

FY2021
City-to-City Collaboration Programme for
Zero-Carbon Society

Support for the Realization of Zero-Carbon Society to
Achieve Thailand 4.0

Report

March 2022

Nippon Koei Co., Ltd.
Osaka City

FY2021
City-to-City Collaboration Programme for Zero-Carbon Society
Support for the Realization of Zero-Carbon Society to Achieve
Thailand 4.0
Report

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Attachment 1. Presentation Materials for Webinar on the JCM Implementation in Thailand 2021

Attachment 2. Presentation Materials for Online Workshop

- 2.1. Agenda
- 2.2. Presentation material by Osaka City
- 2.3. Presentation material by Nippon Koei
- 2.4. Presentation material by EEC

Attachment 3. Materials for MOU Signing Ceremony

- 3.1. Agenda
- 3.2. Presentation material by Osaka City
- 3.3. Presentation material by EEC
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- 3.5. Press release by EEC and Osaka City

Attachment 4. Presentation Materials for Business Matching

- 4.1. Agenda
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Attachment 5. Presentation Materials for Second Zero Carbon City International Forum

Presentation materials of private companies in abovementioned events are not attached due to including confidential information.

ABBREVIATIONS

AI	Artificial Intelligence
BAY	Bank of Ayudhya Public Company Limited
BBL	Bangkok Bank, Limited
BCG	Bio, Circular, Green
BOI	The Board of Investment, Thailand
COP	Conference of Parties
DEPA	Digital Economy Promotion Agency
EEC	Eastern Economic Corridor
EV	Electric Vehicle
FTI	Federation of Thai Industries
GDP	Gross National Product
GEC	Global Environment Centre Foundation
GHG	Greenhouse Gas
HVAC	Heating, Ventilation, and Air Conditioning
IEAT	Industrial Estate Authority of Thailand
IoT	Internet of Things
JCM	Joint Crediting Mechanism
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KBANK	Kasikorn Bank
LNG	Liquefied Natural Gas
LPG	Liquefied Petroleum Gas
MOU	Memorandum of Understanding
MRV	Measurement, report and verification
NSTDA	Thailand National Science and Technology Development Agency
OG	Osaka Gas
COVID-19	Coronavirus Disease of 2019
PHEIC	Public Health Emergency of International Concern
PSA	Pressure Swing Adsorption
PTT	Public Company Limited
SDGs	Sustainable Development Goals
T-COP	Thailand Carbon Offsetting Program
TDEM	Toyota Daihatsu Engineering and Manufacturing CO., Ltd.
TGO	Thailand Greenhouse gas Organization
TOD	Transit-Oriented Development
T-VER	Thailand Voluntary Emission Reduction
WHO	World Health Organization

CHAPTER 1 INTRODUCTION

1.1 Background

(1) Significance of City-to-City collaborations

At the United Nations Framework Convention on Climate Change (hereinafter called “UNFCCC”) of the 21st Conference of the Parties (hereinafter called “COP21”), it was recognized that the actions of non-state bodies including cities welcomed the efforts of all non-government players (urban and other local governments) and scale up of their activities. Urban areas are the places where socio-economic development support activities are implemented, and citizens live. About half of the world's population lives in urban areas, which account for 2% of the world's total land area, and that proportion is expected to increase to 70% by 2050. Also, it is estimated that more than 70% of the Carbon Dioxide (hereinafter called “CO₂”) emissions in the world are emitted from cities as of 2006, and cities play a major role in climate change mitigation. Continuous implementation of climate change countermeasures in urban areas is the key factor for total Greenhouse Gas (hereinafter called “GHG”) emission reduction and achieving the goals of the Paris Agreement.

In Japan, the Ministry of the Environment, Japan (hereinafter called “MOEJ”) recruited local governments that declared zero CO₂ emissions by 2050, and as of February 2022, it expanded to 598 local governments (total population of local governments: about 115.23 million people). The construction of a social system that coexists with decarbonization has begun to spread.

To realize a zero-carbon society as a whole, especially in Asia where economic growth is remarkable, it is necessary to accelerate the movement toward the construction of a sustainable decarbonized society and a low-carbon society as a passing point. There is a growing movement to support urban efforts internationally toward decarbonization and low carbonization of cities, which are places where support economic development activities.

(2) City-to-City collaboration with EEC

The Kingdom of Thailand (hereinafter called “Thailand”) has rapidly developed and become a middle-income country by utilizing natural resources, and it is attracting foreign-owned enterprises. Hence, the government has a sense of crisis on growth slowdown to transition to high-income country. Aiming for the country's future socio-economic prosperity, the government has set a national strategy of “Thailand 4.0” since 2015, promoting economic growth over 20 years, and entering status as a high-income country by 2036.

To lead to the Thailand 4.0, three provinces (Chonburi, Chachoengsao, and Rayong) were selected as the focal area of the Eastern Economic Corridor (hereinafter called “EEC”) ¹. EEC has been developed since the 1980s, and many Japanese factories located in EEC have become important production bases in Southeast Asia. The coastal area of the EEC is remarkably developed as an industrial zone, with regional GDP exceeding 15% of Thailand’s GDP. Also, there are many companies included in the Japanese automobile industry, and many Joint Crediting Mechanism (hereinafter called “JCM”) projects have been formulated and implemented in this region. It is expected that a number of JCM model projects will be developed in the future. In fact, it is confirmed that many Japanese companies are eager to join

¹ The EEC is a national strategy for the implementation of Thailand 4.0 in the Kingdom of Thailand, which has been established as a governmental organization and targets three (3) provinces in eastern Bangkok. For this reason, EEC assume a city to create City-to-City collaboration with Osaka City.

a JCM scheme.

(3) Strategy of Osaka City Government on City-to-City collaboration

Osaka City Government (hereinafter called “Osaka City”) has implemented City-to-City collaboration with Ho Chi Minh city, Vietnam and Quezon city, Philippines, and has achieved steady results. Also, Osaka City has involved private entities, and supported realization of decarbonization society in Asian cities and aimed to contribute to the revitalization of the Osaka/Kansai economy and Japan's international role by utilizing the “Team OSAKA Network²” established and operated by Osaka City, a public-private partnership platform for formulation and creation of decarbonization and low carbonization projects.

Osaka City has paid attention to the possibility of forming a JCM model projects in the EEC area, where industrial parks are accumulated. Since the Osaka City has been consulted from Osaka Gas Co., Ltd. (hereinafter called “Osaka Gas”) etc. registered in Team OSAKA Network to support business development in this region, the formulation of JCM model projects has been considered.

(4) Significance of the City-to-City collaboration under COVID-19

The impact of COVID-19, which has become an international issue since the latter half of FY2020, has had a major impact on this City-to-City collaboration project. In particular, all the meetings, discussions, and studies were implemented online due to the restriction of travelling from Japan to Thailand. Activities to combat with COVID-19 has been carried out at the national and citizen levels but also city level. It is expected that collaboration between Japan and overseas local governments is expected to produce new results in the future. With an eye on after-corona, it is believed that there is significance of promoting City-to-City collaboration even during the COVID-19 pandemic.

1.2 Objective

City-to-City Collaboration Programme for Zero-Carbon Society “Support for the Realization of Zero Carbon Society to Achieve Thailand 4.0” (hereinafter called "the Project") is a study on the realization of a zero carbon and low carbon society in the collaboration between EEC and Osaka City, with the following objectives:

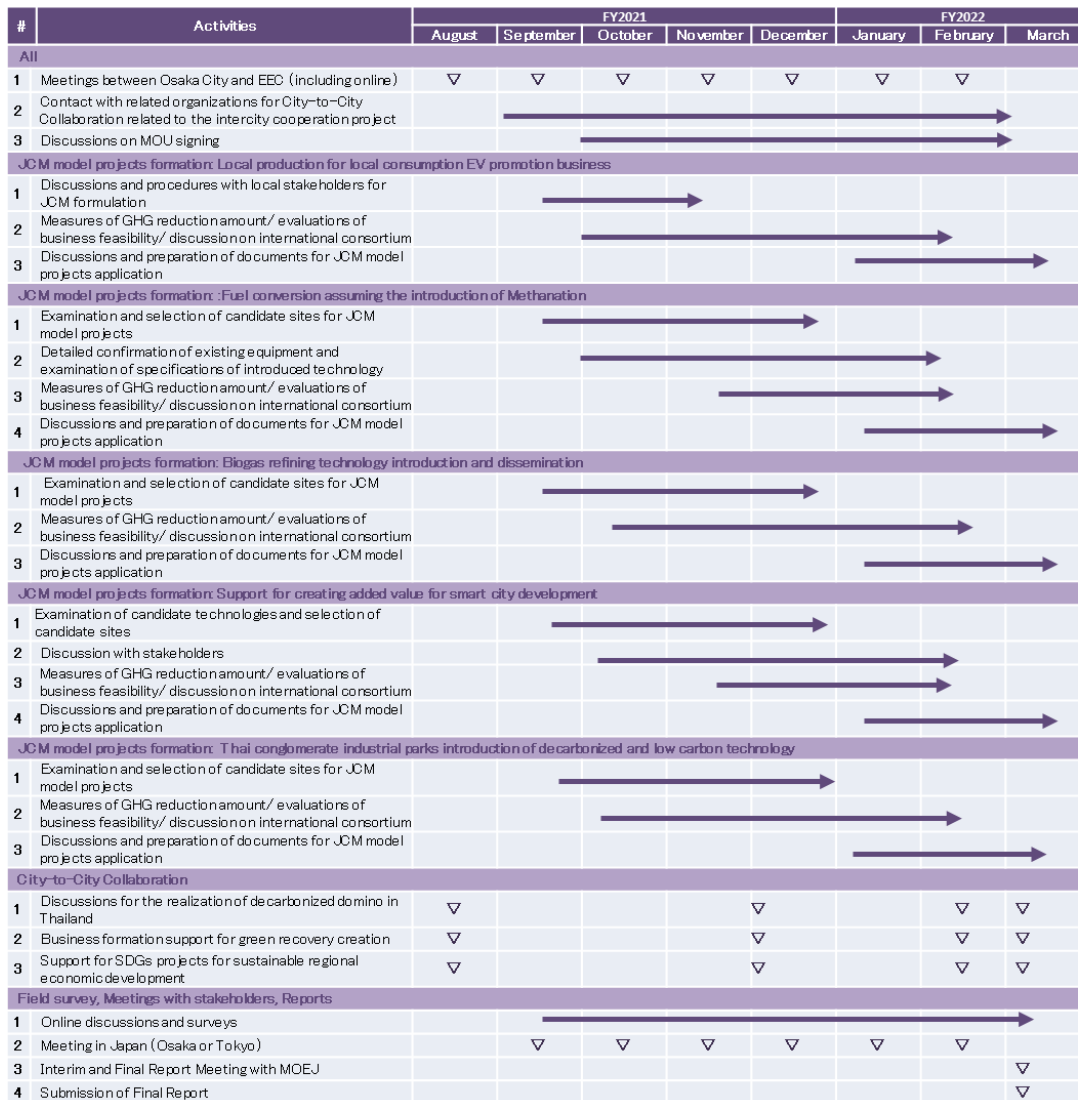
- (1) Deepening the cooperation between Osaka City and EEC
- (2) Formulating JCM model projects that contributes to zero carbon and low carbon society in Thailand

² Team Osaka Network is a public-private partnership platform centered on companies in Osaka City.

1.3 Implementation Schedule

This project was adopted in the first call for proposals of City-to-City collaboration projects in FY2021 and began in August 2021.

The City-to-City collaboration Project between Osaka City and EEC started in 2019, and as the third year of the project, various activities were conducted to lead the development of a decarbonized society through the sharing of knowledge on smart city development by companies in Osaka City and the sharing of know-how on environmental measures in Osaka City. In addition, in February 2022, a Memorandum of Understanding (hereinafter called “MOU”) on the formation of a decarbonization society was signed between Osaka City and EEC. EEC is one of the most actively developed areas in Asia region and Osaka City aims to contribute to environmental improvement and decarbonization in the Thailand and as well as the revitalization of the Osaka-Kansai economy by transferring the city's initiatives and know-how and promoting the introduction of superior technologies and products from Japanese companies including Osaka and Kansai companies. The detailed schedule of the Project is shown in Figure 1.1.



Source: Nippon Koei

Figure 1.1 Implementation Schedule

CHAPTER 2 OVERVIEW OF THE PARTICIPATING CITIES

2.1 Osaka City

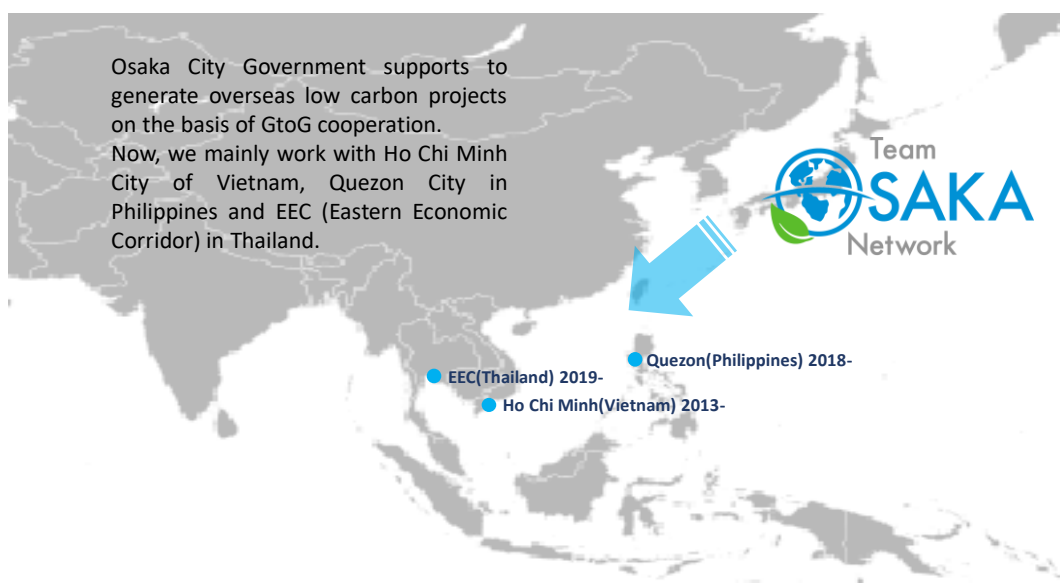
2.1.1 International Cooperation by Osaka City

Osaka City promotes exchange with cities in various countries in the fields of culture, sports, economy and the environment through various relationships such as sister cities and business partner cities.

In the environmental field, Osaka City currently conducts overseas development in EEC, Ho Chi Minh City (Vietnam), Quezon City (Philippines), Maharashtra State (India), St Petersburg City (Russia) and Greater Manchester (UK), and City-to-City collaboration project is being implemented in Ho Chi Minh City, Vietnam and Quezon City, Philippines as shown in Figure 2.1.

The Environment Bureau of Osaka City, which is the main department in charge of the Project, has been taking various actions such as a package of support that combines knowledge on various systems by Osaka City and low-carbon technologies by companies in Osaka City and Japan to solve environmental problems in developing countries that will be the target of JCM model projects. Osaka City has involved private entities, and promoted realization of decarbonization society in Asian cities in cooperation with member companies of the “Team OSAKA Network”, a public-private partnership platform, and aimed to contribute to the revitalization of the Osaka/Kansai economy and Japan's international role.

Also, Osaka City, which is one of the major cities in Japan, has a history of improving the public health of citizens and overcoming pollution issues. It can provide useful insights and contributions to the challenges facing the Bangkok Metropolitan Government and the EEC. Osaka City supports overseas cities facing environmental problems and create opportunities for private companies to expand their business through cooperation between the cities and the through international cooperation.



Source: Osaka City

Figure 2.1 International Cooperation by Osaka City

2.1.2 Team OSAKA Network

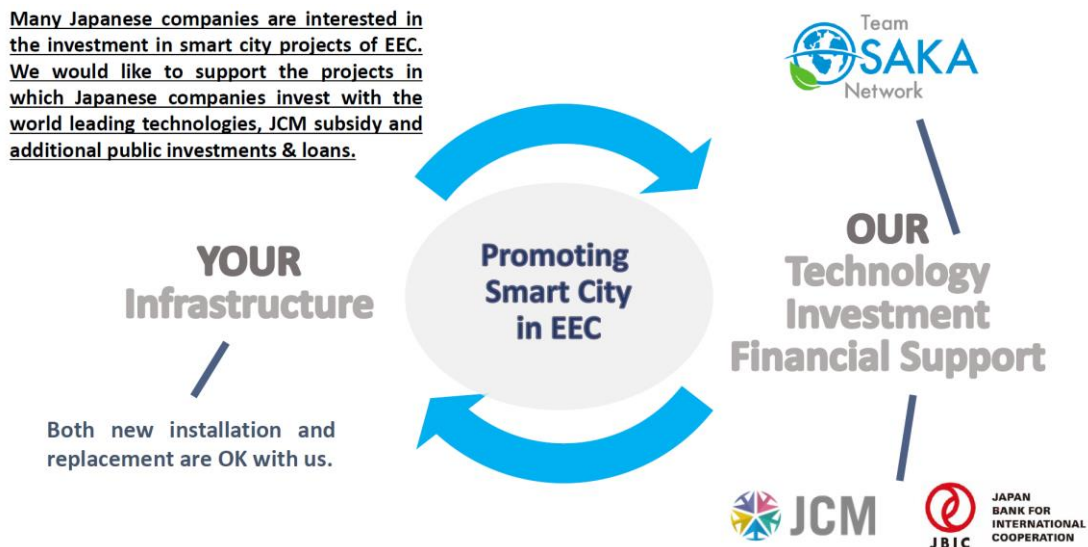
In June 2016, Osaka City launched the "Team OSAKA Network", a platform for more effective cooperation between industry, academia and government, in order to support the realization of a decarbonized society with cities in Asia, etc. As of October 2021, 154 companies, which have energy-saving and renewable energy technologies, are registered. The secretariat of this



platform is the Environment Bureau, Osaka City.

