FY2022 Project for Ministry of the Environment Japan

FY2022
City-to-City Collaboration Programme for Zero-Carbon Society

Support for Designing Decarbonization Society with BCG Economy

Report

March 2023

Nippon Koei Co., Ltd.
Osaka City

FY2022

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

Support for Designing Decarbonization Society with BCG Economy

Report

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ABBREVIATIONS

AI	Artificial Intelligence
ASEAN	Association of Southeast Asian Nations
BCG	Bio, Circular, Green
BOI	The Board of Investment, Thailand
CO2	Carbon dioxide
COP	Conference of Parties
DX	Digital Transformation
EEC	Eastern Economic Corridor
EPC	Engineering, Procurement, and Construction
ESCO	Energy Service Company
EV	Electric Vehicle
GDP	Gross National Product
GEC	Global Environment Centre Foundation
GHG	Greenhouse Gas
GX	Green Transformation
IoT	Internet of Things
IURC	International Urban and Regional Cooperation
JCM	Joint Crediting Mechanism
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
MOU	Memorandum of Understanding
NSTDA	Thailand National Science and Technology Development Agency
OCCI	Osaka Chamber and Commerce and Industry
COVID-19	Coronavirus Disease of 2019
RDF	Refuse Derived Fuel
SDGs	Sustainable Development Goals
TCNN	Thai Carbon Neutral Network
TDEM	Toyota Daihatsu Engineering and Manufacturing CO., Ltd.
TGO	Thailand Greenhouse gas Organization
TOD	Transit-Oriented Development

CHAPTER 1 INTRODUCTION

1.1 Background

(1) Background of the Programme

The United Nations Framework Convention on Climate Change (hereinafter called The 26th session of the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC), held in November 2021, confirmed a new global goal of limiting the temperature increase to 1.5°C above pre-industrial levels. To achieve this goal, it is essential for each country to accelerate its efforts at various levels, such as state, city, and district levels. In Japan, the goal of a decarbonized society with zero greenhouse gas (GHG) emissions by 2050 has been declared, and the number of municipalities declaring virtually zero CO2 emissions has rapidly increased to more than 831 (as of January 31, 2023). Under the regional decarbonization roadmap formulated in June 2021, advanced measures are being created in each region, and efforts are being made to expand these measures throughout the country.

As described above, the role of cities and municipalities in considering and implementing specific regional climate change measures and projects is becoming increasingly important. To realize a decarbonized society in the whole world, it is necessary to accelerate the movement toward building a sustainable decarbonized society, especially in Asia, where economic growth is remarkable, and there is a growing international movement to support cities' efforts to decarbonize their cities, which are places of activity that support social and economic development.

In addition, under the current situation of the spread of COVID-19, cities are being forced to recalibrate and consider new measures to achieve sustainable development at the same time as dealing with challenges related to the spread of the virus.

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

(2) City-to-City Collaboration with EEC

The Kingdom of Thailand had a sense of crisis as a developing countries that had become middle-income countries through the utilization of natural resources and the attraction of foreign companies would find it difficult to transition to high-income country with growth rates slowed down if they neglected efforts to transform their industrial structure. 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 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

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.

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") model 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 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 Project 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 aims to contribute to the revitalization of the Osaka/Kansai economy and Japan's international role by utilizing the "Team OSAKA Network[2]" 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 have 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 City-to-City Collaboration after COVID-19

Until last fiscal year, most discussions, opinion exchanges, and various surveys in the City-to-City Collaboration Project were forced to be conducted online, due to the restrictions by the COVID-19, which has wreaked havoc on a global scale.

Since the spring of 2022, the impact of the COVID-19 pandemic has gradually calm down, and domestic and international travel has become possible. In response to this, the Project has made multiple visits to Thailand, including the site survey in August, to change from online meetings to face-to-face discussions, and to make various progress and gain new activity opportunities unique to site visits. As a result, the Project has created new City-to-City collaboration and confirm a new path for the future.

1.2 Objective

City-to-City Collaboration Programme for Zero-Carbon Society "Support for Designing Decarbonization Society with BCG Economy" (hereinafter called "the Project") is a study on the realization of a zero carbon society in the collaboration between EEC and Osaka City, with the following objectives:

(1) Strengthening the cooperation between Osaka City and EEC

(2) Formulating JCM model projects that contributes to zero carbon society in Thailand

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

1.3 Implementation Schedule

The Project was adopted in the first call for proposals of City-to-City collaboration projects and activities for FY 2022 began in June 2022.

The City-to-City collaboration Project between Osaka City and EEC started in 2019, and as the fourth year of the project, various activities were conducted to lead the development of a decarbonized society through the sharing know-how on environmental measures in Osaka City. The detailed schedule of the Project is shown in Figure 1.1

