutrality in 2050. The region will also achieve reductions in other GHG emissions, including those from the transportation sector and heat utilization, which are consistent with the 2030 targets, depending on regional characteristics.

The Midosuji area of Osaka City was selected as a leading decarbonization area in November 2023. The project targets 38 private facilities and 1 public facility in the Midosuji area, which is a business concentration area. Together with co-proposers Midosuji Town Planning Network and The Association for Reciprocal Revitalization of Renewable energy and Region (FOURE), Osaka City is working to create a Business Continuity District (BCD) through the reorganization of road spaces from cars to people-centered streets, and the introduction of independent and distributed power sources. The aim is to promote decarbonization, create attractive urban walking spaces, and improve resilience in the event of disasters by constructing and converting buildings to ZEB.

The rooftop solar power generation project for schools in Quezon City is in line with the "renewable energy supply from residences and primary and secondary schools in the city" in this "Decarbonization Leading Area," and the model can be expanded to Quezon City.

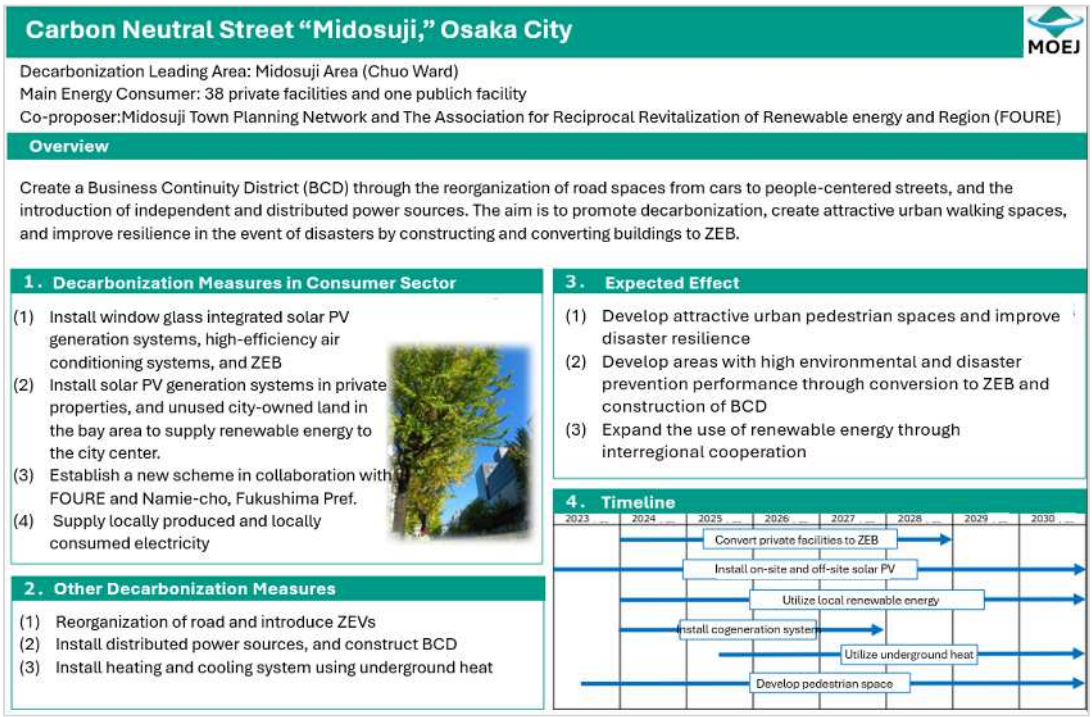



Figure 4-5 Decarbonization leading Area Plan

Source: MOEJ[11]

[10] https://policies.env.go.jp/policy/roadmap/preceding-region/#about
[11] https://policies.env.go.jp/policy/roadmap/assets/preceding-region/4th-keikaku-gaiyo-08.pdf

# Chapter5　Mayor-level Policy Dialogue and Green Business Needs Seminar

In this project, a mayor-level policy dialogue and green business needs seminar were held in person and online, with the aim of sharing the policies and initiatives of Osaka City and Quezon City for developing JCM Model Projects. See Appendix 5-1 and 5-2 for the presentation materials.