Team OSAKA Network aims to encourage companies to expand overseas, revitalize the Osaka / Kansai economy, and play a role in Japan in the field of international environment, which also meets the purpose of the City-to-City collaboration.

In FY2021, as a cooperation for the smart city development envisioned by the EEC, the support structure was established by initiative of Osaka City as shown in Figure 2.2.



Source: Presentation material of Osaka City

Figure 2.2 Supporting Structure of Team OSAKA Network on Smart City Development

Though the EEC Office does not directly lead the development of smart cities in the EEC area, they are promoting support for the development of the region, in other words, the realization of Thailand 4.0, through the development of smart cities to encourage various investments and the advancement of companies.

Taking the position of the EEC Office into consideration, Osaka City aims to introduce Japanese companies for decarbonization and smart projects in EEC.

2.1.3 Actions to Climate Change by Osaka City

The main actions and plans to climate change by Osaka City are discussed below.

(1) Osaka City Action Plan of Global Warming Countermeasures (Local Program)

Mayor of Osaka City, Mr. Matsui announced to aim at realizing Zero-Carbon City by 2050 in Osaka City Council of 27 November 2020 and reported it to the Ministry of the Environment, Japan (MOEJ) on 9 December 2020. Also, implementation of measures to achieve goal of FY2030 and an approaches and measures to realize “Zero-Carbon Osaka 2050”, that is, zero-carbon society leading to the maturity of Osaka City are clearly stated in “Osaka City Action Plan of Global Warming Countermeasures (Local Program)” which was prepared in March 2021.

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

Target of the Action Plan

To reduce 30% of GHG emission reduction by FY2030, compared with FY2013 to achieve net zero emission of GHG in 2050.

Vision for 2050

“Zero-Carbon Osaka 2050 -Realization of zero-carbon society leading to maturity of Osaka-”

(2) “SDGs Future City” and “SDGs Models of Local Governments”

Osaka Prefecture and Osaka City were selected as the “SDGs Future City and SDGs Models of Local Governments” by the Cabinet Office, Japan on July 17, 2020, which is the first case of a joint proposal by prefecture and municipality. In October 2020, the “Osaka Prefecture/Osaka City SDGs Future City Plan” was formulated, and it was revised in July 2021.

The vision of “Osaka Prefecture/Osaka City SDGs Future City Plan” is as follows.

Three visions

- <1> Human Well-being
- <2> Diverse innovation
- <3> Global Co-Creation Hub

(3) Action Plan for “Osaka Blue Ocean Vision”

As one of the activities of "SDGs Future City and SDGs Models of Local Governments, " Osaka Prefecture and Osaka City formulated the Action Plan for "Osaka Blue Ocean Vision" in March 2021. The plan aims to contribute to the realization of "zero pollution of marine plastic waste by 2050" and achieve SDGs targets as an individual plan for the water field of the Osaka City Environmental Basic Plan.

The goals of the Action Plan for "Osaka Blue Ocean Vision" are as follows.

Goals of the Action Plan

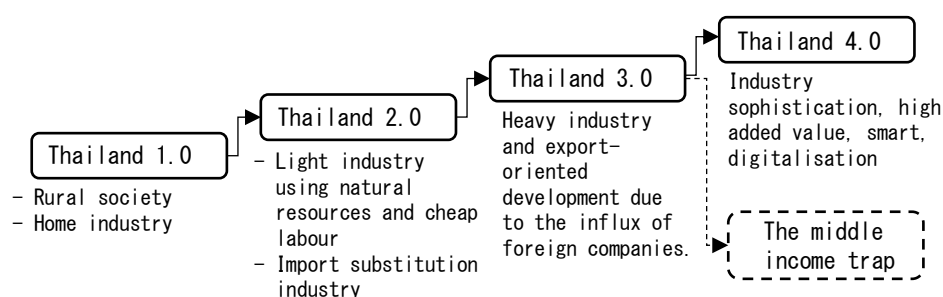
- <1> Reduce the amount of plastic waste flowing into Osaka Bay by half in 2030.
- <2> Achieve and maintain 100% of the national environmental standard for water quality in rivers and seas, and improve citizen satisfaction with water environment to 40%.

2.2 Eastern Economic Corridor (EEC)

2.2.1 Outline of the EEC

In 2016, Prime Minister Prayunit announced Thailand 4.0 and a long-term national strategy to break out of the middle-income trap and become a high-income country by making its industrial structure more sophisticated, high-value-added, smart and digital.

An image of Thailand 4.0 is shown in Figure 2.3. Specifically, the strategy aims to promote investment in specific high-tech industries, including next-generation automobiles, healthcare, aviation and robotics, as well as the comprehensive development of various types of infrastructure. In particular, the government is committed to transforming to innovation-led economic growth and to becoming a digital nation in the 20 years from 2016. The main pillars are the development of the digital economy and the development of a new generation of industries.

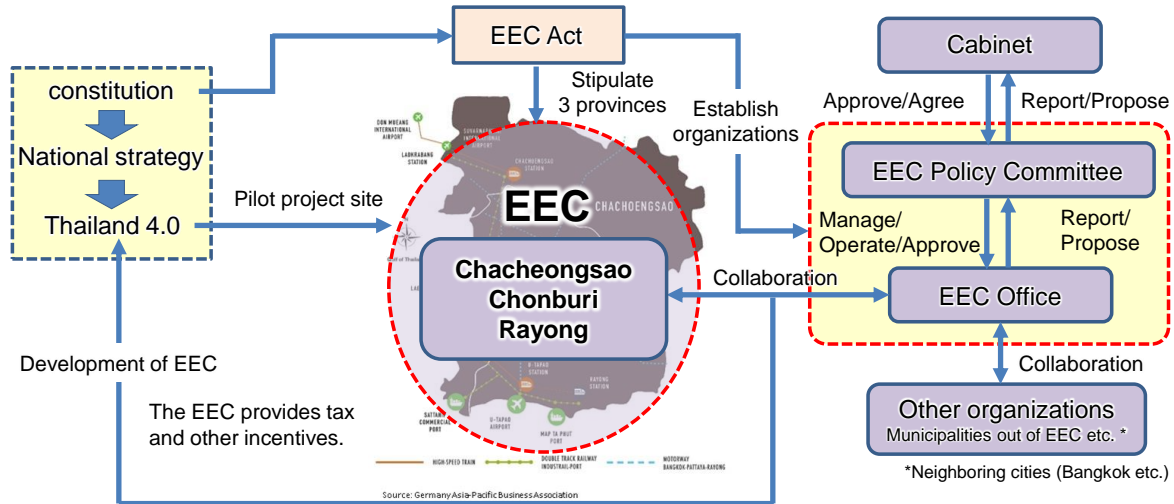


Source: Nippon Koei

Figure 2.3 Image of Thailand 4.0

The three provinces of Chachoengsao, Chonburi and Rayong were positioned as EECs as pilot project areas for the realisation of Thailand 4.0, with the EEC Act defining the area in 2018 and establishing the EEC Policy Committee and EEC Office as administrative bodies of EEC management.

The EEC Policy Committee has the authority to 'make policy decisions for the development of the EEC', 'approve the overall land use plan', 'decide on tax incentives', etc., in accordance with the EEC Act, and is chaired by the Prime Minister of Thailand, with the Minister of State and others as members. The EEC Office is a government body established under the EEC Policy Committee. In collaboration with the three provinces that constituted the EEC, EEC area has been developed based on policies and plans set by the EEC Policy Committee. An overview of the EEC is shown in Figure 2.4.



Source: Prepared by NIEC based on the EEC Act, 2year of EEC (July 2019).

Figure 2.4 Overview of the EEC

The EEC was formerly known as the Eastern Seaboard and, as shown in Figure 2.5, has well-developed infrastructure, including railways, airports, ports, and highways. The petrochemical industry and automobile and component manufacturing industries are also concentrated in the region. Table 2.1 shows the main infrastructure projects underway.



Source: Prepared by Nippon Koei based on 2 Years of EEC (July 2019)

Figure 2.5 Infrastructure in EEC

Table 2.1 Infrastructure Projects in EEC

Project name	Outline	Project value	Year of operation	Project Owner
High-Speed Rail Linking 3 Airports	Construction of high-speed railway linking Don Mueang, Suvarnabhumi and U-Tapao airports. Travel times of 2-3 hours by car will be reduced to less than one hour by high-speed railway.	6.0 billion USD	2023	State Railway of Thailand
U-Tapao International Airport	Increase annual passenger capacity from 3.7 million to 60 million.	9.4 billion USD	2023	Royal Thai Navy
MRO Facility at U-Tapao airport	The intelligent MRO Center providing aircraft parking for 7 airplanes (5 wide body and 2 narrow-body aircraft)	343 million USD	2022	Thai Airways International PCL
Map Ta Phut Industrial Port Phase 3	Increase the annual capacity of gas and liquid cargo ships from 16 million to 31 million tonnes.	1.7 billion USD	2025	Industrial Estate Authority of Thailand
Laem Chabang Port Phase 3	Increase container handling volume from 11.1 million TEUs to 18.1 million TEUs per year.	2.7 billion USD	2025	Port Authority of Thailand
Intercity Motorway	Reducing traffic congestion and increasing connectivity between cities	-	2020	Ministry of Transport

Source: Prepared by Nippon Koei based on 2 Years of EEC (July 2019)

2.2.2 Targeted Industries in EEC

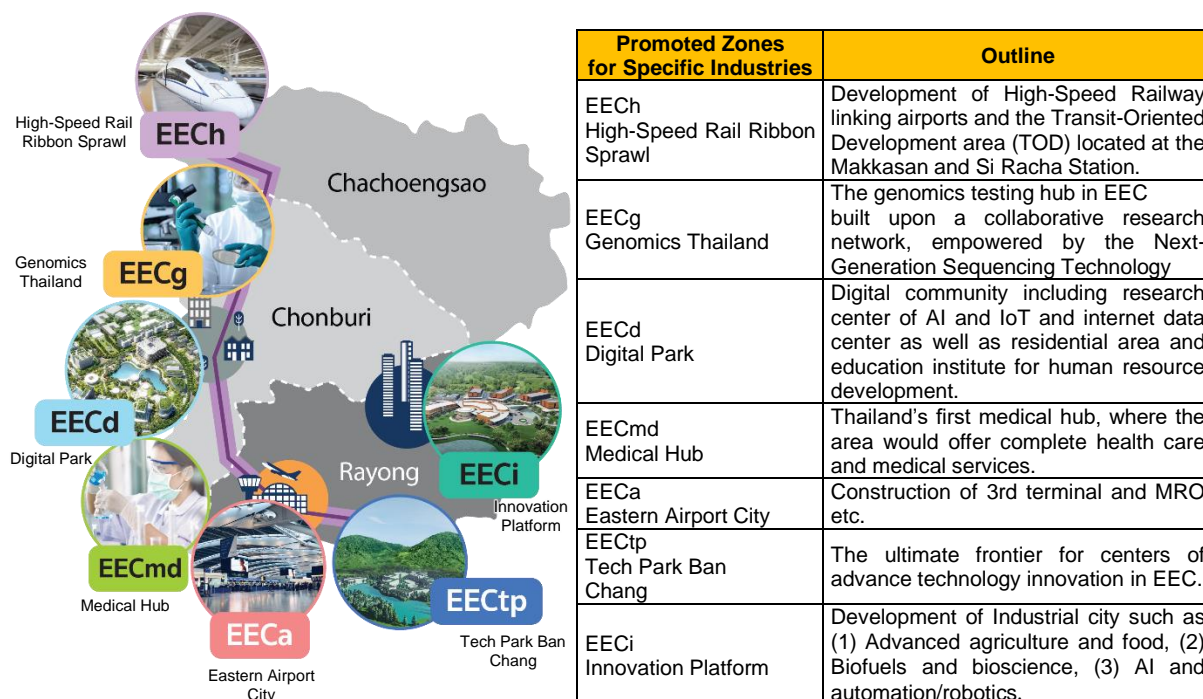
The EEC Policy Committee has designated 12 sectors of targeted industries (Table 2.2), as well as Promoted zones for specific industries (Figure 2.6) and Promoted zones for targeted industries (industrial parks (26 locations) and industrial clusters (2 locations)) (Table 2.3).

For (1) Promoted zones for specific industries (excluding EECh and EECh), (2) Promoted zones for targeted industries and (3) other industrial estates in the EEC, incentives (EEC package) are provided in addition to the investment incentives (basic incentives) by the Board of Investment of Thailand (BOI)³.

Table 2.2 12 Targeted Industries

No.	Targeted Industries
1	Next-generation Automotive
2	Intelligent Electronics
3	High-value and Medical Tourism
4	Advanced Agriculture and Biotechnology
5	Food for the Future
6	Automation and Robotics
7	Medical and Comprehensive Healthcare
8	Aviation and Logistics
9	Biofuel and Biochemical
10	Digital
11	Defense
12	Education and Human Resource Development

Source: Nippon Koei



Source: Prepared by Nippon Koei based on EEC Fact Sheet

Figure 2.6 Outline of Promoted Zones for Specific Industries

3 The Board of Investment (BOI) is the Thai Government agency responsible for encouraging investment in Thailand providing incentives to national and international investors.

Table 2.3 Promoted Zones for Targeted Industries

No.	Promoted Zones for Targeted Industries	Targeted Industries
Industrial Parks		
1	WHA Rayong Industrial Estate	(1) (6) (8)
2	Eastern Seaboard I.E. (Rayong)	(1) (2)
3	WHA Eastern Industrial Estate (Map Ta Phut)	(9) (10)
4	WHA Eastern Seaboard I.E.1	(1) (2) (6)
5	WHA Chonburi I.E.1	(1) (8) (10)
6	WHA Chonburi I.E.2	(2) (8) (10)
7	WHA Eastern Seaboard I.E.2	(1) (2) (6)
8	WHA Eastern Seaboard I.E.3	(1) (2) (6)
9	WHA Eastern Seaboard I.E.4	(1) (2) (6)
10	CPGC I.E. (Rayong)	(1) (2) (6) (7) (10)
11	Amata City Chonburi I.E.	(1) (2) (3) (6) (8) (10)
12	Amata City Chonburi I.E. (2nd Project)	(1) (2) (3) (4) (5) (6) (7) (8) (10)
13	Amata City Rayong I.E.	(1) (2) (3) (8)
14	Pinthong Industrial Estate	(1) (8)
15	Pinthong Industrial Estate (Laem Chabang)	(1)
16	Pinthong Industrial Estate (3rd Project)	(1)
17	Pinthong Industrial Estate (4th Project)	(1) (2) (5) (6) (8) (9) (10)
18	Pinthong Industrial Estate (5th Project)	(1) (2) (5) (6) (8) (9) (10)
19	TFD I.E.(2nd Project)	(1) (2) (8)
20	Yamato Industries I.E.	(1) (2)
21	Smart Park I.E.	(3) (4) (6) (7) (8) (10)
22	Asia Clean	-
23	Rojana Nongyai	-
24	Rojana Lamchabang	-
25	WHA Industrial Estate (Rayong)	-
26	EGCO Rayong Industrial Estate	-
Industrial Clusters		
1	Next-Generation Automotive Banpho	-
2	E-Commerce Bang Pakong	-

Note: Numbering of Targeted Industries: (1) Next-generation Automotive, (2) Intelligent Electronics, (3) High-value and Medical Tourism, (4) Advanced Agriculture and Biotechnology, (5) Food for the Future, (6) Automation and Robotics, (7) Medical and Comprehensive Healthcare, (8) Aviation and Logistics, (9) Biofuel and Biochemical, (10) Digital, (11) Defense, (12) Education and Human Resource Development * Those that could not be identified on the EEC website are indicated by "-"

Source: Prepared by Nippon Koei based on EEC Web site and EEC Fact Sheet

2.2.3 Decarbonization Activities in EEC

In January 2021, Thai government positioned Bio-Circular-Green Economy as the National Strategy, and in terms of being Circular and Green, the EEC has set a target “Net Zero Carbon Emission area for industrial sector” and has developed the plans to realize the target as shown in Table 2.4.

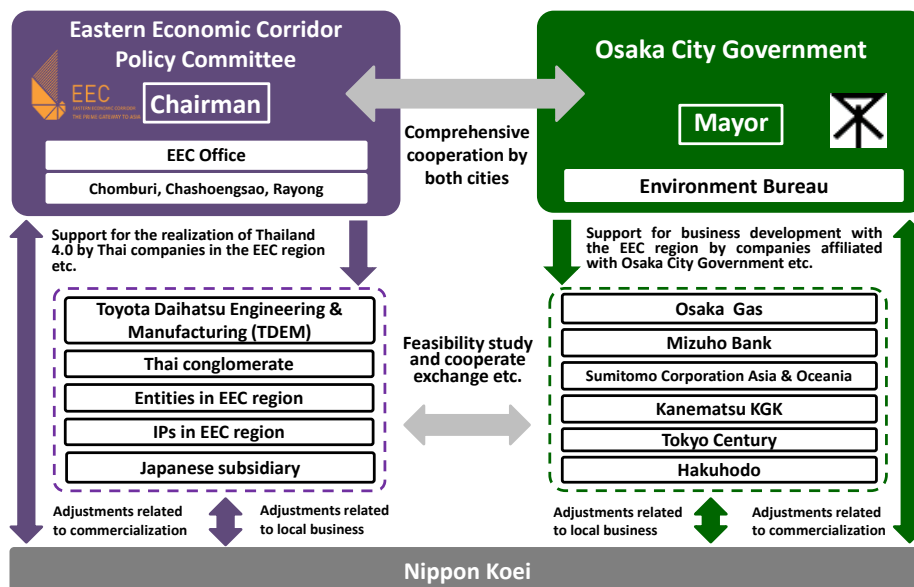
Table 2.4 Green & Circular Execution Plan in EEC

Plan	Contents
Electricity Supply	EEC Board (March 2020) endorsed green energy plan in EEC · Phase 1 : Solar 500 MW+ · Phase 2 : 30% of total electricity demand
Waste Management	· Total Waste Management Project in Rayong (Rayong Model) · Waste-to-energy Plant Project in Pattaya City
Ban Chang Smart City Development	· Spatial Development : Develop city to support EV transportation, Infra for Charging Station · Ban Chang Clean Energy : Generate 50 MW of solar power in the area · Ecosystem for Investment : Regulatory Sandbox for EV Certification, Digital Monitoring Platform for Energy Supply
Developing Carbon Credit Trading Platform	· In a collaboration with EEC Office, Federal of Thai Industries and Thailand Greenhouse Gas Organization (hereinafter called “”) · Starting operation by 2022

Source: Presentation material of EEC in the workshop on 17 Nov. 2021

2.3 Implementation Structure

Implementation structure for the City-to-City collaboration in FY2021 is as shown in Figure 2.7. Osaka City and Japanese companies participated from Japanese side and EEC Office, and Japanese subsidiaries, etc. participates from Thai side. The project was implemented with close cooperation and held online meetings when necessary.