#	Activities	2022							2023		
		June	July	August	September	October	November	December	January	February	March
Formulation of JCM Model Projects											
1	Meetings with stakeholders			▼	▼	▼	▼	▼	▼	▼	
2	Field survey		◄	———	———	———	———	———	———	►	
3	Examination and selection of the candidate sites		◄	———	———	———	———	———	———	►	
4	Detailed confirmation of existing equipment					◄	———	———	►		
5	Measures of GHG emission reductions and evaluation of business feasibility					◄	———	———	►		
6	Formulation of international consortium					◄	———	———	►		
7	Discussion and preparation of documents for application					◄	———	———	►		
8	Identification of potentioal JCM model projects for the next year		◄	———	———	———	———	———	———	►	
City-to-City Collaboration Activities											
A	Policy Dialogue based on the MOU										
	Implementation of pre-meeting and follow-up		◄	———	———	►	◄	———	———	►	
	Implementation of Policy Dialogue							▼			
B	Sharing know-how related to environmental policies and digital fields										
	Implementation of Workshop							▼			
C	Expanding of the decarbonized dominos in Thailand										
	Discussion with officials from 3 provinces in EEC region				◄	———	———	———	———	►	
	Sharing know-how by Osaka City			◄	———	———	———	———	———	►	
D	Strengthening cooperation with Japanese and Thai organizations to build a zero-carbon society										
	Meeting with related organizations for cooperation		◄	———	———	———	———	———	———	►	
E	Contribution to the green recovery by supporting for the achieving SDGs goals activities										
	Confirmation of EEC needs, study of recovery menu		◄	———	►						
	Response to green recovery				◄	———	———	———	———	►	
Field Servey, Meetings, Report etc.											
I	Meeting between Osaka City and EEC	▼	▼	▼ 1st Field Survey	▼	▼ 2nd Field Survey	▼	▼ 3rd Field Survey	▼	▼	
II	Presentations at seminar designated by the MOEJ										▼
III	Report to the MOEJ at kick-off, interim and final meeting				▼				▼	▼	
IV	Submission of final report										▼

Source: Nippon Koei

Figure 1.1 Implementation Schedule

CHAPTER 2 OVERVIEW OF THE PARTICIPATING CITIES

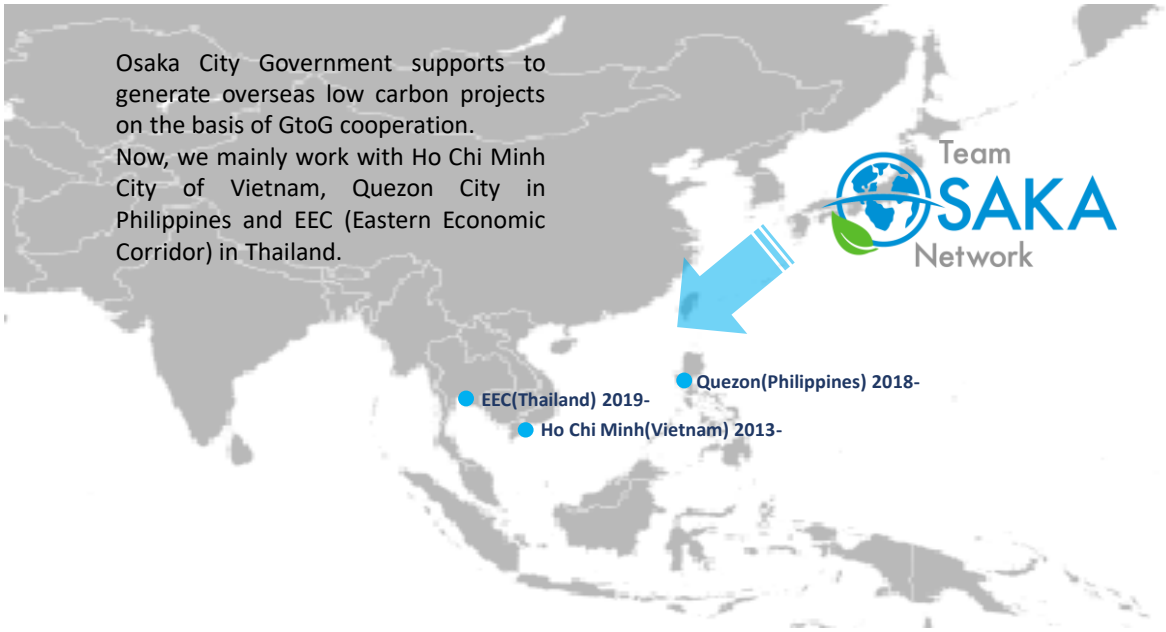
2.1 Osaka City

2.1.1 International Environmental Cooperation by Osaka City

In the environmental field, Osaka City conducts City-to-City collaboration projects with Ho Chi Minh City, Vietnam and Quezon City, Philippines as shown in Figure 2.1.

The Environment Bureau of Osaka City, the main department for the Project, aims to contribute to solving environmental problems in developing countries by sharing know-how on various experiences and measures in Osaka City and promoting decarbonization technologies in cooperation with member companies of the "Team OSAKA Network", a public-private partnership platform, to formulate environmental projects including JCM Model Projects. In addition, Osaka City is strengthening its international collaboration to achieve a decarbonized society by signing a memorandum of understanding on environmental cooperation with the state of Maharashtra, India, in 2020, and by launching a partnership with Greater Manchester, UK, in 2021 in the framework of the European Union International Urban and Regional Cooperation (IURC) program.

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 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 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 December 2021, 155 companies, which have energy-saving and renewable energy technologies etc., 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 leading role in Japan in the field of international environment, which also meets the purpose of the City-to-City Collaboration.

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)

The Mayor of Osaka City, Mr. Matsui announced to aim of realizing Zero-Carbon City by 2050 in the Osaka City Council on 27 November 2020, and reported it to the Ministry of the Environment, Japan (MOEJ) on 9 December 2020. Also, the implementation of measures to achieve the goal of FY2030 and 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. This action plan was being revised in October 2022, taking into account the acceleration of efforts to achieve carbon neutrality in Japan and the world.

“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 Revised Action Plan

To reduce 50% of GHG emission reductions 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.