Table 5-1　Mayoral-level Policy Dialogue and Green Business Needs Seminar

| Meetings | Date |
|---|---|
| Mayor-level Policy Dialogue<br>Green Business Needs Seminar | Oct. 10th, 2023 |

## 5.1 Mayor-level Policy Dialogue

### 5.1.1 Objectives

- Strengthen Cooperation for the development of a zero-carbon society
- Share the status of initiatives in Quezon City and Osaka City

### 5.1.2 Achievement

- Introduce each other's plans for climate change action and deepen mutual understanding between the two cities on their efforts for decarbonization
- Understand Quezon City's high interest in Osaka City's initiative to install solar PV system with low initial cost (roof rentals, leasing, and Power Purchase Agreement (PPA))
- Held the policy dialogue in person for the first time in three years after the pandemic of COVID-19, and both mayors sent video messages


Quezon City Mayor Joy Belmonte

Osaka City Mayor Hideyuki Yokoyama

### 5.1.3 Overview

Date and Time: Oct. 10th, 2023 at 13:30-14:30

Venue: RICHMONDE HOTEL, Quezon City

Participants from the Philippines: Head of the Climate Change and Environmental Sustainability Department and others

Participants from Japan: Environment Bureau of Osaka City Govt., Oriental Consultants Co., Ltd.

5.1.4 Program

| Philippine time (Japan time) | Contents | Presenter |
|---|---|---|
| 13:30-13:40 (14:30-14:40) | Opening Remarks | Quezon city<br>Osaka city |
| 13:40-14:10 (14:40-15:10) | Quezon City Enhanced Local Climate Change Action Plan 2021-2050 (Enhanced LCCAP) | Quezon city |
| | City to City Cooperation toward Promoting the Climate Change Action Plan of Quezon City | Osaka city |
| | Zero Carbon Development in Quezon City for the Realization of Carbon Neutral Society | Oriental Consultants Co., Ltd. |
| 14:10-14:25 (15:10-15:25) | Discussion | Quezon city<br>Osaka city |
| 14:25-14:30 (15:25-15:30) | Closing Remarks<br>Photo Session | Quezon city<br>Osaka city |

5.1.5 Meeting Materials (Appendix 5-1)

- Agenda
- Outline of video message from Quezon City Mayor
- Presentation materials
- Participant list

## 5.2 Green Business Needs Seminar

5.2.1 Objectives

- Introduce and promote the utilization of JCM scheme
- Share the information on efforts in both Japan and the Philippines for identifying the needs and business matching for developing JCM Model Projects

5.2.2 Achievement

- The seminar was announced to member companies of the Osaka Chamber of Commerce and Industry and the Japanese Chamber of Commerce and Industry of the Philippines, Inc. Interest from the Philippine side was particularly high, and the seminar was attended by 115 participants, including online participants.
- Based on the responses to the questionnaire (72 responses), we identified companies and project candidates interested in the JCM project and examined their possibilities (see Chapter 3 for details)
- It was agreed to continue our collaboration with the Osaka Chamber of Commerce and Industry and the Japanese Chamber of Commerce and Industry of the Philippines, Inc. in supporting the overseas expansion of Japanese companies in the next fiscal year, and to consider opportunities to share information and exchange opinions that are beneficial to both the Japanese side and the local side.
- Ayala Group, a major conglomerate in the Philippines, participated in the seminar. They are developing “IT Park U.P.-Ayala Land Techno Hub,” and a site visit was conducted together with Osaka

City to propose the introduction of roof-top solar power generation for the gymnasium in the facility, and a proposal by a Japanese company is under consideration.


Green Business Needs Seminar

Gymnasium in U.P.–Ayala Land Techno Hub

5.2.3 Overview

Date and Time: Oct. 10th, 2023 at 15:00-16:00

Venue: RICHMONDE HOTEL, Quezon City/Online

Participants from the Philippines: Quezon City Govt., Eastwood City State, SM North EDSA

Participants from Japan: Osaka City Govt., Osaka Chamber of Commerce and Industry, The Japanese Chamber of Commerce and Industry of the Philippines, Inc., Kyowa Kako Co., Ltd., Institute for Global Environmental Strategies (IGES) and Oriental Consultants Co., Ltd.

5.2.4 Program

| Philippine time (Japan time) | Contents | Presenter |
|---|---|---|
| 15:00-15:05 (16:00-16:05) | Opening Remarks | Quezon city<br>Osaka city |
| 15:05-15:15 (16:05-16:15) | Zero-carbon initiatives in Japan (JCM scheme) | Oriental Consultants Co., Ltd. |
| 15:15-15:35 (16:05-16:35) | Environmental and zero-carbon technologies of Japanese companies | Kyowa Kako Co., Ltd. |
| | | IGES |
| 15:35-15:55 (16:35-16:55) | Zero-carbon projects of Philippine companies | Eastwood City State |
| | | SM North EDSA |
| 15:55-16:00 (16:55-17:00) | Explanation for next steps | Oriental Consultants Co., Ltd. |
| | Closing remarks | Osaka city |

5.2.5 Meeting Materials (Appendix 5-2)

- Agenda
- Presentation materials
- Participant list