Source : Nippon Koei

Figure 2.7 Implementation Structure

Details of participated Japanese companies are described as follows.

(1) Nippon Koei Co., Ltd.

Nippon Koei Co., Ltd. (hereinafter called “Nippon Koei”) took the initiative in discussions, coordination, and support between the two cities, and was in charge of supporting the formulation of JCM model projects in the EEC.

Nippon Koei has overseas bases around the world and has a lot of experience of City-to-City collaboration projects in southeast Asia countries such as Indonesia, Vietnam as well as Latin America as shown in Figure 2.8. To conduct this project efficiently, activities in other City-to-City collaboration projects were referenced as necessary and to establish efficient project implementation protocol. Considering the situation of COVID-19 impact this year, study was conducted with support of Bangkok office of Nippon Koei when necessary.



Source: Nippon Koei

Figure 2.8 City-to-City Collaboration Experience by Nippon Koei

(2) Osaka Gas Co., Ltd.

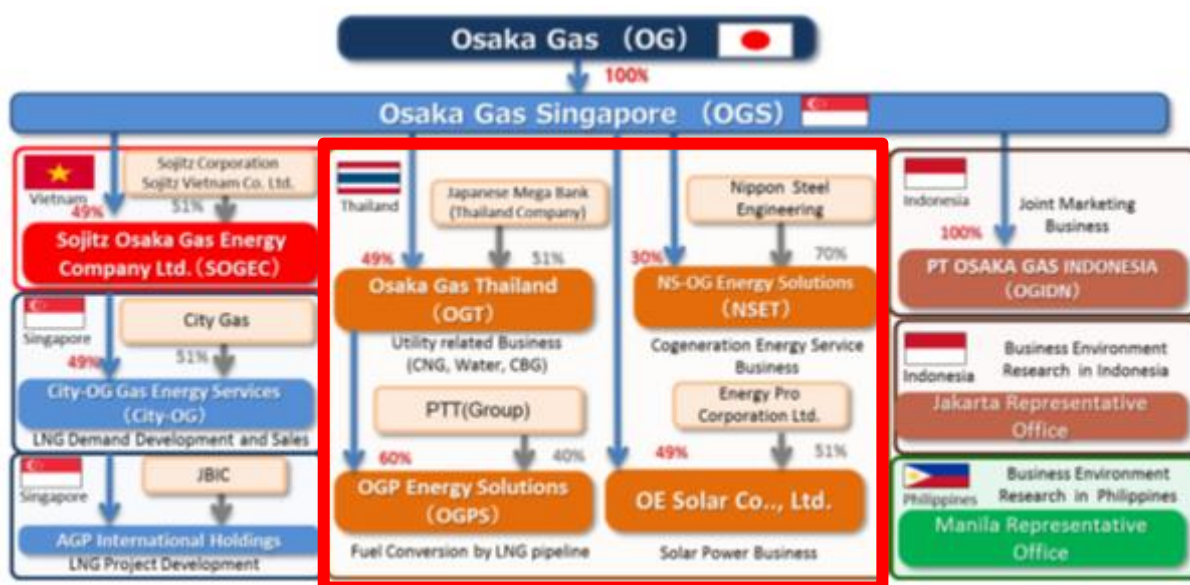
As a natural gas supplier in the Kansai area, Osaka Gas Co., Ltd. (hereinafter called “Osaka Gas”) is responsible for wide business field such as gas mining, transportation, refining, retailing as a supplier, and gas-fired power generation. Osaka Gas has already entered the Thai market and established a local subsidiary company and is promoting biogas refining technology for one of targeted industries of Thailand 4.0 “biofuel and biochemistry”.

Osaka Gas is expanding its gas business in Thailand with their many years of experiences and know-how of the gas supply and gas-related businesses. The company profile of Osaka Gas, business structure in southeast Asia and company profile of subsidiary in Thailand (Osaka Gas Thailand) is shown in Table 2.5, Figure 2.9 and Table 2.6.

Table 2.5 Company Profile of Osaka Gas

Company name	Osaka Gas Co., Ltd.
Head office	4-1-2 Hiranomachi, Chuo-ku, Osaka 541-0046, Japan
Established	April 10, 1897
Number of employees	[Non-consolidated] 3,203 (including operating officers, directors and temporary employees, and excluding employees temporarily transferred to affiliated companies) [Consolidated] 20,941
Capital	132,166 million JPY

Source: Osaka Gas website



Source: Osaka Gas

Figure 2.9 Osaka Gas’s Business Structure in Southeast Asia

Table 2.6 Company Profile of Osaka Gas Thailand

Company name	Osaka Gas (Thailand) Co., Ltd.
Services	Utility (energy) related business for industrial customers etc.
Location	10F, Wave Place Building, 55 Wireless Road, Lumpini, Pathumwan, Bangkok 10330 Thailand
Establish	October, 2013

Source: Osaka Gas Thailand website

(3) Toyota Daihatsu Engineering and Manufacturing CO., Ltd. (TDEM)

Toyota Daihatsu Engineering and Manufacturing Co., Ltd. (hereinafter called “TDEM”) is a Thai subsidiary of Toyota Motor Corporation and is responsible for supervising the operations of the company in the Asia region. The company profile of TDEM is shown in Table 2.7.

Table 2.7 Company Profile of TDEM

Company name	TOYOTA DAIHATSU ENGINEERING & MANUFACTURING CO., LTD. (TDEM)
Services	The Small Car Products and Business Planning Department in emerging countries will carry out planning operations related to products and businesses in general, such as the lineup of Toyota brand vehicles in emerging countries and the planning of overall strategies.
Location	99 Moo 5, Ban-Ragad, Bang-Bo, Samutprakarn 10560

Source: TDEM website

TDEM is proceeding with various businesses such as promoting Electric Vehicles (hereinafter called “EV”) and procuring zero-emission fuel in the EEC.

Toyota Motor Corporation has been implementing the "Toyota Environmental Challenge 2050" (Figure 2.10) since 2015 when the Paris Agreement was signed. Specifically, Toyota aims to reduce the negative factors of vehicles to zero and bring positive effects to society in response to global environmental problems such as climate change, water shortages, resource depletion, and biodiversity deterioration. Toyota is promoting activities such as the CO₂ Zero Challenge.



Source : Toyota web site

Figure 2.10 Toyota Environmental Challenge 2050

This year, draft plan of formulation of the JCM model project in which popularization of EVs planned by TDEM in Pattaya City in the EEC is considered. Preparations for the JCM application for the next year is also proceeding.

(4) Hakuodo Incorporated

Hakuodo Incorporated (hereinafter called “Hakuodo”) is one of Japan's leading advertising agencies. In EEC, the support on decarbonization from the viewpoint of citizens in urban city is important. Hakuodo provides various services on smart city development from the viewpoint of citizens. Hakuodo has participated in this City-to-City collaboration since the latter half of last year and, this year, provided support for adding value to smart city development in the EEC and contributing to the formulation of JCM model projects. The company profile is shown in Table 2.8

Table 2.8 Company Profile of Hakuholdo

Company name	Hakuholdo Incorporated
Head office	Akasaka Biz Tower, 5-3-1 Akasaka, Minato-ku, Tokyo 107-6322, Japan
Incorporated	11 February 1924 (Established on 6 October 1895)
Number of employees	3,812 (as of April 1, 2021; including contract workers)
Capital	35,848 million JPY

Source: Hakuholdo website

(5) Sumitomo Corporation

Sumitomo Corporation (hereinafter called “Sumitomo”) is a leading Japanese general trading company with various business operations in Thailand, including investment in Amata B. Grim, which supplies electricity to EEC’s industrial parks, and has participation in the industrial parks business. Sumitomo has experience of smart city development projects in Southeast Asia and in FY2021, provided information on smart city development to achieve EEC’s target. The company profile is shown in Table 2.9

Table 2.9 Company Profile of Sumitomo

Company name	Sumitomo Corporation
Head office	Otemachi Place East Tower 3-2 Otemachi 2-Chome, Chiyoda-ku, Tokyo 100-8601, Japan
Established	December 24, 1919
Number of employees	5,396* (Consolidated Base: 75,383) * It includes 153 persons whom overseas branches and offices of the Company employ.
Capital	219.9 billion JPY

Source: Sumitomo website

(6) Kanematsu KGK Corp.

Kanematsu KGK Corp. (hereinafter called “Kanematsu KGK”) is a machinery trading company that focuses on sales operations of machine tools and industrial machinery and contributes to the protection of the global environment in the 21st century by implementing activities with due consideration to reducing environmental impact and risks. Kanematsu KGK has implemented JCM projects in Vietnam and Thailand. In this year, Kanematsu KGK adopted JCM model project for “35MW Solar Power and Storage Battery Project in Suphanburi Province” in Thailand. The company profile is shown in Table 2.10.

Table 2.10 Company Profile of Kanematsu KGK

Company name	Kanematsu KGK Corp.
Head office	15th floor, Museum Tower Kyobashi 1-7-2 Kyobashi, Chuo-ku, Tokyo 104-8510, Japan
Established	May 15, 1963
Number of employees	504 (Consolidated), 279 (Non-Consolidated), As of July 1, 2020
Capital	706,835,000 JPY

Source: Kanematsu KGK website

(7) Mizuho Bank, Ltd.

Mizuho Bank, Ltd. (hereinafter called “Mizuho Bank”), one of the major banks in Japan, concluded a MOU on attracting business investment with the EEC in March 2018, and has been providing information and supporting to companies to consider investment. Mizuho Bank provides general banking services to Japanese companies in EEC and launched the EEC-One Stop Service (hereinafter called “EEC-OSS”) in October 2019, which enables various applications to Thai government agencies in the web. Mizuho Bank takes preparatory actions for Japanese companies to enter the EEC and is expected to contribute to this project.

Due to the restriction of COVID-19, Mizuho Bank could not work in Thailand as coordinator, however it was in charge of data collection on Thai market, trends of Japanese company in Thailand etc. The company profile is shown in Table 2.11.

Table 2.11 Company Profile of Mizuho Bank

Company name	Mizuho Bank, Ltd. (MHBK)
Head office	Otemachi Tower, 1-5-5 Otemachi, Chiyoda-ku, Tokyo 100-8176, Japan
Established	July 1, 2013
Number of employees	27,659 (As of March 31, 2021)
Capital	JPY 1,404.0 billion (As of March 31, 2021)

Source: Mizuho Bank website

(8) Tokyo Century Corporation

Tokyo Century Corporation (hereinafter called “Tokyo Century”) has been developing leasing businesses for financial and service companies in Japan and overseas. In the JCM scheme, Tokyo Century has implemented JCM model projects as a representative of an international consortium in Philippines, Indonesia, and Thailand in the past few years. In this City-to-City collaboration, Tokyo Century has mainly supported and coordinated with Saha Group, which is a Thai conglomerate, on installation of energy saving and renewable energy equipment other than solar power generation enhancement. The company profile is shown in Table 2.12.

Table 2.12 Company Profile of Tokyo Century

Company name	Tokyo Century Corporation
Head office	FUJISOFT Bldg., 3 Kanda-neribeicho, Chiyoda-ku, Tokyo 101-0022 Japan
Established	July 1, 1969
Number of employees	917 (non-consolidated FY2020), 7,438 (consolidated)
Capital	81,129 million JPY

Source: Tokyo Century website

CHAPTER 3 CITY-TO-CITY COLLABORATION

The City-to-City collaboration project consists of 2 pillars which are the collaboration between two cities and JCM model project formulation by private companies. Activities of the collaboration between Osaka City and EEC to realise decarbonization society are explained in this chapter.

3.1 Objective

This year is the third year of the City-to-City collaboration between EEC and Osaka City. The Project had focused on discussions and exchange of opinions of smart city development which EEC Office is interested in.

3.2 Implementation Policy and Results

In the Project, the experience and knowledge of Osaka City were shared to EEC Office in order to promote EEC’s growth toward realization of Thailand 4.0.

It is necessary to provide support from various aspects to EEC, which boasts one of the best economic developments in Southeast Asia, without slowing the growth. Therefore, it was decided to conduct actions through the Project even during the inconvenient period of COVID-19 as shown in Table 3.1.

Table 3.1 Policies and Results for The City-to-City Collaboration in This Year (1/2)

Policy 1 : Introduction of companies in Osaka utilizing Team OSAKA network	By introducing the optimum technology of Japanese companies including companies participating in the Team OSAKA network, support JCM model projects formation to meet the decarbonization and low-carbon needs of various facilities in factories, industrial zones, smart cities, etc. in the EEC area.
Result	Selected Japanese companies with knowledge and achievements in the fields that EEC focuses on, such as digital, smart factories and smart cities, and invited to the workshop and business matching.
Policy 2 : Sharing know-how related to environmental activities	The Project contributes to the realization of the EEC Green Plan and provide know-how. In particular, Osaka City's activities related to climate change (Osaka City Action Plan of Global Warming Countermeasures, "Osaka Blue Ocean Vision" Promotion Project, etc.), waste-related activities, and other environmental measures which EEC are highly interested in.
Result	In the meetings and workshops with EEC, it introduces the achievements of pollution control implemented by Osaka City and the knowledge and achievements of the Environment Bureau such as Osaka Smart Energy Plan, Action Plan of Global Warming Countermeasures (Local Programme), etc.

Table 3.1 Policies and Results for The City-to-City Collaboration in This Year (2/2)

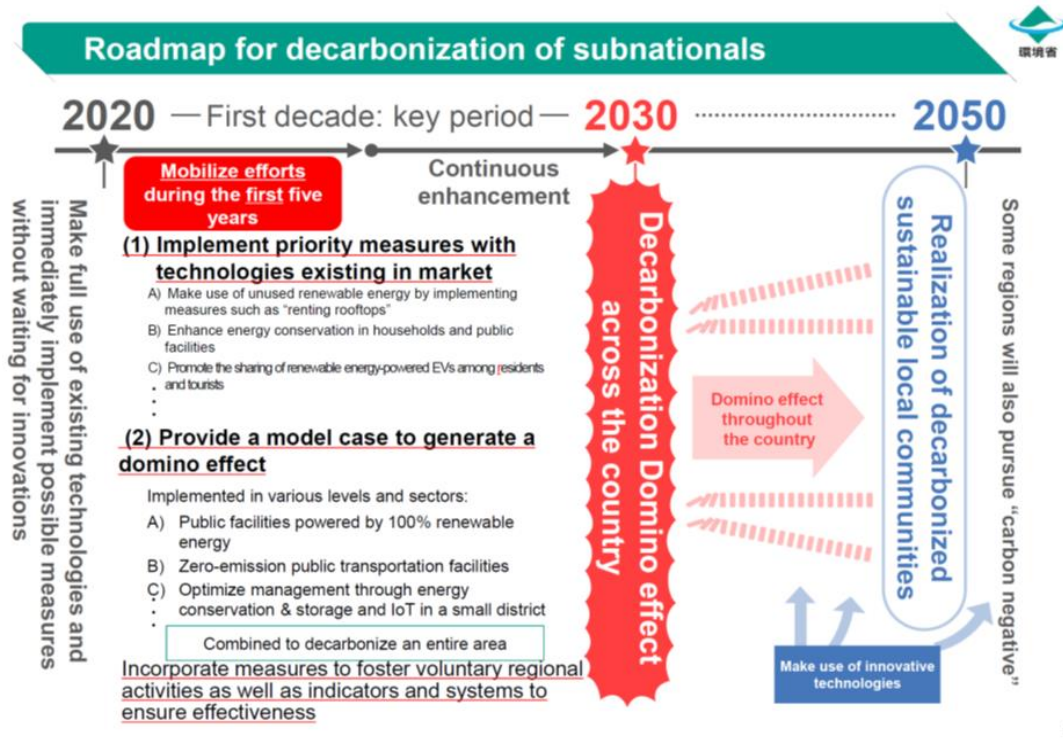
Policy 3 : Discussion among cities to realize decarbonized domino effect in Thailand	Decarbonization domino effect which recommended by Japanese government will be implemented in Thailand because Thailand is in high levels both in technology and economic fields, so it is suitable for its implementation. Specifically, the Project shares the know-how of Osaka City's Action Plan of Global Warming Countermeasure with the EEC (3 provinces) and explains the effects of the decarbonization domino.
Result	At meetings and workshops with the EEC, the Project introduced the achievements of the formulation of the Osaka City Global Warming Countermeasures Implementation Plan (Local Programme), etc., and introduce the mechanism of decarbonization domino effect being promoted in Japan. From the next fiscal year onward, the Project will propose expansion to 3 provinces in EEC.
Policy 4 : Support for emergence of SDGs business for sustainable regional economic development in EEC	Various businesses have been created in EEC, and some companies are highly interested in the SDGs. The efforts to promote loan studies and business evaluations from the perspective of ESG have been confirmed. If necessary, the Project utilizes Nippon Koei's "SDGs Business Emergence Support" to introduce SDGs business emergence for companies in the EEC.
Result	The outline of the SDGs evaluation tool "TSUMUGI" for local governments, which Nippon Koei is promoting in Japan was introduced at the workshop.