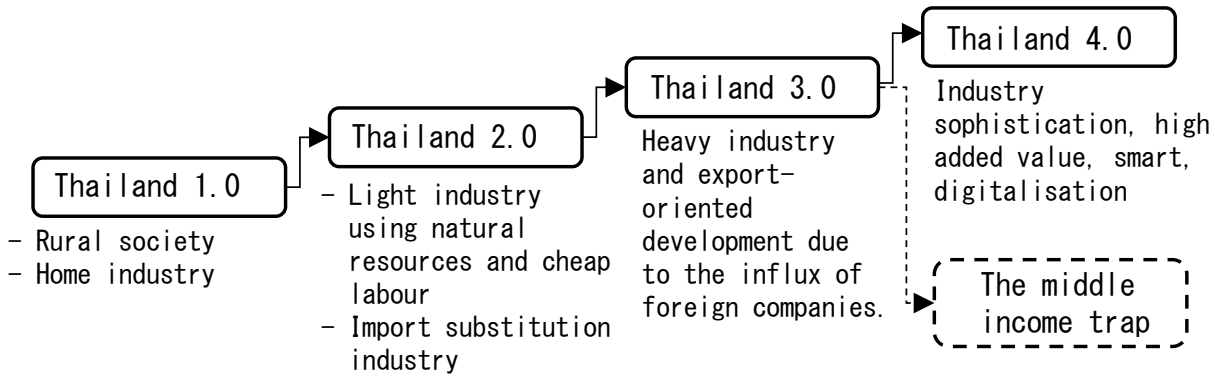
<2> Achieve and maintain 100% of the national environmental standard for water quality in rivers and seas, and improve citizen satisfaction with water environment to 40%.

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 country trap,” which is to be unable to become a developed country, and to 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 2.2. 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.

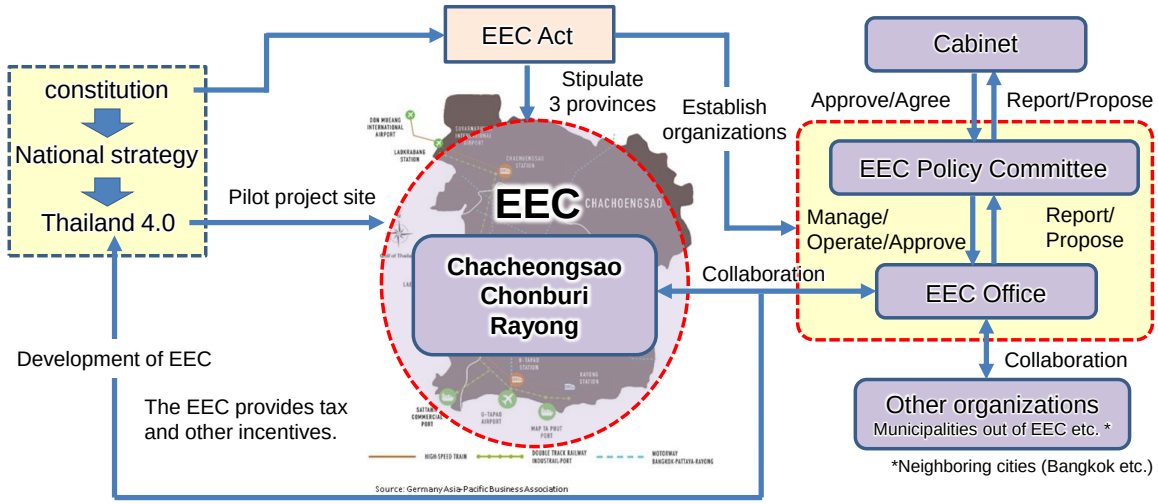


Source: Nippon Koei

Figure 2.2 Image of Thailand 4.0

The three provinces of Chachoengsao, Chonburi and Rayong were positioned as EEC 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.

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 (2018), 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 2.3.



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

Figure 2.3 Overview of EEC

The EEC office has three main missions;

1) Sustainable area-based development

2) Comprehensive infrastructure and connectivity

3) Promoting advanced technology and innovation

Also, EEC has investment targets of 50 billion USD for Phase 1（2018-2022）and 65 billion for Phase 2 (2022-2026). As shown in Figure 2.4, infrastructure such as railways, airports, ports, and highways have been developed, and the petrochemical industry and automobile manufacturing industry are 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 2.4 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	2026	State Railway of Thailand
U-Tapao International Airport	Increase annual passenger capacity from 3.7 million to 60 million.	9.4 billion USD	2025	Royal Thai Navy
Map Ta Phut Industrial Port Phase 3	Expand the capacity of the shipment hub in Southeast Asia up to 19 million tons per year.	1.7 billion USD	2026	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

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

2.2.2 Targeted Industries in EEC

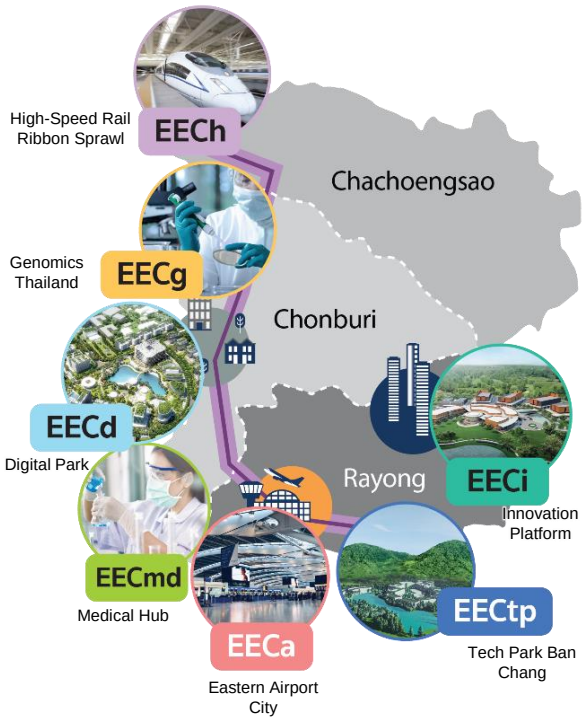
The EEC Policy Committee has designated 12 sectors of targeted industries (Table 2.2), as well as Promoted zones for specific industries (Figure 2.5). For (1) promoted zones for specific industries (excluding EECh and EECtp), (2) promoted zones for targeted industries and (3) other industrial estates 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	Items
1	Next-generation Automotive	Electric Vehicles (EV), Autonomous Vehicles (AV)
2	Intelligent Electronics	Smart Appliances, Micro Electronics Design, 5G Components Manufacturing
3	High-value and Medical Tourism	Medical and Wellness Tourism, Mice and Mega Event
4	Advanced Agriculture and Biotechnology	Bio-Refinery and Bio-Extraction, Genome Editing for Plants and Animals
5	Food for the Future	Nutrition and Supplements, Functional Food, Plant-based Food
6	Automation and Robotics	Industrial Robots, Service Robots
7	Medical and Comprehensive Healthcare	Next-generation Health Therapy, Precision Medicine and Biopharma, Regenerative Medicine and Advanced Cosmeceuticals
8	Aviation and Logistics	Smart Logistics
9	Biofuel and Biochemical	Specialty Materials (Bioplastic), Biochemical, Biofuel
10	Digital	Software and Platform, Artificial Intelligence, Big Data
11	Defense	Import Substitution, Maintenance, Disaster Management
12	Education and Human Resource Development	International Universities, certification Bodies for Professional Skills, EduTech

Source: Nippon Koei

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



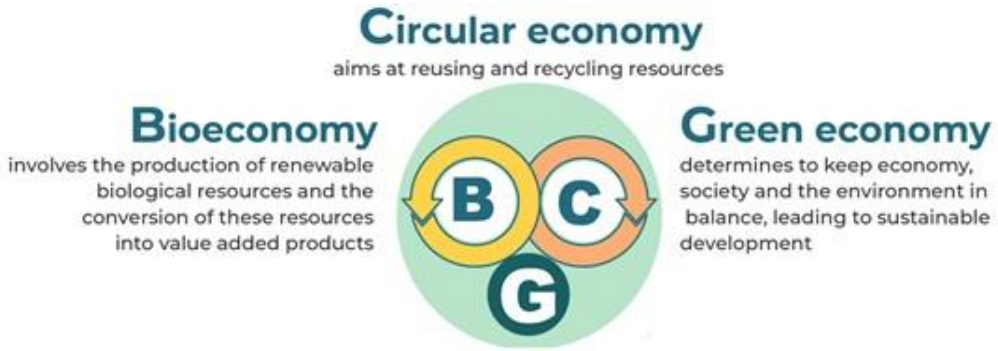
No.	Promoted Zones	Role	Location	Area	Overview
1	EECh	High-Speed Rail Ribbon Sprawl	Don Mueang, Suvarnabhumi, and U-Tapao Airport	220km	Develop Makkasan and Si Racha stations, a high-speed railway area between airports and the transit-oriented development (TOD) area.
2	EECg	Genomics Thailand	Burapha University, Chonburi	0.6ha	Establishment of a collaborative research network and a center for EEC genome testing using next-generation sequencers.
3	EECd	Digital Park	Si Racha District, Chonburi	132.8ha	Consist of the world-class data center, digital innovation testbed and IoT institutes which are fully equipped with high-tech facilities.
4	EECmd	Medical Hub	Bang Lamung District, Chonburi	93.6ha	Thailand's first medical hub offering comprehensive medical services and healthcare.
5	EECa	Eastern Airport City	U-Tapao International Airport, Rayong	1,040ha	Construction of a third terminal and the establishment of an aircraft maintenance center.
6	EECtp	Tech Park Ban Chang	Ban Chang, Rayong	83.4ha	Aiming to become a central center for advanced technological innovation in EEC.
7	EECi	Innovation Platform	Wangchan Valley, Rayong	552.6ha	Develop industrial cities for (1) advanced agriculture and food, (2) biofuels and bioscience, and (3) AI and automation/robotics.

Source: Prepared by Nippon Koei based on EEC Fact Sheet

Figure 2.5 Outline of Promoted Zones for Specific Industries

2.2.3 Realization of the BCG Economy Model in EEC

As green recovery from the economic damage caused by the COVID-19, Thailand has positioned the Bio-Circular-Green (BCG) economy model as the National Strategy in January 2021. The BCG economy model was proposed in 2019 and is being promoted as a new economic model for sustainable growth in Thailand. “Bio-economy” involves the production of renewable biological resources, “Circular-economy” aims at reusing and recycling resources, and “Green-economy” works to keep economy, society and the environment in balance, and leading to sustainable development. The image of BCG economy model is illustrated in Figure 2.6.



Source: NSTDA HP

Figure 2.6 Image of BCG Economy Model

EEC is positioned as a target area of the BCG economy model, with the goal of becoming a "Net Zero Carbon Emission area for Industrial Sector." In EEC’s implementation plan for 2021-2025, EEC has set a goal of reducing GHG emissions in the industrial sector by 10% compared to 2021 levels. Furthermore, the plan shown in Table 2.3 has been developed to realize the goal.

Table 2.3 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 “TGO”) · Starting operation by 2022

Source: Prepared by Nippon Koei based on presentation material of EEC in the workshop on 26 Dec. 2022

In this fiscal year, the City-to-City Project aims to promote efforts toward a decarbonized society by supporting the realization of the above BCG economy model in the EEC.