Source: Nippon Koei

3.2.1 Introduction of Decarbonization Domino Effect and Explanation of the Significance of Implementing the Decarbonization Domino Effect in Thailand

In Japan, the 10 years until 2030 is positioned as an important period for the realization of carbon neutrality by 2050. Japanese Government also recommend that it emerges decarbonized domino effect by 2030 that will realize decarbonization one after another in each region through efforts to double the amount of renewable energy in Japan.

The introduction of these efforts will be useful in Thailand, which has declared zero carbon by 2050 and net zero emission by 2065 at COP26. Therefore, the efforts of decarbonized domino effect as shown in Figure 3.1 was shared at meetings with the EEC.



Source: MOEJ

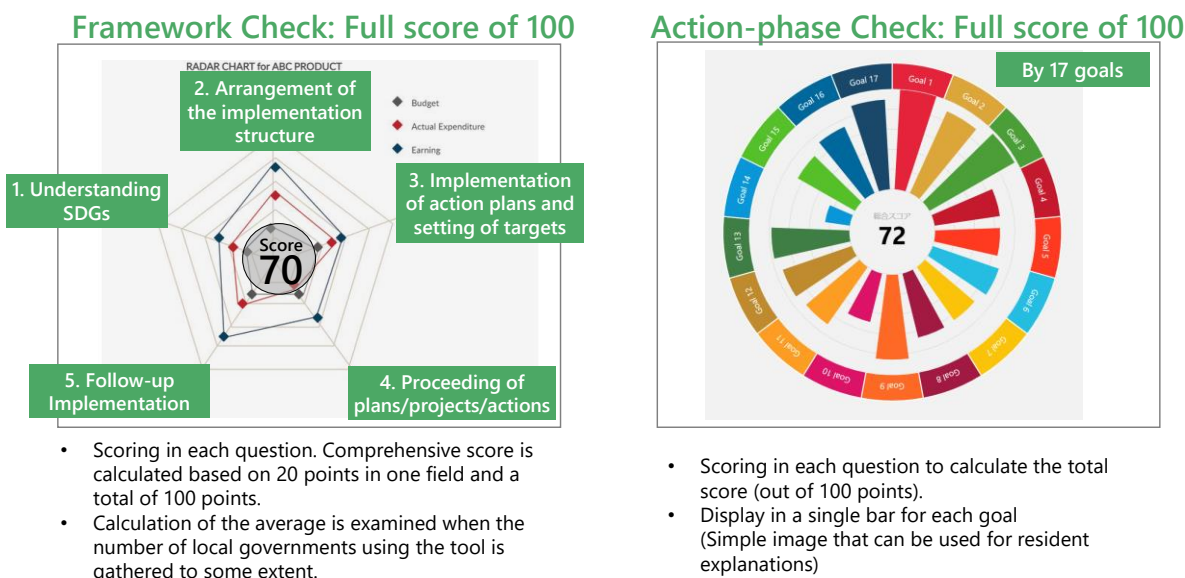
Figure 3.1 Mechanism of Decarbonization Domino Effect

In this year, information related to the decarbonized domino effect was shared with Thailand at the meeting/seminar. After the next year, this information will be shared with the three provinces in the EEC area, and considered the specific support for decarbonization domino effect in Thailand. (Thai version decarbonized domino effect).

3.2.2 Support for Emergence of SDGs Business for Sustainable Regional Economic Development

Nippon Koei is developing its own application "TSUMUGI" that visualizes the efforts of local governments for SDGs activities in order to make SDGs more useful in society. Sample Analysis Results of SDGs Tool (TSUMUGI) is shown in Figure 3.2.

This year, since it was in the demonstration stage in the domestic local government, the Project only provided information to EEC officials. The Project will introduce the application of TSUMUGI to the EEC and three provinces in the EEC from the next fiscal year. And the Project are planning to provide support for business emergence related to SDGs.



Source: Nippon Koei

Figure 3.2 Sample Analysis Results of SDGs Tool (TSUMUGI)

3.2.3 Support for The Creation of Additional Value for Smart City Development

Various businesses are underway in EEC area, and smart city development is one of the featured businesses. At a workshop in FY2020, Hakuodo Inc. was participated to explain the company's efforts for smart city development in North Hanoi, Vietnam, and participants from Thai side showed their interests.

Therefore, the discussion was held with Hakuodo to exchange opinions regarding the creation of added value for smart city development.

Based on the discussion, it was recognized that it is important to be aware of the creation of added value as it can be applied not only to smart city development but also decarbonization society development. Points to be considered when creating added value in the smart development business are summarized below.

(1) Take Things from Consumer's Perspective

In the development of smart city, convenience is a priority, so the introduction and use of the latest technology is emphasized. Therefore, technology-driven development may take the lead.

However, it is considered that focusing on consumers who lives under the development is key factors for a long lasting development. It is important to take these points into consideration in the development of various smart cities in the EEC.

(2) Find the Ideal Form from Life Issues

Based on the issues in various living environments such as energy, medical care, community, education, and culture, will influence the ideal form and shape. This will give an idea of what consumers really need and what is important.

(3) Take a Bird's-Eye View of Issues and Problems

It is important to assume a green recovery after COVID-19 based on the current situation of COVID-19. First of all, it is easy to take symptomatic treatment for problems such as the economic decline caused by COVID-19 pandemic, however, it is necessary to grasp problems and issues from an overview and reconstruct (redesign) the existing system.

3.3 Activities of the Collaboration

In order to promote City-to-City collaborations of Osaka City and EEC, events with related organizations and companies have been arranged for providing opportunity to exchange opinion, share know-how and internal meetings are arranged. In addition, meetings were held with the Ministry of the Environment, Japan to report the progress and results.

Furthermore, presentations were made at seminars and other events in order to publicize activities and fruits of project as well as a City-to-City collaboration project and a JCM model project. In these events and meetings, not only the City-to-City collaboration cooperation but also the JCM projects were included in the agenda. The details of City-to-City collaboration activities are shown in Table 3.2 and 3.3.1 to 3.3.6.

Table 3.2 Activities related to City-to-City Collaboration (1/2)

Time	Activity	Description
21 Sep. 2021	Kickoff meeting with MOEJ	Report the planning activities (MOU signing, workshops, JCM model project formation)
27 Sep. 2021	Presentation in webinar	Presentation on the project at the “Webinar on the JCM Implementation in Thailand 2021 – Innovation for Carbon Neutrality through JCM –“ organized by MOEJ, GEC, Ministry of Natural Resources and Environment of Thailand, Thailand Greenhouse Gas Management Organization (TGO). *See Attached 1 for presentation materials.
17 Nov. 2021	Online workshop with EEC	- Introduction of Osaka City's activities (Action Plan of Global Warming Countermeasures, SDGs). - Introduction of Japanese companies' activities (smart cities, digital technology) *See Attached 2 for presentation materials.

Table 3.2 Activities related to City-to-City Collaboration (2/2)

Time	Activity	Description
27 Dec. 2021	Progress report to MOEJ	<ul style="list-style-type: none"> - Report the progress (Workshop held in Nov., preparation for MOU signing, current status of JCM related companies' activities) - Explanation on draft activity plan of next 3 years
24 Feb. 2022	MOU signing between Osaka City and EEC	<ul style="list-style-type: none"> - Greetings and signing by the Mayor of Osaka and the EEC Secretary General (online). - Presentations by the Osaka City, EEC, Nippon Koei, and TDEM <p>*See Attached 3 for presentation materials.</p>
4 Mar. 2022	Final report to MOEJ	<ul style="list-style-type: none"> - Report the final results (Workshops, MOU signing, Business matching) and progress of the JCM model projects. - Explanation of key points of planned activities for next 3 years.
4 Mar. 2022	Online business matching	<ul style="list-style-type: none"> - Presentation on smart city and smart factory from DEPA and NSTDA - Presentation on technology in the field of digital/energy/smart city from Japanese companies <p>*See Attached 4 for presentation materials.</p>
9-10 Mar 2022	Presentation in forum	<p>Presentation on the project at “the 2nd Zero Carbon City International Forum” organized by MOEJ.</p> <p>*See Attached 5 for presentation materials.</p>
As necessary	Discussion with Osaka City, EEC, and companies related to JCM	<p>Consultations on City-to-City collaboration (including JCM model projects) were held as follows</p> <ul style="list-style-type: none"> - 14 and 22 Sep. (Hakuhodo): value-added creation support for smart city development - 9 Sep. (Osaka City): workshops - 27 Sep. (Osaka City, SoftBank): workshops - 14 Oct. (Osaka City): workshops - 15 Oct. (EEC, Osaka City): workshops - 15 Oct. (Osaka City, Hankyu Hanshin Properties Corp.): workshops - 22 Oct. (Mizuho Bank): information gathering survey on economic trends, smart cities and investment and financing trends in the EEC - 26 Oct. (Osaka Gas): JCM model project formation - 15 Nov. (Osaka City, EEC): workshops and business matching - 15 Dec. (EEC): business matching - 23 Dec. (TDEM): JCM model projects - 5, 12, 14 Jan. (Osaka City, EEC): MOU signing - 5 and 31 Jan (EEC): business matching

Source: Nippon Koei

3.3.1 Kickoff Meeting with MOEJ

The main contents of the Kickoff meeting with MOEJ are discussed below and the presentation materials are shown in Figure 3.3.

Day/Time: 21 Sep. 2021

Venue: Online meeting (Webex)

Participant: Global Environment Bureau, MOEJ : 2 people

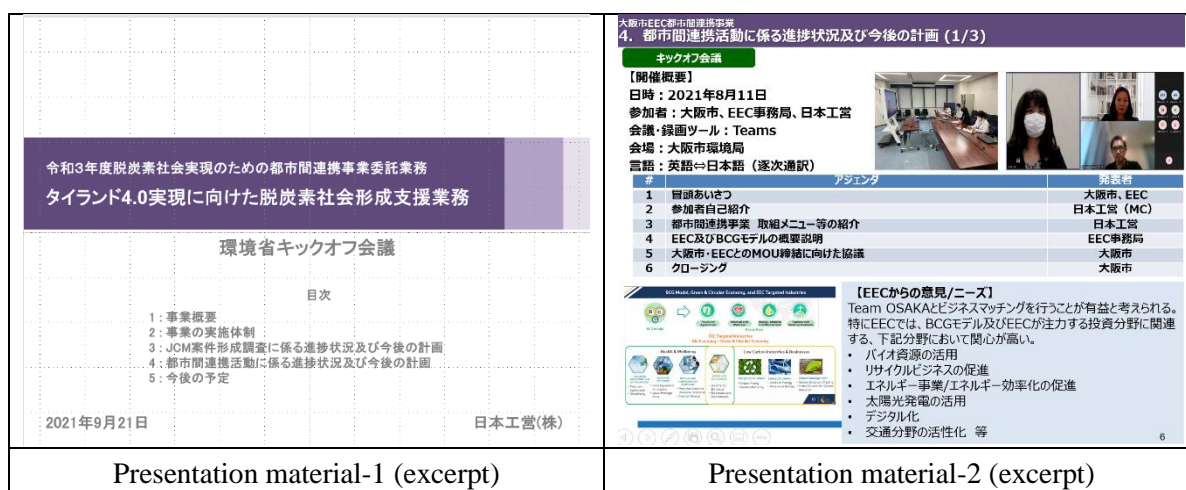
Environment Bureau, Osaka City Government : 3 people

International Environment Dept., Nippon Koei : 5 people

Purpose: To explain outlines of this year's activities

Outline: At the meeting, an overview of the Project and its implementation structure was presented with the Osaka City. This year, through discussions and workshops between Osaka City and the EEC, the two cities will share their know-how on environmental policies, with the aim of realizing the decarbonization domino effect in Thailand. The current situation is also explained that MOU in order to build a stable relationship between Osaka City and the EEC is under preparation. Regarding JCM model projects formation, an overview of this year's candidate projects, TDEM, Osaka Gas and Tokyo Century are explained.

In response, MOEJ gave comment that it hoped that the conclusion of the MOU would deepen City-to-City collaboration between Osaka City and the EEC and accelerate the decarbonization domino effect in industrial parks and smart cities in the EEC.



Source: Nippon Koei

Figure 3.3 Presentation Materials of Kickoff Meeting with MOEJ

3.3.2 Online Workshop with EEC

The main contents of the online workshop are discussed below and photos are shown in Figure 3.4.

Day/Time: 17 Nov. 2021 (Wed) 15:00~16:30

Venue: Zoom meeting (Venue: Meeting room in Link Osaka, Osaka City)

Participant: Total: 42 people

Thailand side (30 people): EEC, DEPA, IEAT, FTI, Related local municipalities, PTT, Thai Industrial Estate And Strategic Partner Association


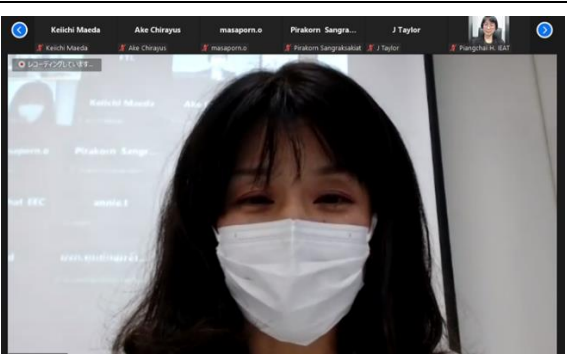
Japan side (12 people): MOEJ, Osaka City, SoftBank, Hankyu Hanshin Properties Corp., Nippon Koei

Note: DEPA (Digital Economy Promotion Agency), IEAT (Industrial Estate Authority of Thailand), FTI (Federation of Thai Industries), PTT (PTT Public Company Limited)

Purpose: To share activities of Osaka City and Japanese company with the EEC regarding carbon neutrality and SDGs.

Outline: Mr. Horii, Director General for Energy Policy, Environment Bureau, Osaka City Government, expressed his hope that the activities of Osaka City and Japanese companies would contribute to the realisation of a zero carbon society in the EEC and Thailand. Dr. Kanit, Secretary General of the EEC Office, also expressed his expectations for Japan to help realise the BCG economy in the EEC. Osaka City introduced their activities of the Action Plan for Global Warming Countermeasures, the Zero Carbon Osaka 2050 concept and related SDGs activities. Umekita Phase 2, urban development around Osaka Station implemented by Hankyu Hanshin Properties Corp., and Smart City and Carbon Neutrality using digital technology owned by SoftBank were introduced as Japanese environmentally friendly activities and technologies. The programme is as follows.

Items	Presenter
Opening Remarks	Env. Bureau, Osaka City
Opening Remarks (Video)	EEC Office
Opening Remarks	MOEJ
Carbon Neutrality in Osaka City	Env. Bureau, Osaka City
Photo Session (Zoom)	-
Introduction of Activities of City-to-City Collaboration of Osaka City and EEC	Nippon Koei
Realization of BCG Economy Model in EEC	EEC office
Introduction of Concept and Introduced Technologies in Umekita Phase 2	Hankyu Hanshin Properties Corp.
Introduction of Smart City with 5G-based Technology	SoftBank
Closing Remarks	Env. Bureau, Osaka City

	
<p>Venue in Osaka City</p>	<p>Opening remarks (Mr. Horii, Director General Env. Bureau, Osaka City)</p>
	
<p>Opening remarks (Dr. Kanit, Secretary General, EEC Office)</p>	<p>Opening remarks (MOEJ)</p>
	
<p>Presentation of Env. Bureau, Osaka City</p>	<p>Presentation of Hankyu Hanshin Properties Corp.</p>
	
<p>Closing remarks (Env. Bureau, Osaka City)</p>	

Source: Nippon Koei

Figure 3.4 Photos of Online Workshop with EEC

3.3.3 Progress Report to MOEJ

The main contents of the Progress report to MOEJ are discussed below and the presentation materials are shown in Figure 3.5.

Day/Time: 27 Dec. 2021

Venue: Online meeting (Webex)

Participant: Global Environment Bureau, MOEJ : 2 people

Embassy of Vietnam : 1 people

Environment Bureau, Osaka City Government : 3 people

International Environment Dept., Nippon Koei : 5 people

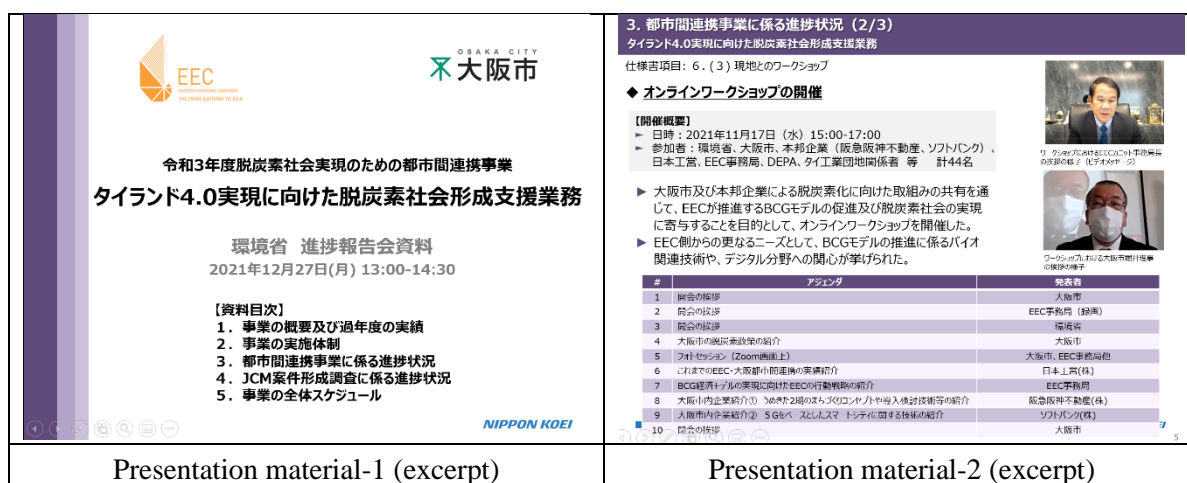
Purpose: To report current progress of activities to MOEJ.