EEC Office

EEC Office

Transportation -Chao Phraya River-

Transportation -Bus-

Electric lines

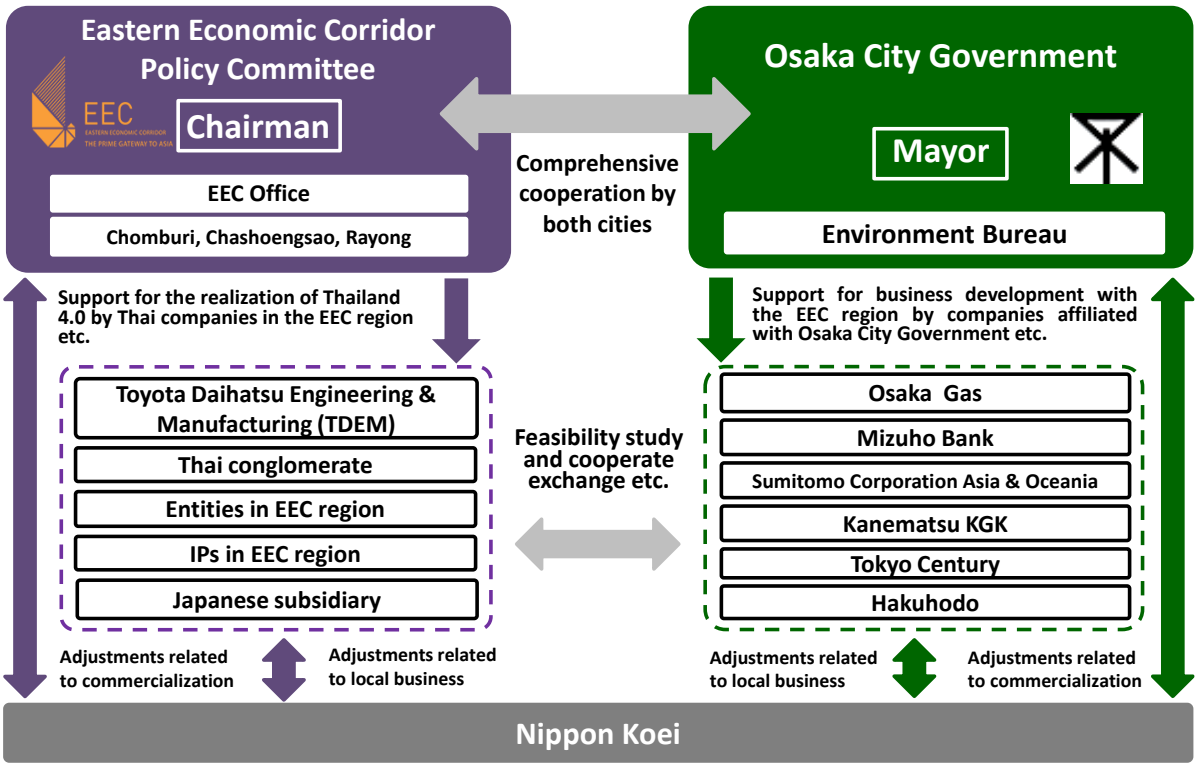
AMATA Industrial Park

Source: Taken by Nippon Koei

Figure 2.7 Photos of EEC region

2.3 Implementation Structure

Implementation structure for the City-to-City collaboration in FY2022 is shown in Figure 2.8. Osaka City and Japanese companies participated from Japanese side and EEC Office, and Japanese subsidiaries, etc. participated from Thai side. The project was implemented with close cooperation with members and held online meetings when necessary.



Source : Nippon Koei

Figure 2.8 Implementation Structure

Details of participating 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 and Latin America as shown in Figure 2.9. To conduct this project efficiently, activities in other City-to-City collaboration projects were referenced as necessary and to establish efficient project implementation protocol. The study was conducted with support of Bangkok office of Nippon Koei when necessary. In addition, workshop in Thailand could build stronger connection with the EEC.

Source: Nippon Koei

Figure 2.9 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 experience 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 2.4, Figure 2.8 and Table 2.5.

Table 2.4 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] 3,189 (including operating officers, directors and temporary employees, and excluding employees temporarily transferred to affiliated companies) [Consolidated] 20,961 (As of March 2022)
Capital	132,166 million JPY

Source: Osaka Gas website

Source: Osaka Gas

Figure 2.10 Osaka Gas's Business Structure in Southeast Asia

Table 2.5 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,
Establish	Lumpini, Pathumwan, Bangkok 10330 Thailand

Source: Osaka Gas Thailand website

(3) 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 in FY2021 and approaches to Japanese tenant companies aiming for carbon neutrality in the industrial park were considered in FY2022. The company profile is shown in Table 2.6.

Table 2.6 Company Profile of Sumitomo Corporation

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	5,257* (Consolidated Base: 75,487) * It includes 143 persons whom overseas branches and offices of the Company employ.
Capital	220.0 billion JPY

Source: Sumitomo website

(4) 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 2.7.

Table 2.7 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), 7,438 (consolidated) (As of 2020)
Capital	81,129 million JPY

Source: Tokyo Century website

(5) Hitachi Zosen Corporation

Hitachi Zosen Corporation (hereinafter called "Hitachi Zosen") has been developed decarbonization projects in Japan and overseas in the region of waste to energy, sewage/sludge treatment system. In recent years, the company conducted many projects in the Asian region, and maintains one of the largest number of plants in the world. In Thailand, they managed waste-to-energy plans in Rayong and Nong Khai provinces considering climate conditions. For further development in the future, this year feasibility study of waste to energy project was conducted. Company profiles are shown in Table 2.8.

Table 2.8 Company Profile of Hitachi Zosen

Company name	Hitachi Zosen Corporation
Head office	7-89, Nankokita 1-chome, Suminoe-ku, Osaka 559-8559, Japan
Established	May 29, 1934
Number of employees	11,540 (consolidated) (As of March 31, 2022)
Capital	45,442 million JPY

Source: Hitachi Zosen website

(6) SoftBank Corp.