Outline: The project outline, achievements, progress and the next three-year plan were explained to MOEJ with Osaka City.

Reported the progress up to December 2021, which is the introduction of companies of the Team OSAKA Network to EEC, sharing of knowledge on smart city development and Osaka City's environmental policy. The progress of JCM model projects formation were also explained.

In addition, future actions for the next three-year plan that further knowledge sharing by Osaka City and support for the creation of synergies in JCM projects are planned for realization of the BCG economy that the EEC is aiming for were explained.

MOEJ gave comment that it expects further development by utilising the strengths of this project, which can provide a variety of solutions.



Source: Nippon Koei

Figure 3.5 Presentation Materials of Progress Report to MOEJ

3.3.4 MOU Signing between Osaka City and EEC

Since 2019, Osaka City and EEC have established an amicable and cooperative relationship by sharing knowledge, exchanging opinions and discussions through workshops and seminars etc. for the formulation of a zero-carbon society towards the realisation of Thailand 4.0. The main contents of the MOU are as follows.

1. Toward the development of a Carbon Neutrality in EEC, both Participants make efforts to promote mutual cooperation amicably in the following:
 - (1) Sharing knowledge of standard and systems supporting the Carbon Neutrality policies of EEC;
 - (2) Creating new projects toward the realization of a Carbon Neutrality;
 - (3) Sharing information and promoting projects related to green and circular economy; and
 - (4) Promoting other projects related to environmental conservation.
2. Both Participants make reasonable efforts to continuously hold a high-level policy dialogue once a year toward the realization of Thailand 4.0 development on Carbon Neutrality.

The main contents of the MOU signing ceremony are discussed below and photos are shown in Figure 3.6.

Day/Time: 24 Feb. 2022 (Thu) 16:00~17:00

Venue: Zoom meeting (Venue: City Hall, Osaka City)

Participant: Total: 32 people

Thailand side (14 people): EEC, Royal Thai Embassy in Japan, Royal Thai Consulate-General, Osaka, Department of International Economic Affairs, MFA, Department of East Asian Affairs, MFA, NSTDA, TGO, FTI

Japan side (18 people): Osaka City Government, MOEJ, Embassy of Japan in Thailand, JETRO, JICA, Osaka Chamber of Commerce and Industry, TDEM, Nippon Koei

Note: MFA (Ministry of Foreign Affairs), NSTDA (Thailand National Science and Technology Development Agency), TGO (Thailand Greenhouse Gas Management Organization), FTI (Federation of Thai Industries)

Purpose: To conclude and sign MOU

Outline: Mr. Matsui, Mayor, Osaka City, expressed his hope that deep collaboration among Osaka/Kansai companies, Osaka City, which is a commercial capital of Japan, and EEC, which has been developing and expanding economy in the field of bio, circular, and green. Dr. Kanit, Secretary General of the EEC Office, also expressed his expectations for expanding collaboration with Osaka City in the field of Bio, Circular and Green economy and other fields. MOU was signed at the same time by both cities. After signing MOU, both parties presented current activities related to decarbonizations, Nippon Koei presented outline of City-to-City collaboration and TDEM presented achievement of carbon neutral

project. The programme is as follows.

Items	Presenter
Opening Speech	Mayor, Osaka City
Opening Speech	Secretary General, EEC Office
MOU Signing and Photo Session	-
Osaka City Overview and Action Plan for Decarbonization	Env. Bureau, Osaka City
Decarbonization Business Opportunities	EEC Office
Outlines of the City-to-City Collaboration between EEC and Osaka City Government	Nippon Koei
Main Achievements -EEC-zone Carbon Neutral Project	TDEM
Closing Remarks	Env. Bureau, Osaka City



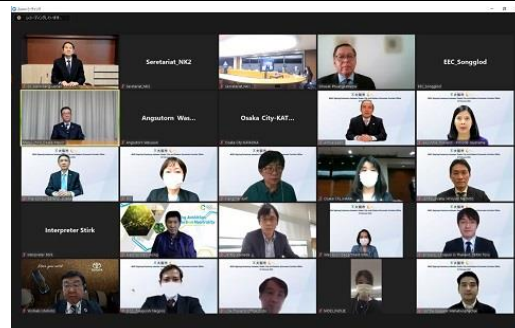
Venue in Osaka City



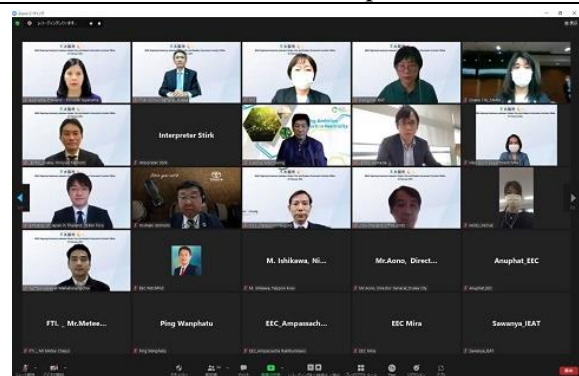
Signing MOU



Commemorative photo



Commemorative photo with online participants



Commemorative photo with online participants

Source: Nippon Koei

Figure 3.6 Photos of MOU Signing between Osaka City Government and EEC

3.3.5 Online Business Matching

The main contents of the Online Business Matching are discussed below, and photos are shown in Figure 3.7.

Day/Time: 4 March 2022 (Fri) 16:00-18:00

Venue: Online meeting (zoom)

Participant: Total 46 people

Thailand side : EEC, DEPA, NSTDA, Thai companies, etc.

Japan side : Osaka City Government, SoftBank, Sumitomo, Tokyo Century, Nippon Koei, Japanese companies, etc.

Purpose: To provide investment opportunity to Japanese companies and promote BCG models in the field of digital, energy, and smart city in EEC.

Outline: Business matching was held as the first event after the signing of the MOU. Ms. Ihara, Director of Environmental Bureau, Osaka City Government, and Mr. Petch, Deputy Secretary General of the EEC Office, expressed their expectations for future collaboration to promote decarbonization.

First, Osaka City presented an overview of activities for decarbonization, and Nippon Koei presented an overview of City-to-City collaboration project. NSTDA and DEPA introduced the needs of smart cities and smart factories, and Japanese companies introduced their technologies in the digital, energy and smart city fields. SoftBank introduced technologies related to digital transformation, Sumitomo Corporation introduced its smart city achievements, and Tokyo Century introduced its achievements in forming JCM model projects, and introduced to the Thai participants. Programme is as follows.

Items	Presenter
Opening Remarks	Osaka City Gov.
Opening Remarks	EEC Office
Photo Session	-
Osaka City Overview and the Action for Decarbonization	Env. Bureau, Osaka City
Outlines of City-to-City Collaboration	Nippon Koei
Smart City Development Plan in Thailand	DEPA
Current Situation of Smart Factory in Thailand and Introduction of Sustainable Manufacturing Center	NSTDA
Contents of Digital Transformation	SoftBank
Company Introduction and Reference of Smart City Activities	Sumitomo
Achievement of Tokyo Century Group with the JCM	Tokyo Century
Closing Remarks	MC

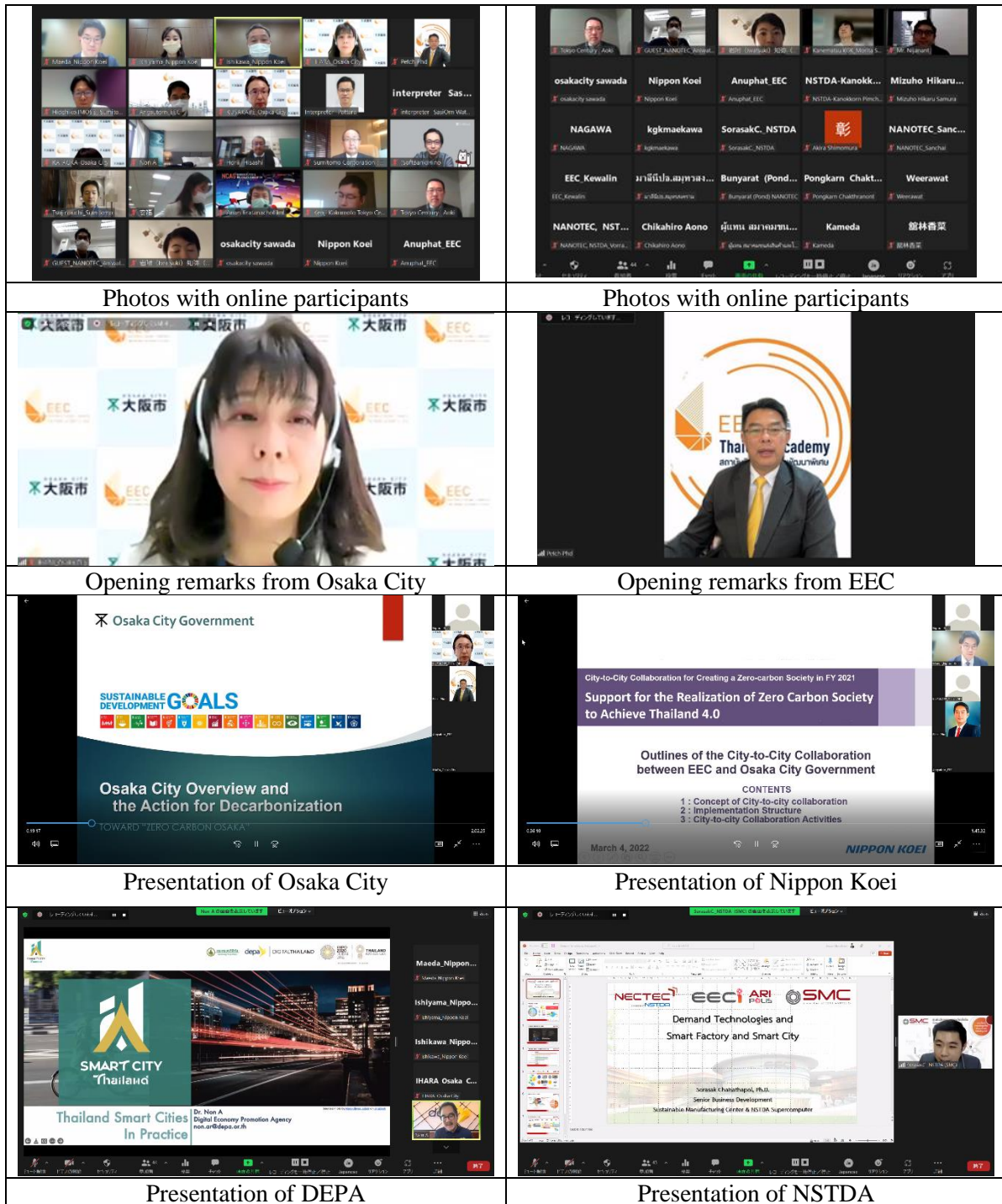
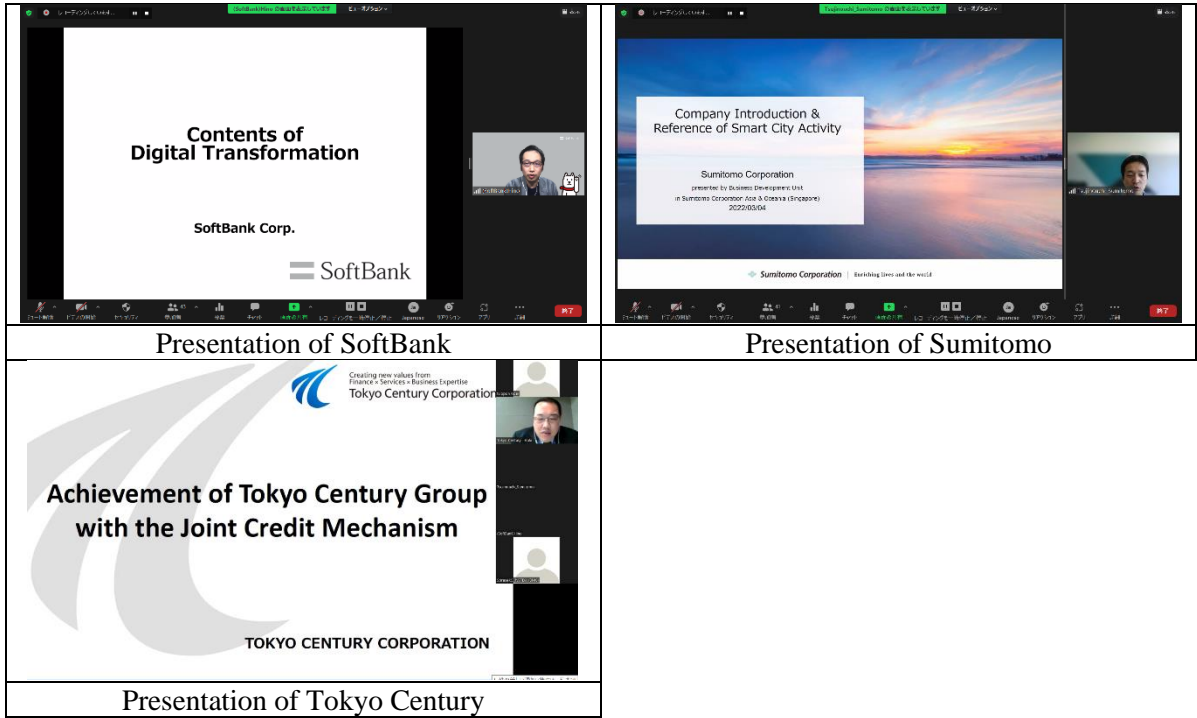


Figure 3.7 Photos of Online Business Matching (1/2)



Source: Nippon Koei

Figure 3.7 Photos of Online Business Matching (2/2)

3.3.6 Final Report to MOEJ

The main contents of the final report to MOEJ are discussed below and the presentation materials are shown in Figure 3.8.

Day/Time: 4 March 2022 (Fri) 13:00-14:00

Venue: Online meeting (zoom)

Participant: Global Environment Bureau, MOEJ : 2 people

Environment Bureau, Osaka City Government : 2 people

International Environment Dept., Nippon Koei : 5 people

Purpose: To report the activities of this year and explain next three-year plan to MOEJ.

Outline: The activities of the City-to-City collaboration projects this year and plans for the following years were reported.

MOU signing between Osaka City and the EEC is explained as one of the main achievements of this year's City-to-City collaboration. MOU established a stable relationship and further cooperation for promoting decarbonization is expected.

In addition, this year build relationship with DEPA and NSTDA, which are in charge of smart factory and smart city, so activities in the field of smart city and smart factory will be developed in next year in accordance with Thailand 4.0 which are aiming realization of digital economy development. Approach to realization of decarbonization domino effect in 3 provinces and factories in the EEC will also be considered.

MOEJ gave comment that they expect to promote activities in the next year, especially in the digital and DX sectors. In addition, in relation to the promotion of decarbonization domino effect, MOEJ expects to implement activities for decarbonization at the enterprise and district level, following the Japanese model of 100 regions of Japan in decarbonization.



Source: Nippon Koei

Figure 3.8 Photos of Final Report to MOEJ

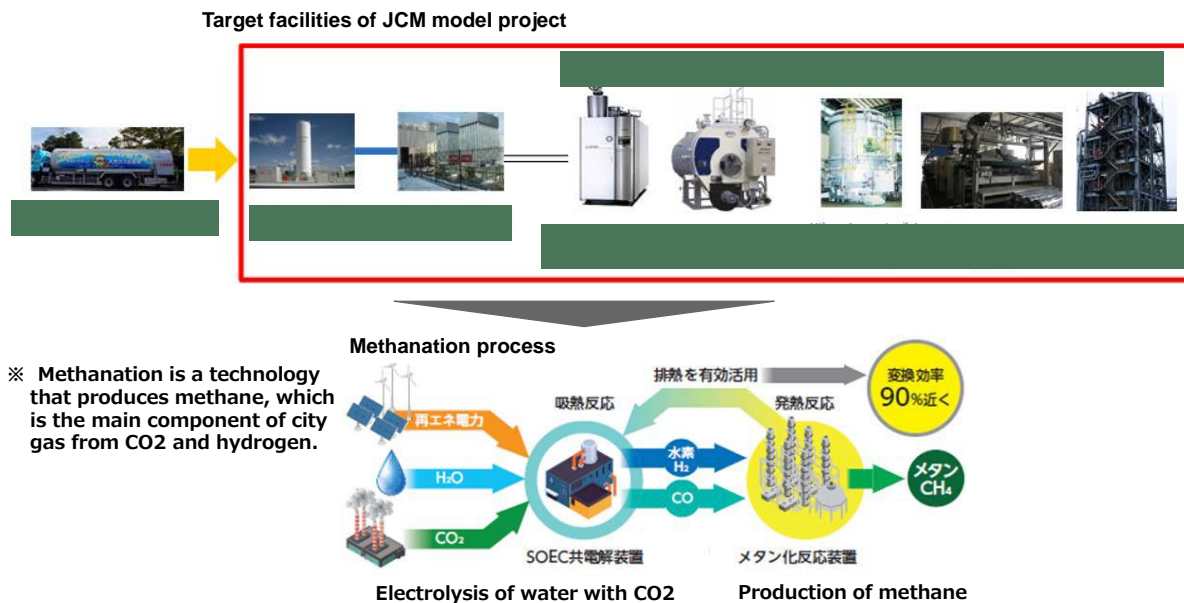
CHAPTER 4 STUDY FOR JCM MODEL PROJECTS FORMULATION

The City-to-City collaboration project consists of 2 pillars which are the collaboration that exchange between two cities and JCM project formulation by private companies. The state of JCM project formulation by private companies are explained in this chapter.