SoftBank Corp. is a leading Japanese telecommunications company that develops Internet connection and mobile communication services. The company collaborates with Osaka city by the 5G XLAB, and develops IoT technologies. SoftBank Corp. is also actively participating in GX (Green Transformation), transforming its business model and creating new businesses to achieve economic growth and environmental protection. The company profile is shown in Table 2.9.

Table 2.9 Company Profile of SoftBank

Company name	SoftBank Corp.
Head office	1-7-1 Kaigan, Minato-ku, Tokyo 105-7529
Established	December 9, 1986
Number of employees	18,929 (non-consolidated) 49,581 (consolidated) (As of March 31, 2022)
Capital	204,309 million JPY

Source: SoftBank Corp. website

(7) Fuji Furukawa Engineering &Construction Co.Ltd.

Fuji Furukawa E&C Co.Ltd. (hereinafter called "FFEC") is a company that constructs electrical equipment and information and telecommunications equipment. FFEC has a wide range of experiences in Japan and internationally, especially energy plants and electrical construction projects in Southeast Asia. The company has developed a photovoltaic system in Thailand since 1969. Also, FFEC contributed construction of garbage incineration plants in Myanmar.Table 2.10 shows the company outline.

Table 2.10 Company Profile of Fuji Furukawa Engineering & Construction

Company name	Fuji Furukawa Engineering & Construction Co.Ltd.
Head office	580 Horikawa-cho, Saiwai-ku, Kawasaki, Kanagawa, Japan
Established	October 1, 1923
Number of employees	1,580 (consolidated) (As of September 30, 2022)
Capital	1.97 billion JPY

Source: Fuji Furukawa Engineering &Construction Co.Ltd. website

(8) 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 ASEAN region. The company profile of TDEM is shown in Table 2.11.

Table 2.11 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 (EV) and procuring zero-emission fuel in the EEC.

Toyota Motor Corporation has been implementing the "Toyota Environmental Challenge 2050" (Figure 2.11) 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 2.11 Toyota Environmental Challenge 2050

This year, exchanging information about popularization of EVs planned by TDEM in Pattaya City was conducted.

(9) THS Innovations Co., Ltd

THS Innovations Co.,Ld consists of a joint venture of Mitsubishi Corporation, TEO HONG SILOM CO., LTD., and Sohgo Security Services Co., Ltd (ALSOK). The company conducts construction of chillers (cooling water circulators), ESCO business by reducing electricity of compressors or CO2 emissions in office buildings, as well as sales of IoT-related equipment and facility management business. Table 2.12 shows a corporate profile of THS Innovations.

Table 2.12 Company Profile of THS Innovations

Company name	THS Innovations Co., Ltd.
Head office	Bangna Towers B, 17th Floor, 2/3 Moo 14,Bangna-Trad Rd. KM. 6.5, Bangkaew, Bangplee, Samutprakarn 10540 Thailand
Established	2001
Number of employees	-
Capital	-
Investment ratio	Mitsubishi Corporation and Sohgo Security Services Co., Ltd.:60% THS：40%

Source: EO HONG SILOM GROUP website

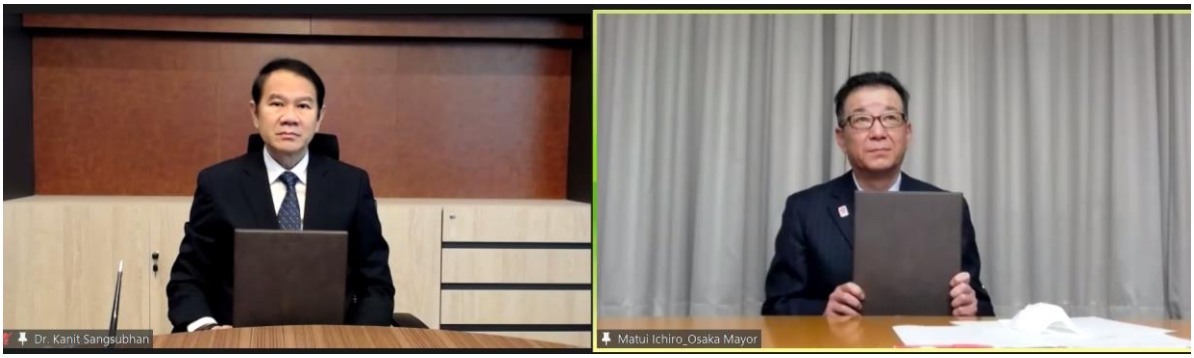
CHAPTER 3 CITY-TO-CITY COLLABORATION

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

3.1 Signing MOU between Osaka City and EEC

Since October 2019, Osaka City and EEC started the City-to-City Collaboration Project for the formulation of a zero-carbon society towards the realisation of Thailand 4.0, and they have established an amicable and cooperative relationship by sharing knowledge, exchanging opinions and discussions through workshops and seminars etc. On February 24, 2022, the MOU was signed to strengthen cooperation between the two cities and to realize the decarbonization of EEC. 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 will 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.