4.1 Project for Fuel Conversion Assuming the Introduction of Methanation

4.1.1 Study Outlines

Osaka Gas plans to implement urban gasification of factories that use coal and Liquefied Petroleum Gas (hereinafter called “LPG”) etc. in anticipation of its contribution to future decarbonization in Thailand and to promote fuel conversion through LNG promotion in the short term. Also, Osaka gas aims to realize further decarbonization by utilizing the existing gas infrastructure, produce highly efficient and promote carbon-neutral gas from renewable energy (Methanation⁴) as shown in Figure 4.1.



Source: Osaka gas website information “Contribution to decarbonization of city gas”
https://www.osakagas.co.jp/company/press/pr2021/_icsFiles/afieldfile/2021/01/25/210125_2_1.pdf

Figure 4.1 Outline of the LNG Conversion Project

Methanation technology is considered to become widespread technology after 2030. Co-benefit effects of the methanation is stated below.

4 Methanation is the conversion of carbon monoxide and carbon dioxide (CO_x) to methane (CH₄) through hydrogenation.

1) Technology contributes to decarbonization

Osaka gas is working to innovate methanation-related technologies in order to take on low-carbonization and decarbonization of the raw materials of city gas. In case that methane produced by this technology can be used as the main component of city gas system, construction and O&M costs will be saved by utilization of existing infrastructure.

2) Utilization of existing infrastructure

Hydrogen technology, which is expected to spread in the future, needs some lead time for infrastructure development (installation of hydrogen stations, etc.) for implementation in society. On the other hand, the methanation technology can be converted to base infrastructure by utilizing the existing one with minimum equipment changes such as nozzles.

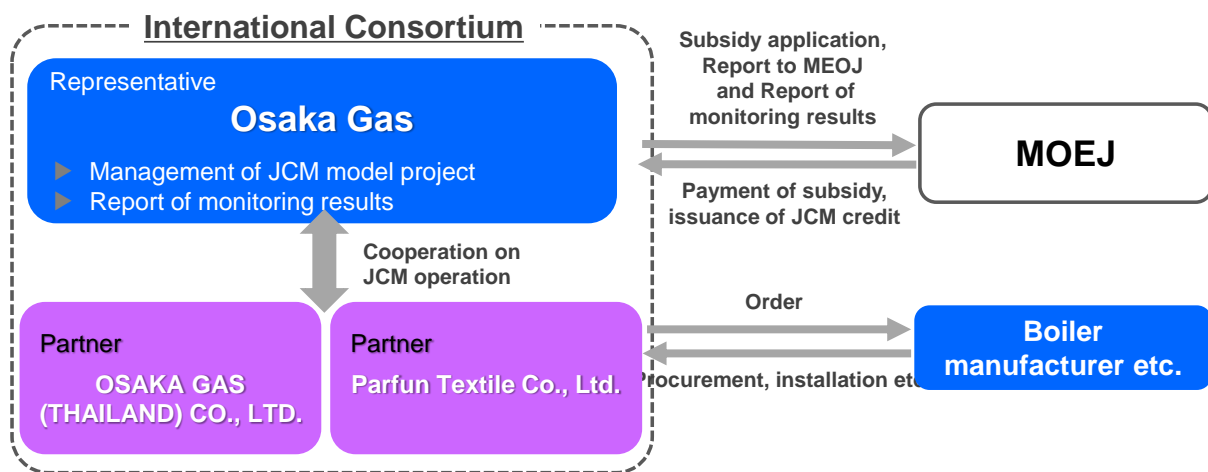
3) Domestic business development of methanation technology

Osaka gas aims to put into practical use the technology "Methanation" that generates city gas system by 2030 and plan to expand it domestically and internationally. The unique highly efficient generation technology of methanation is being developed and utilization and dissemination of the technology is expected to contribute to decarbonization (carbon neutrality in 2050), which is of great international benefit.

4.1.2 International Consortium

Osaka Gas is promoting various fuel businesses in Thailand with a view to introducing advanced technologies such as the methanation technology above.

In this fiscal year, the project "Introduction of High Efficiency Once Through Boiler to Garment Factory" was selected as a JCM model project. The details are shown in Figure 4.2.



Source: Nippon Koei

Figure 4.2 Draft Implementation Structure for International Consortium of Adopted JCM Model Projects

In the JCM project mentioned above, a high-efficiency once through boiler (boiler efficiency 98%) will be installed for Thai customers (Parfun Textile Co., Ltd.) to save energy and switch fuel from coal to natural gas, which GHG emissions will be reduced. Before replacing the boiler, water pipe boiler are used.

4.1.3 Calculation of GHG Emission Reduction

In this JCM model project, fuel conversion and GHG emission reduction will be realized by replacement from existing water tube boiler to once-through boiler.

The JCM methodologies below have already been approved between Japan and Thailand.

- Approved methodology

TH_AM010 : Energy Saving by Introduction of High Efficiency Once-through Boiler and Installation of Economizer into Existing Boiler, Version 01.0

- Formular of Reference Emission

$$RE_p = \sum_i \sum_j \left(FC_{p,i,j,PJ(OT)} \times NCV_{i,j,PJ(OT)} \times \frac{\eta_{i,PJ(OT)}}{\eta_{RE(OT)}} \times EF_{RE(OT)} \right) + \sum_i \sum_j \left(FC_{p,i,j,PJ(EC)} \times NCV_{i,j,PJ(EC)} \times \frac{\eta_{i,PJ(EC)}}{\eta_{i,RE(EC)}} \times EF_{j,RE(EC)} \right)$$

RE_p : Reference emissions during the period p [tCO₂/p]

FC_{p,i,j,PJ(OT)} : The amount of fuel consumption of project boiler (OT) i for the fuel type j during the period p [mass or volume unit/p]

NCV_{i,j,PJ(OT)} : Net calorific value of fuel used by project boiler (OT) i for the fuel type j [GJ/mass or volume unit]

η_{i,PJ(OT)} : Efficiency of project boiler (OT) i [-]

η_{RE(OT)} : Efficiency of reference boiler (OT) [-]

EF_{RE(OT)} : CO₂ emission factor of fuel used by reference boiler (OT) [tCO₂/GJ]

FC_{p,i,j,PJ(EC)} : The amount of fuel consumption of project boiler (EC) i for the fuel type j during the period p [mass or volume unit/p]

NCV_{i,j,PJ(EC)} : Net calorific value of fuel used by project boiler (EC) i for the fuel type j [GJ/mass or volume unit]

EF_{j,RE(EC)} : CO₂ emission factor of fuel used by reference boiler (EC) for the fuel type j [tCO₂/GJ]

η_{i,PJ(EC)} : Efficiency of project boiler (EC) i [-]

η_{i,RE(EC)} : Efficiency of reference boiler (EC) i [-]

• Formular of Project Emission

$$PE_p = \sum_i \sum_j (FC_{p,i,j,PJ(OT)} \times NCV_{i,j,PJ(OT)} \times EF_{i,j,PJ(OT)}) + \sum_i \sum_j (FC_{p,i,j,PJ(EC)} \times NCV_{i,j,PJ(EC)} \times EF_{i,j,PJ(EC)})$$

PE_p : Project emissions during the period p [tCO₂/p]

FC_{p,i,j,PJ(OT)} : The amount of fuel consumption of project boiler (OT) i for the fuel type j during the period p [mass or volume unit]

NCV_{i,j,PJ(OT)} : Net calorific value of fuel used by project boiler (OT) i for the fuel type j [GJ/mass or volume unit]

EF_{i,j,PJ(OT)} : CO₂ emission factor of fuel used by project boiler (OT) i for the fuel type j [tCO₂/GJ]

FC_{p,i,j,PJ(EC)} : The amount of fuel consumption of project boiler (EC) i for the fuel type j during the period p [mass or volume unit]

NCV_{i,j,PJ(EC)} : Net calorific value of fuel used by project boiler (EC) i for the fuel type j [GJ/mass or volume unit]

EF_{i,j,PJ(EC)} : CO₂ emission factor of fuel used by project boiler (EC) i for the fuel type j [tCO₂/GJ]

Results of GHG emission reduction calculation of the JCM model project based on the above formula are as follows.

GHG emission reductions: 2,665 [tCO₂/year]

= Reference CO₂ emission (7,837 [tCO₂/year])

– Project CO₂ emission (5,172 [tCO₂/year])

Reference emissions

= *Fuel consumption of Reference boiler* × *Emission factor of reference fuel*

+ *Power consumption* × *Emission factor of the grid*

Project emissions

= *Fuel consumption of Project boiler* × *Emission factor of reference fuel*

+ *Power consumption* × *Emission factor of the grid*

The fuel conversion project in the industrial field carried out by Osaka Gas is expected to become widespread in Thailand in the future. Therefore, it plans to continue to support a similar project from the next fiscal year onward through the City-to-City collaboration project.

4.2 EV Project in Pattaya city

4.2.1 Study Outline

TDEM aims for carbon neutrality in the EEC and has concluded MOU regarding the trial introduction of electric vehicle (hereinafter called “EV”) in the city of Pattaya in the EEC to achieve the Toyota Environmental Challenge 2050 of Toyota Motor Corporation.

Specifically, as part of the smart city plan in Pattaya City, an EV will be introduced in the city's public transportation system (shared taxi: Songthaew). Then, regarding the purchase of EV, this City-to-City collaboration project examined the application of the JCM model project and conducted various surveys.

Due to the influence of COVID-19, the number of foreign tourists to Thailand has decreased sharply, and the city of Pattaya, which is one of the leading tourist destinations in Thailand, is also situation that profits decrease temporally.

Therefore, the EV project, which has been under consideration since last year, will be examined after the recovery of the local economic situation.

4.2.2 Project Evaluation

The vehicle to be introduced in Pattaya City is assumed to be an EV. The purchase of the vehicle will be a business operator that operates in the city with a license for public transportation. It is assumed that vehicle owner is a company or an individual, and in order to apply to the JCM model project, it is important to specify the scope of the JCM model project and to build an efficient international consortium assuming MRV support. It has been agreed that the charging station that supplies electricity to the EV will be installed by the city of Pattaya or the Kingdom of Thailand.

The above descriptions are stated in the MOU of the signing ceremony with the city of Pattaya, which was signed on December 23, 2020. Photo of MOU Signing Ceremony in Pattaya City is shown in Figure 4.3.



Source: Bangkok Post, December 23, 2020
<https://www.bangkokpost.com/thailand/pr/2040035/pattaya-city-together-with-toyota-and-osaka-gas-lays-the-foundation-for-decarbonized-sustainable-city>

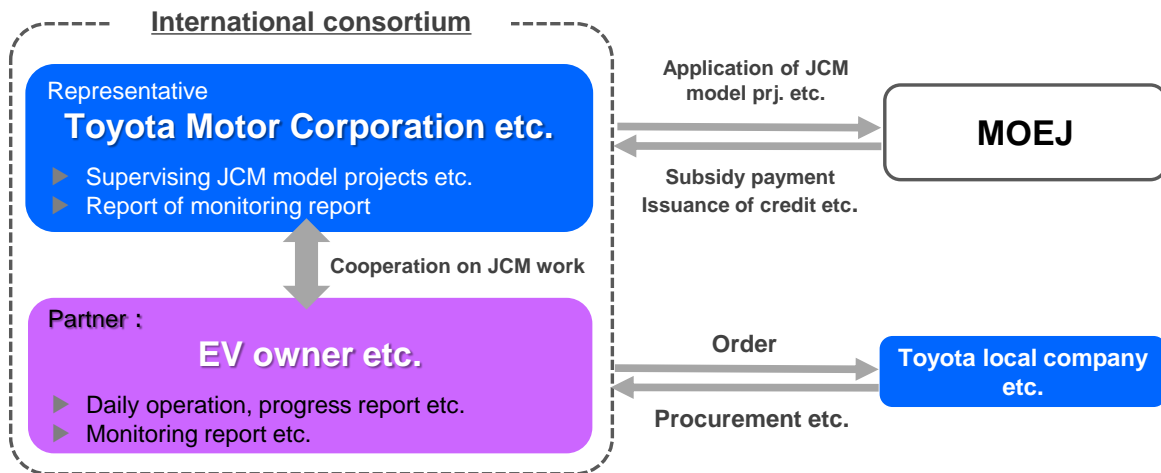
Figure 4.3 Photo of MOU Signing Ceremony in Pattaya City

The long-term low emission development strategy (LTS) in Thailand has been submitted to the UNFCCC in October 2021 clearly states the introduction of EV vehicles. Therefore, it is expected to spread not only to private passenger cars but also to public transportation.

The development of the EV business by TDEM, which is expanding its business on a global scale, is expected to have a great impact in Thailand. Therefore, it plans to continue to support the project from the next fiscal year through City-to-City projects.

4.2.3 JCM Model Project

The key point in creating an international consortium in this Project is the handling of EV owners. In Thailand, vehicle owners belonging to public transportation are not necessarily companies. Taking the above point in to consideration, the international consortium will be created. Image of the consortium is shown in Figure 4.4.

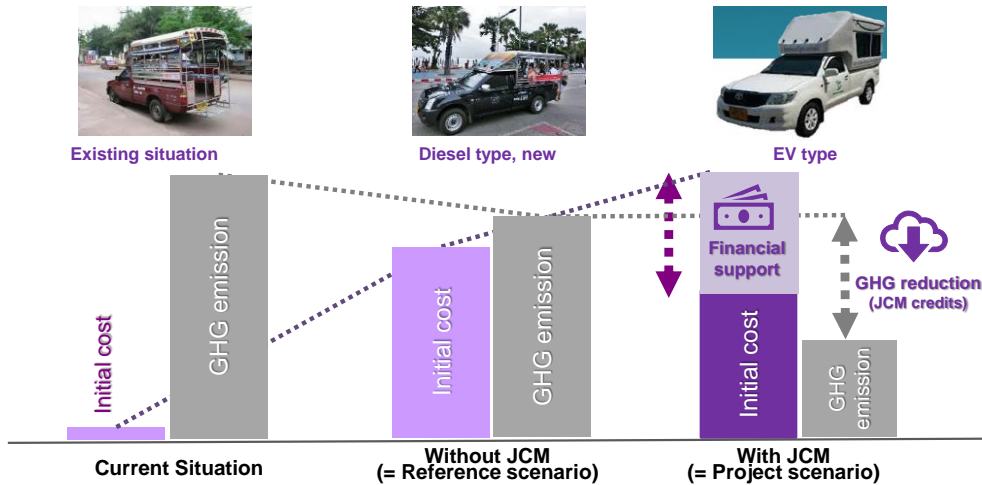


Source : Nippon Koei

Figure 4.4 Draft Implementation Structure for International Consortium of EV Project

4.2.4 Calculation of GHG Emission Reduction

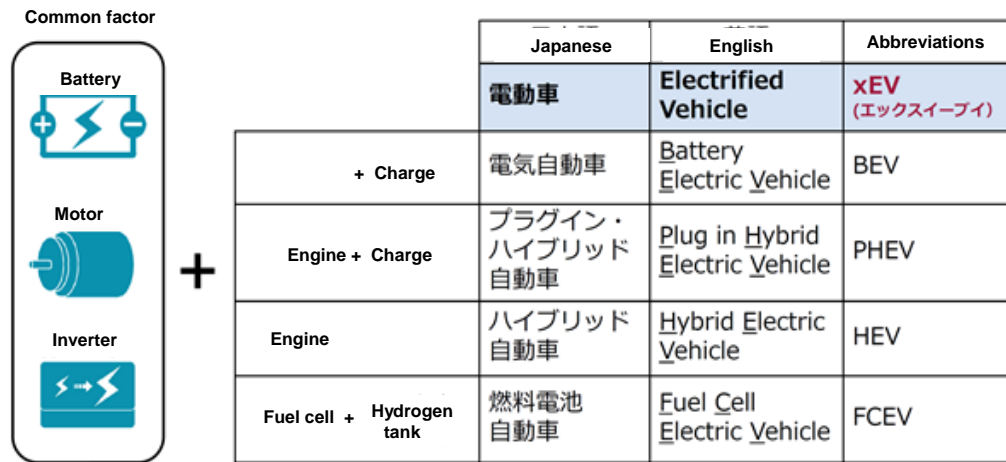
As of February 2022, JCM methodology for EV system is not developed yet. Therefore, it is desired to develop a methodology suitable for the Project in the future. Currently, pickup trucks are the mainstream of public transportation (Songthaew) in Pattaya City, and most of them use diesel oil as fuel. Image of JCM model project of EV project is shown in Figure 4.5.



Source: Nippon Koei

Figure 4.5 Image of JCM Model Project of EV Project

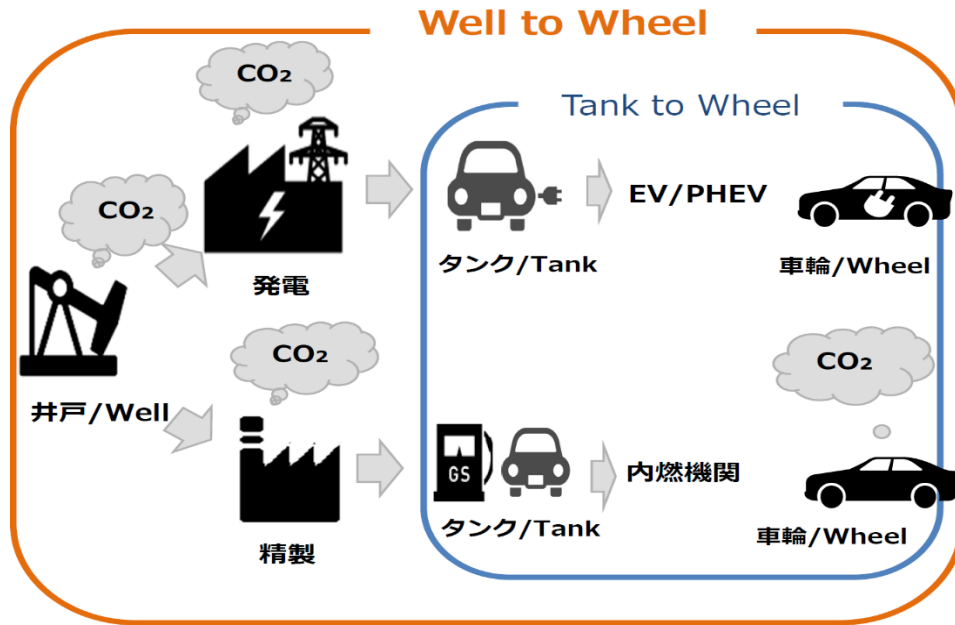
In recent years, many alternatives to gasoline and diesel-fueled vehicles, such as EVs and hybrid vehicles, have been developed and become widespread. Some vehicles run entirely on electricity, while others run in combination with other power sources. These vehicles are collectively called xEV and are expected as a GHG emission reduction tool for realization of carbon neutrality in 2050 and the Paris Agreement. The outlines of xEV is shown in Figure 4.6.



Source: Agency for Natural Resources and Energy

Figure 4.6 Outlines of xEV

In addition, the points to be considered when applying EV to JCM scheme cover the ideas of Well to Wheel and/or Tank to Wheel. Well to Wheel expresses a series of environmental loads from fuel mining, procurement to driving of automobiles. On the other hand, Tank to Wheel is the load from the fuel tank of the car to the wheels. These relationships are shown in Figure 4.7.



Source: Agency for Natural Resources and Energy

Figure 4.7 Image of Well/Tank to Wheel

As of February 2022, no methodology on EV has been developed in the JCM scheme. Therefore, the methodology of the EV project examined in the JCM model project formulation survey over the past years is shown below as a reference.

• Reference emissions

$$RE_p = \sum_i (SFC_i \times NCV_{RFi} \times EF_{RFi} \times DD_{i,p} \times N_{RF,i,p})$$

- RE_y : Total reference emissions in year y [tCO₂/year]
- SFC_i : Specific fuel consumption of reference vehicle category i [l/km]
- NCV_{RFi} : Net calorific value of fossil fuel consumed by reference vehicle category i [(MJ/l)]
- EF_{RFi} : Emission factor of fossil fuel consumed by reference vehicle category i [tCO₂/MJ]
- DD_{i,y} : Annual average distance travelled by project vehicle category i in the year p [km/y]
- N_{RF,i,y} : Number of reference vehicles in category i in year p

• Project emissions

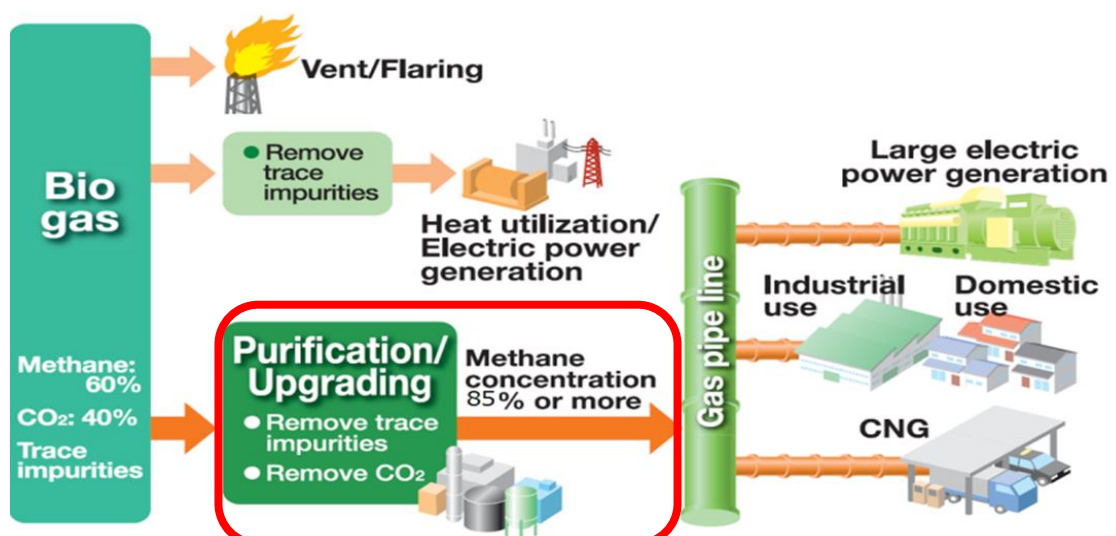
$$PE_p = \sum_i (SEC_{PJ,i,p} \times EFe_{lect,p} / (1 - TDLP) \times DD_{i,p} \times N_{PJ,i,p})$$

- PE_p : Total project emissions in year p [tCO₂/y]
- SEC_{PJ,i,p} : Specific electricity consumption by project vehicle category i per km in year p in urban conditions [kWh/km]
- EFe_{lect,p} : CO₂ emission factor of electricity consumed by project vehicle category i in year p [tCO₂/kWh]
- TDLP : Average technical transmission and distribution losses for providing electricity in the year
- DD_{i,p} : Annual average distance travelled by the project vehicle category i in the year p [km/year]
- N_{PJ,i,p} : Number of operational project vehicles in category i in year p

4.3 Project for the Introduction and Diffusion of Biogas Refining Technology

4.3.1 Study Outlines

Since 2019 Osaka Gas has aimed to contribute to the spread and expansion of biofuels in the EEC by disseminating and deploying new biogas refining technology (OG system). Continuing from last year, the Project considered the commercialization and JCM application of the OG system in this area. Due to the spread of COVID-19 this year, JCM model projects were not formed in this year, but it is expected to spread in the after COVID-19 in the future. The outline of the OG system is shown in Figure 4.8.



Source: Osaka Gas

Figure 4.8 Outline of the OG System

One of the major industries in Thailand and other Southeast Asian countries is biomass-related business.

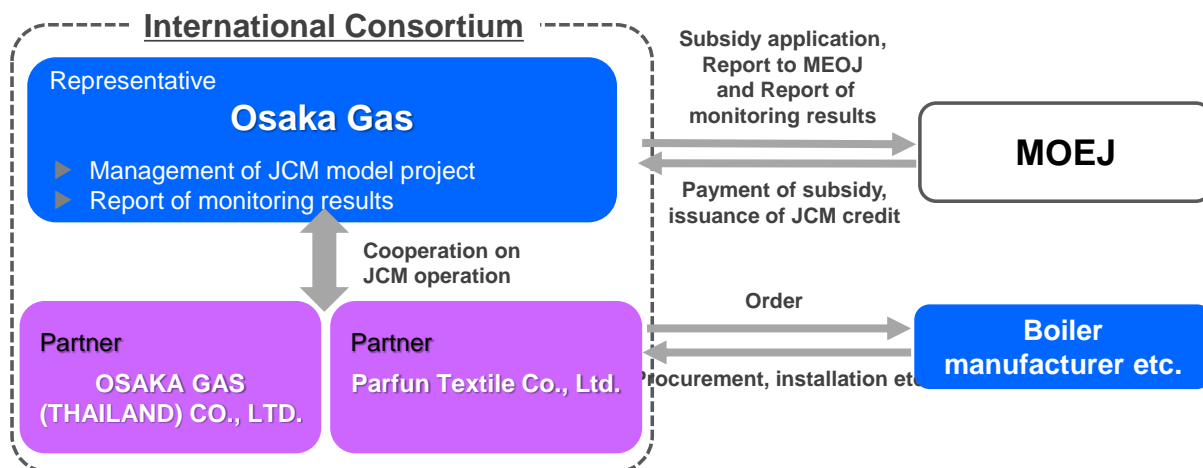
In particular, compared to other Southeast Asian countries, Thailand has a large number of installations of biogas production equipment and abundant raw materials. Therefore, effective utilization of biomass and biogas is expected as an activity contributing to low carbon and zero carbon in the EEC.

In the use of biogas, CO₂ and impurities are contained as well as the methane gas, and they must be removed in order to use city gas. However, removing has not done properly due to the technical issues.

Osaka Gas has developed "Biogas Refining System" to remove impurities from biogas and increase methane concentration, and been introducing it to biomass factories in Thailand and other countries. Osaka Gas's proprietary biogas refining technology (OG system) has been pilot-tested in Thailand from FY2017 to FY2018, and commercialization has been completed.

4.3.2 International Consortium

In the international consortium of the OG system and LNG conversion business, representative of the consortium will be in charge of the player who has enough knowledge of application technology, such as Osaka Gas etc. The structure is shown in Figure 4.9.



Source: Based on the open information in GEC website, Nippon Koei prepared.

Figure 4.9 Draft Implementation Structure for International Consortium of Introduction of OG System

In the future, after diminishing the COVID-19, it is expected that the OG system will become widespread with the recovery of industry in Thailand and the rise in demand for biogas. Therefore, it plans to continue to support a similar project from the next fiscal year onward through the Project.

4.3.3 JCM Application Plan

Table 4.1 compares the effects of introducing the OG system for factories that generate biogas derived from agricultural waste distributed in Thailand.

Table 4.1 Technical Superiority of OG System

Type	Pressure fluctuation absorption Competitor A	Membrane Competitor B	High pressure water absorption Competitor C	OG system
Feature	CO ₂ is absorbed and removed by the adsorbent. Suitable for small to medium systems	Separation based on the difference in the transmission speed of the polymer membrane between CH ₄ and CO ₂ . Suitable for small systems	High pressure water absorbs CO ₂ and removes it. Suitable for large-scale systems	Combination of PSA and membrane. Concentration to high purity and high CH ₄ recovery rate
The number of introductions	More than 50 in worldwide	10 mainly in Europe	More than 50 in worldwide	Under preparation
Rate of CH ₄ collection	93%	99%	98%	99%
Price [JPY/Nm ³]	11.9	21.4	9.7	9.0

Source: Osaka gas presentation material

Due to the influence of COVID-19, there was no significant progress in considering the commercialization of the OG system in this year. The biomass business has large share in Thailand, it is expected that discussion of JCM model project on this scheme will be commenced after COVID-19.

4.4 Implementation of Study on Decarbonization Technologies and Market Trends Related to Energy Conservation and Renewable Energy as a Reference for The Formation of JCM Projects

4.4.1 Study Outlines

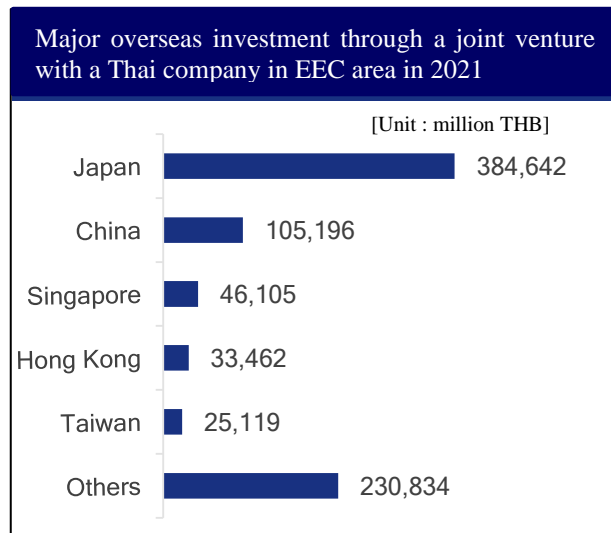
Mizuho Bank, which is familiar with market trends in Thailand, is participating in the Project. This study is not a JCM project formation activity, however, is a survey of market trends that can be used as a reference for further project formation in Thailand and the EEC.

Some of the findings of the company's research into decarbonisation technologies and market trends related to energy conservation and renewable energy are described below.

4.4.2 Study Results

Investment in the EEC area continues even during the economic stagnation of COVID-19, and Japan is the largest investor in the joint venture with Thai companies as shown in Figure 4.10. Therefore, it can be said that Japan is a good business partner in Thailand.

Although the breakdown of investment from Japan has not been confirmed, the real estate industry, construction industry, and transportation industry are the top three fields in the new company registration at EEC in 2021. From this point, it can be confirmed that infrastructure development in the EEC has been promoted.

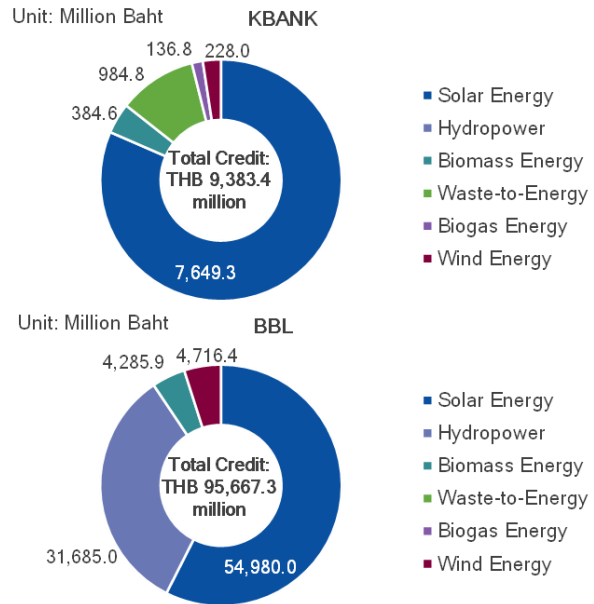


Source: Prepared by Mizuho Bank

Figure 4.10 Overseas Investment with Thai Company in EEC

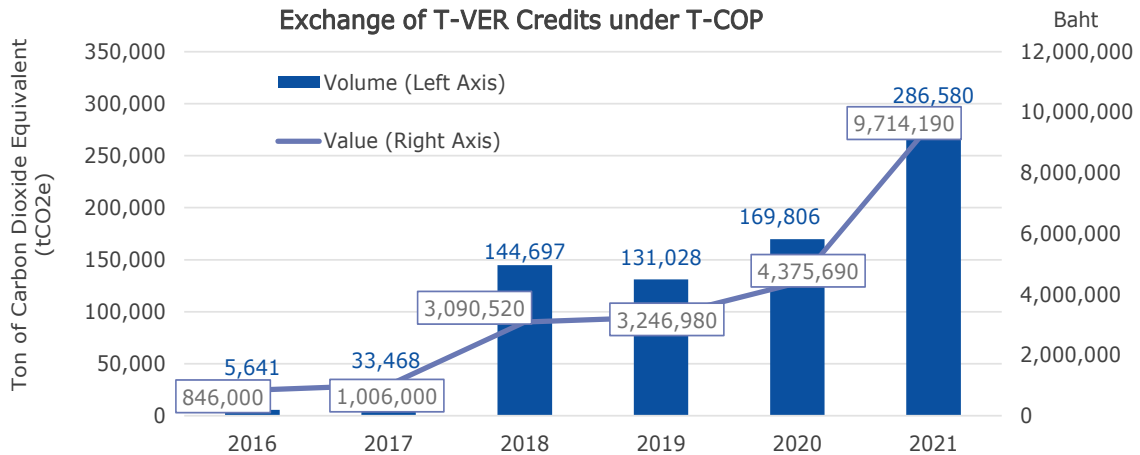
Sustainable (green) loans by Thai domestic banks that promote energy efficiency and renewable energy businesses are broadly divided into (1) loans for renewable energy projects and (2) loans for energy and environmental conservation.

As shown in Figure 4.11, more than half of the sustainable loans by Kasikorn Bank (KBANK: about 33 billion yen) and Bangkok Bank (BBL: about 336.7 billion yen), which are domestic banks in Thailand, solar power generation, hydropower generation, biomass power generation, and waste power generation are the majority of project in 2020. On the other hand, Bank of Ayutthaya (BAY) is different from the two banks on the right because hydropower generation accounts for more than half.



Source: Prepared by Mizuho Bank
Figure 4.11 Achievements of Loan by Thai Domestic Banks

In Thailand, a voluntary carbon market (Thailand Voluntary Emission Reduction: T-VER) has been operated by the Thai Greenhouse Gas Organization (TGO) since 2014. In T-VER scheme, GHG emissions reduced by individuals or organizations can be bought and sold under the Thailand Carbon Offsetting Program (T-COP) as T-VER credits. Transaction Trend of T-VER is shown in Figure 4.12.



Source: Prepared by Mizuho Bank

Figure 4.12 Transaction Trend of T-VER

The trading volume of T-VER was not large until around 2017, but in recent years, the volume has increased sharply, due to the growing interest in decarbonization.

In addition, as shown in Table 4.2, the large number of transactions of biomass indicates that the potential of the biomass business in Thailand is very high.

Table 4.2 T-VER Transaction by Sector, as of December 2021

Sector	Transaction [tCO₂]	Average price [THB/tCO₂]
Biomass	696,977	22.00
Hydropower	45,489	87.00
Bio energy	7,804	157.00
Composting	4,773	201.00

Source: Prepared by Mizuho Bank

As for the T-VER scheme, TGO and the Federation of Thai Industries (FTI) have jointly developed the Thailand Carbon Credit Exchange Platform as the main carbon credit trading center in Thailand and have been preparing for operation from year 2022. With this platform, it is possible to connect buyers and sellers electronically instead of buying and selling at stores.