Source : Taken by Nippon Koei

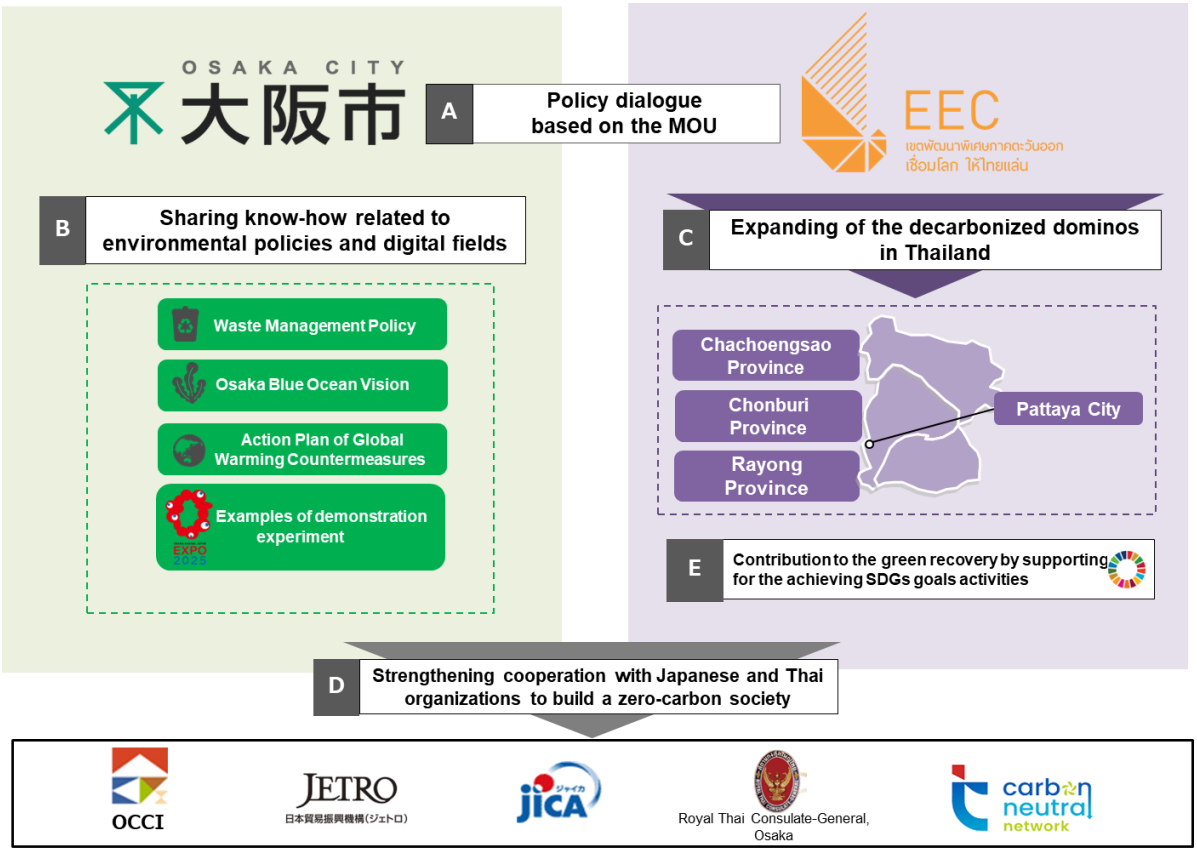
Figure 3.1 MOU Signing Ceremony (Online)

3.2 Implementation Menu and Results

Based on the previously mentioned MOU, Osaka City and EEC aim to support the implementation of the BCG economy model promoted by the Thai government to build a decarbonized society in EEC.

In this fiscal year, in addition to the collaboration with EEC, Osaka City expanded its cooperation with Pattaya City, a city in the EEC region, to implement the decarbonization dominos in Thailand. Also, to strengthen collaboration with other organizations, Osaka City and Nippon Koei started working with the Osaka Chamber of Commerce and Industry (OCCI) and the Thai Carbon Neutral Network (TCNN) to expand the City-to-City Collaboration activities.

The correlation of this year's 5 activities (A-E) is organized in Figure 3.2, and implementation menu and results are shown in Table 3.1.



Source : Prepared by Nippon Koei

Figure 3.2 City-to-City Collaboration menu in FY2022

Table 3.1 Activity Menu and Results for the City-to-City Collaboration FY2022

Menu A: Policy dialogue based on the MOU	Based on the MOU between Osaka City and EEC signed in February 2022, a policy dialogue between the two cities will be held to ensure cooperation toward the realization of a decarbonized society. This year, as the first dialogue after the MOU signing, Osaka City and EEC will deepen cooperation through officer-level and director-level dialogues.
Result	Osaka City visited EEC to exchange opinions at the officer-level in August 2022. In December 2022, a face-to-face policy dialogue at the director-level was held to share environmental policies and to discuss the promotion of investment in the EEC region. This was the first policy dialogue between Osaka City and EEC, and they agreed to continue cooperation in the decarbonization fields.
Menu B: Sharing know-how related to environmental policies and digital fields	Osaka City will share its environmental measures and achievements in the digital fields with EEC, which aims to realize the BCG economy model as a net-zero carbon emission region in the industrial sector.
Result	Osaka City Action Plan of Global Warming Countermeasures (Local Program) and other achievements were introduced at meetings in August 2022, policy dialogue, and workshop in December 2022 with EEC.
Menu C: Expanding of the decarbonized dominos in Thailand	"Decarbonized Dominos" that Japanese Government is promoting will be expanded in Thailand, aiming to expand the zero-carbon area from Osaka City to EEC Office and the three prefectures in EEC, and start collaboration with cities in EEC region.
Result	Among the cities in EEC region, Pattaya City, which has its own financial resources as a self-governing district along with the Bangkok Metropolitan Administration, was selected as a target and discussions were started in November 2022. Interviews were held on the environmental needs of the Pattaya City, and based on their needs, technologies from the Japanese private companies were introduced.
Menu D: Strengthening cooperation with Japanese and Thailand organizations to build a zero-carbon society	Collaboration with the Osaka Chamber of Commerce and Industry (OCCI) and the Thai Carbon Neutral Network (TCNN) will be considered to expand networking among the Osaka City, EEC, and the private companies.
Result	JCM seminar was held with OCCI for OCCI member companies in November 2022 to identify companies interested in forming JCM model projects in Thailand. In addition, meetings were conducted with JETRO Bangkok Office, JICA Thailand Office, and the Japanese Chamber of Commerce Bangkok to exchange views on future collaboration. Nippon Koei joined TCNN.
Menu E: Contribution to the green recovery by supporting for the achieving SDGs goals activities	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.