According to the annual report 2020 by TGO, it is estimated that the demand for T-VER credits generated by 81 companies who has high GHG emissions is equivalent to 162,793,317 [tCO₂] per year.

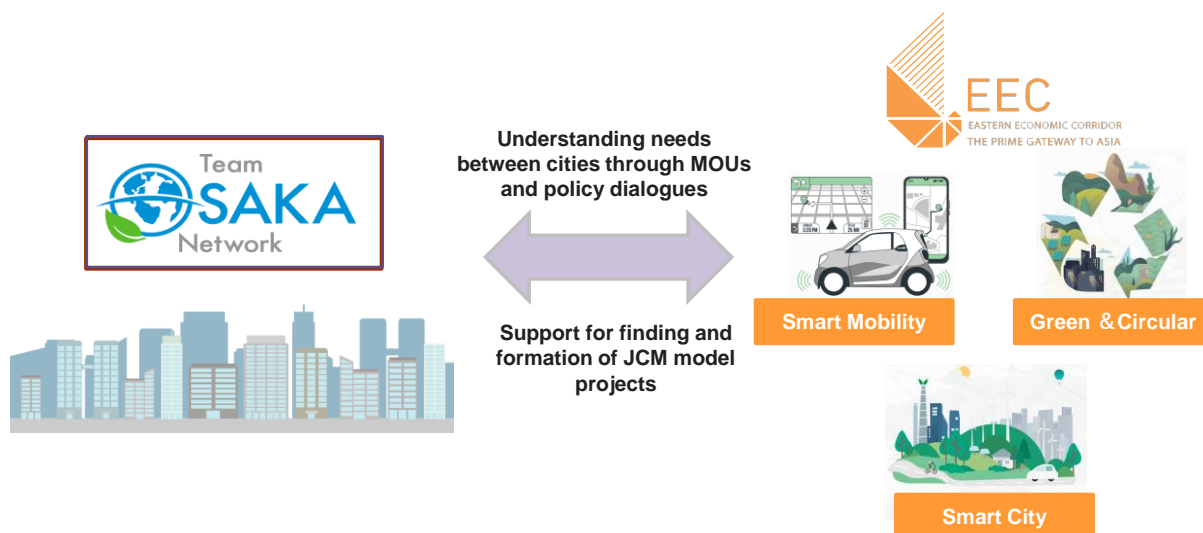
Finally, as a system in Thailand that promotes decarbonization, there is a "Go-Green" system by the Thai Board of Investment (BOI) that supports projects in line with the Bio-Circular-Green (BCG) economic model. Under the Go Green system, there are 55 types of businesses that are eligible for investment incentives.

For instance, recycling business, the renewable energy business, the medical food manufacturing business, and the chemicals manufacturing business using environmentally friendly materials etc. are the candidate projects for Go Green system. Incentives for the system include a 50% reduction in corporate income tax for three years and an exemption from machine import tax etc.

4.5 Survey of Decarbonization Technologies and Market Trends for Energy Efficiency and Renewable Energy

In the Project, JCM model project formulation has been promoted mainly based on the consultation with Japanese company (JCM seeds). Although there were some impacts of COVID-19 in this project this year, sufficient exchanges between two cities have been done.

Based on the conclusion of the MOU and the information of business matching in March 2022, the Project will proceed with discussions among EEC and Osaka City with clear understanding the needs for City-to-City collaboration as shown in Figure 4.3. In particular, it plans to actively identify Japanese technologies and products that contribute to smart mobility, green & circular goals, and smart cities, which the EEC is focusing on as a shift to a decarbonization society, and introduce them to the EEC side.



Source: Nippon Koei

Figure 4.13 Grasp of EEC Needs with Osaka's Initiative

For areas shown in the above figure, it will seek the involvement of Japanese companies which the EEC is paying attention to as a priority area for decarbonization. In accord with the field EEC focus on, the project ideas mainly implemented with Osaka City are as follows.

[Idea 1: Smart mobility]

Commercialization support for EVs and charging stations

Providing technology related to E-bikes / E-bike taxis

[Idea 2: Green (G) & Circulation (C)]

Introduction of Japanese technology and products related to the construction and renewal of G & C factories

Cooperation with GHG mitigation information platform

[Idea 3: Smart city]

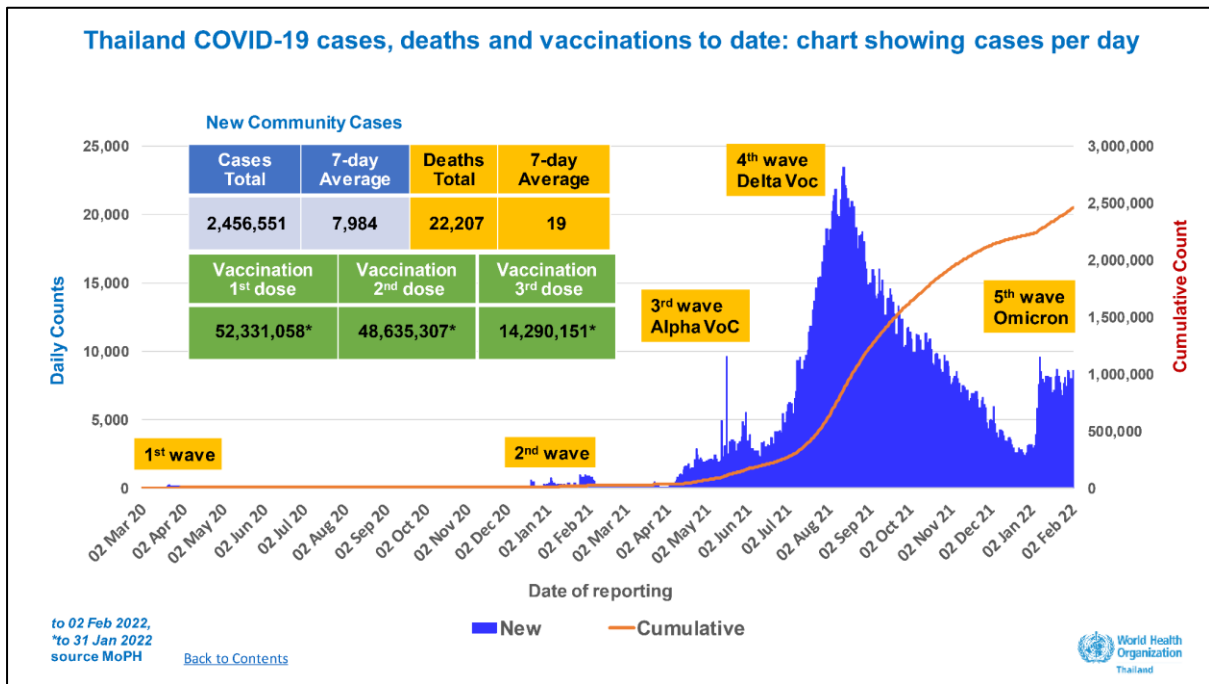
Participation in smart city projects in Wangchan valley, etc.

CHAPTER 5 ISSUES AND COUNTERMEASURES ON COVID-19

5.1 Current State of COVID-19 in Thailand

A Public Health Emergency of International Concern (hereinafter called “PHEIC”) was declared by WHO on 30 January 2020 for the outbreak of new coronavirus infection (COVID-19), which quickly spread worldwide. Travel restrictions were implemented in many countries as a countermeasure against the infection, which also caused a socio-economic crisis. As of January 2022, the WHO announced that PHEIC was still ongoing and the infection situation has not been resolved, however there are various opinions on the effectiveness of travel restrictions in preventing infection, and there are moves worldwide to relax or remove travel restrictions.

Figure 5.1 shows the status of COVID-19 in Thailand as of February 2022. The spread of infection peaked around August 2021, after that the number of infected people began to decline, however as of 2022 February, the fifth wave is being observed. Measures have been taken in response to the infection situation, such as the implementation of lockdowns and teleworking requests, and quarantine exemptions is also started for vaccinated passengers in November 2021.



Source: WHO

Figure 5.1 Current State of COVID-19 in Thailand as of February 2022

5.2 Issues

It was expected that travel restrictions would continue from the beginning of the Project in this year due to COVID-19 pandemic. Therefore, in principle, the Project has been formulated with a business plan to be mainly implemented online. Table 5.1 shows the main activities and the challenges of conducting them online.

Table 5.1 Main Activities Related to City-to-City Collaboration Project and Issues by Implementing Online Basis (1/2)

Activities	Issues	Details
Online workshop with EEC	How to follow up after the workshop.	Online workshop was held for the purpose of sharing the knowledge of Osaka City and the know-how of Japanese companies. And it was used for understanding the needs each other. If the event is held in Osaka or Thailand, it is possible to easily communicate at the level of the person in charge on the spot immediately after the event. And, person in charge is able to deepen mutual understanding through face-to-face follow-up, such as confirming information and exchanging new information. On the other hand, in an online event, since the connection is cut off after the event ends, there is a concern that such follow-up will be lacking and mutual understanding will not be promoted.
MOU signing ceremony between Osaka City and EEC	How to cultivate and sustain the motivation to conclude MOU in situations where the frequency of visits is limited	With travel restrictions, exchanges information/opinions between EEC and Osaka are limited. And there is no event held events that appeal to the public, such as courtesy visits and acceptance of training in Japan. Under the above circumstances, it is important for the two cities to decide on a policy of continuing the cooperative relationship, and how to cultivate and sustain the motivation until the conclusion of the MOU.
	How to make a good-looking MOU signing ceremony	The signing ceremony of the MOU is originally held face-to-face by the representatives of both cities. And it is an event to show off for the development of future cooperative relationships. It is however concern that it will lack glitz when implemented online.

Table 5.1 Main Activities Related to City-to-City Collaboration Project and Issues by Implementing Online Basis (2/2)

Activities	Issues	Details
Business matching	How to minimize anxiety/issue about project formulation due to travel restrictions.	In the current situation where there are travel restrictions, it does not solve anxiety about uncertainty of the future situation, speedy response and the inability to expect speedy response even if matching is done. In addition, face-to-face discussions are expected to create a sense of security and trust in knowing the other person directly.
Contact with Osaka City and EEC	How to contact and exchange opinions with Osaka City, EEC officials, and consultants in a timely manner	Due to the COVID-19, officials from both countries are increasingly introducing and working on telework. In such a situation, it is not easy to contact at an appropriate timing. And it is required to exchange opinions before the event.

Source: Nippon Koei

5.3 Countermeasures

Table 5.2 shows the countermeasures and results for the issues mentioned in 5.2.

Table 5.2 Ingenuity for Online Activities and Results of Implementation of The Projects (1/2)

Activities	Issues	Ideas	Results
Online workshop with EEC	How to follow up after the workshop.	In Japan it sets up a venue in Osaka City after taking measures against COVID-19 infectious so that participants could participate easily. Then, before and after the workshop, it takes into account that a person in charge to exchange information, check progress, and follow up easily.	At the venue on the Japanese side, after the workshop, it was able to effectively follow up, such as looking back on the workshop and mutual awareness of how to proceed in the future.
MOU signing ceremony between Osaka City and EEC	How to cultivate and sustain the motivation to conclude MOU in situations where the frequency of visits is limited	In order to facilitate smooth communication between EEC and Osaka, Japanese side try to keep in touch with the person in charge on the Thai side by e-mail and chat via SNS. In addition, it has established a contact system in a chat group that includes the person in charge of EEC and Osaka.	In the finalization of the MOU description, the persons in charge of EE and Osaka can flexibly respond to small spelling mistakes, confirmation of word nuances, etc. MOU could conclude within the fiscal year.

Table 5.2 Ingenuity for Online Activities and Results of Implementation of The Projects (2/2)

Activities	Issues	Ideas	Results
MOU signing ceremony between Osaka City and EEC	How to make a good-looking MOU signing ceremony	In Japanese side, a large monitor was installed at the venue, and the video screen of the EEC Secretary General was projected in a large size. At the time of greetings and signatures, monitors are placed so that the signers (Mayor of Osaka and EEC Secretary General) face each other to create a sense of reality. At the time of taking a commemorative photo after the signature, not only the screenshot but also the mayor of Osaka stood next to the monitor and took a commemorative photo so that the two people would stand side by side. In addition, a common virtual background was distributed to the participants to enhance the sense of unity at the venue.	It is possible to record photos of the Osaka mayor and EEC secretary general facing each other and holding MOUs side by side. In the screenshots, many participants recorded the screen using the same virtual background. It was able to leave a good-looking photo as a public relations material.
Business matching	How to minimize anxiety/issue about project formulation due to travel restrictions.	It narrowed down the fields of high interest in the EEC and selected Japanese companies representing those fields by consultant. By having Thai policy makers announce their needs, it sent out useful information to Japanese companies. Specifically, announcements from DEPA and NSTDA.	For private companies, obtaining information of interest from government officials is a good opportunity for their future business plans. In this regard, it was able to disseminate some information to member companies in this year. In the future, the Project would like to focus on supporting the realization of this information.
Contact with Osaka City and EEC	How to contact and exchange opinions with Osaka City, EEC officials, and consultants in a timely manner	In addition to online conference tools such as E-mail, Teams, and Zoom, daily communication and exchange opinions were carried out through LINE. It takes easy into account to contact, exchange of opinions and confirmation of information.	It was able to shorten the time for discussion and preparation in addition to increasing the intimacy among Japanese and Thai officials. In the future, the Project would like to maintain exchanges that respect each other's goals and intentions.

Source : Nippon Koei

CHAPTER 6 FUTURE ACTIONS

Based on the results of the JCM project formation and City-to-City collaboration preparation in this year (FY2021), the future plans for the next year and thereafter are described below.

6.1 Image of Future City-to-City Collaboration

City-to-City collaboration between EEC and Osaka City Government is expected to continue activities for at least three years from the next fiscal year.

Under the memorandum of understanding (MOU) between the two cities signed on February 24, 2022, it is expected that EEC and Osaka City will implement a number of new initiatives through further exchanges and the participation of Japanese and Thai private companies. It also plans to conduct policy dialogues between the two cities for continue to exchange opinions.

EEC, which is the driving force of economic growth in Thailand, continues to take on new challenges and is currently focusing on the realization of the BCG economy⁵. On the other hand, Osaka City, which is one of the advanced environmental cities in Japan, continue to provide the knowledge and achievements of the city to the EEC. And Osaka City expects that Japanese companies will advance into the EEC through Team OSAKA network etc.

Based on the above, the concept of the City-to-City collaboration for the next three years is shown below.

<p>[Concept]</p>

<p>City-co-city collaboration project for the realization of BCG economy (tentative)</p>

In addition, to actively promoting the above concept, it is expected that the existing cooperation between EEC and Osaka City will continue to be developed.

Specifically, it is an active collaboration with three provinces belonging to the EEC of Chonburi, Chachoengsao and Rayong. Hence, the Thai version of decarbonized domino effect is expected to be shared the concept and implemented if required. In addition to that, it plans to actively exchange information and opinions regarding the fact that various ongoing efforts related to decarbonization are being organized in Thailand.

⁵ BCG economy is Thailand economic policy/strategy with an eye on after-corona, which has been set up since January 2021. B stands for biology; C stands for circular and G stands for green.

6.2 Plan for City-to-City Collaboration in the Next Year

Based on the image of the Project from the next year onward in the previous section, the activities planned of City-to-City collaboration and JCM project formulation for the next three years and next year are shown in Table 6.1.

Table 6.1 Plan of Activities in the Next Year

Activity and Policy	Reasons of activity etc.
<p>City-to-City Collaboration</p> <p>Implementation of information/opinions exchange for the realization of the BCG economy utilizing the knowledge and achievements of Osaka City</p>	<p>Memorandum of Understanding (MOU) signed between EEC and Osaka City clearly states the following cooperation. To materialize them, knowledge and achievements of Osaka City are essential.</p> <ul style="list-style-type: none"> a) Sharing knowledge of standard and systems supporting the Carbon Neutrality policies of EEC b) Creating new projects toward the realization of a Carbon Neutrality c) Sharing information and promoting projects related to green and circular economy d) Promoting other projects related to environmental conservation e) To continuously hold a high-level policy dialogue once a year toward the realization of Thailand 4.0 development on Carbon Neutrality <p>Since EEC is not a local government, it is expected to deepen cooperation with the three provinces such as Chonburi, Chachoengsao and Rayong, belonging to the EEC as one approach to embody the knowledge and achievements of Osaka City. And it is expected to implement in case of necessary.</p>
<p>JCM Project Formulation</p> <p>Formulation of BCG projects based on EEC needs</p>	<p>In the past three years of City-to-City collaboration, it has been promoting the formulation of JCM projects centred on JCM seeds from Japanese private companies (overseas business development ideas from Japanese companies). Therefore, the response to the market potential and needs of the EEC was insufficient. Based on this point, the Project will review the local needs again and formulate a JCM project neatly.</p> <p>As one of the measures to meet the needs, the Project will invite the participation of Team OSAKA network companies more than ever and introduce them to EEC to generate new economic exchanges. In particular, the Project aims to formulate JCM projects in the following fields that the EEC will focus on.</p> <p><u>Area 1: Smart mobility</u></p> <ul style="list-style-type: none"> - Commercialization support for EVs and charging stations - Providing technology related to E-bikes / E-bike taxis <p><u>Area 2: Green (G) & Circulation (C)</u></p> <ul style="list-style-type: none"> - Introduction of Japanese technology and products related to the construction and renewal of G & C factories - Cooperation with GHG mitigation information platform <p><u>Area 3: Smart city</u></p> <p>Participation in smart city projects in Wangchan valley, etc.</p>

Source: Nippon Koei