Source: Nippon Koei

3.2.1 Menu A: Policy Dialogue based on the MOU

On December 26, 2022, a face-to-face Policy Dialogue was held in Thailand with the aim of strengthening cooperation between Osaka City and EEC toward the realization of a decarbonized society. The Director General for Environment Bureau from Osaka City and the Special Advisor from EEC attended the dialogue and agreed to strengthen collaboration in the future.

As part of Osaka City's knowledge sharing, overview of the Osaka City Action Plan of Global Warming Countermeasures (Local Program), which was revised in October 2022, was introduced. Also, they exchanged opinions on collaboration between local governments and the private sector, etc., utilizing the JCM and tax benefits within the EEC region toward decarbonization.

Since EEC has asked Osaka City to introduce Osaka/Kansai small and medium-sized enterprises (SMEs) interested in investing in Thailand in the EV and hydrogen sectors, Osaka city will consider introducing companies and developing decarbonization projects through cooperation with the Team OSAKA Network and OCCI. Details of the policy dialogue are described in.3.3.3.

3.2.2 Menu B: Sharing Know-how related to the Environmental Policies and Digital Fields

EEC aims to become a "Net Zero Carbon Emission area for industrial Sector" through the implementation of the BCG economy model. In addition, the Eastern Economic Corridor of Innovation (EECi), located in Rayong Province within EEC region, is promoting innovation using the advanced technologies under the leadership of the National Science and Technology Development Agency (NSTDA). In response to these EEC needs, Osaka City shared the measures and initiatives formulated to achieve carbon neutrality by 2050. Specifically, during the field survey in Thailand in August 2022, and the policy dialogue and workshop in December 2022, the content of the Osaka City Action Plan of Global Warming Countermeasures (Local Program) and examples of public-private initiatives utilizing the Team OSAKA Network were introduced, and information was shared regarding the Expo 2050 Osaka, Kansai, Japan.

In addition, Osaka City visited EECi in December 2022 and heard an explanation of EEC's efforts regarding the bio-industry and smart economy. A summary of the visit is shown below.

Date and Time:	December 27, 2022 11:00 a.m. - 1:00 p.m.
Location:	EECi, Rayong Province
Participants:	Osaka City Environment Bureau: 2 people EECi: 2 people Nippon Koei: 1 person
Overview of EECi:	As a platform for promoting innovation, EECi supports the following priority industries. - BIOPOLIS: Innovative Agriculture, Chemical and Bioprocess Technology - ARIPOLIS: Automation, Robotics - FOOD INNOPOLIS: Food Automation - SPACE INNOPOLIS: Aviation, Aerospace

Source : EECi HP

Figure 3.3 Platform in EECi

EECi

EECi

EECi Visit

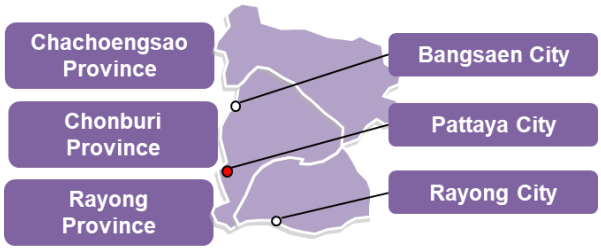
EECi Visit

Source : Taken by Nippon Koei

Figure 3.4 Photos of EECi Site Visits

3.2.3 Menu C: Expanding of the Decarbonization Dominos in Thailand

In Phase 1, the Project developed activities related to decarbonization with EEC Office. This year, the Project aims to expand the zero-carbon activities from Osaka City to EEC, and three prefectures in EEC region.



Source : Prepared by Nippon Koei

Figure 3.5 Location of Pattaya City

In considering target cities, face-to-face discussion was held with EEC Office in August 2022, and three cities (Pattaya City, Bangsaen City, and Rayong City) were selected as candidate cities (Figure 3.5). Comparing the candidate cities, Pattaya City, which has its financial resources as a self-governing district along with the Bangkok Metropolitan Administration, was selected, and face-to-face discussion with Pattaya City began in November 2022, accompanied by the EEC Officer. An overview of Pattaya City and the environmental needs identified through the interviews are shown in Table 3.2.

Table 3.2 Overview of Pattaya City

Area	53.4 ㎢
Population	119,500（2019)
Major Industry	Tourism
Location	Chonburi Province（165 km southeast of Bangkok）

Source : Prepared by Nippon Koei based on the Pattaya City HP

Pattaya City Hall

Meeting with Pattaya City

Source : Taken by Nippon Koei

Figure 3.6 Photos of Pattaya City

Table 3.3 Environmental Needs in Pattaya City

#	Item	Current Situation and Needs
1	Waste Management	・ A waste treatment plan is being developed at Lan Island off the coast of Pattaya City. Current processing capacity is 50 t/day and has not yet reached the waste power generation phase. ・ Pattaya City is aiming for 100% waste disposal rate in the city. Disposal of household food waste is an urgent issue, and there is a high level of interest in separating garbage.
2	Sewerage Management	・ Sewage management in the city is collected and treated in one location. In the future, Pattaya City will consider introducing efficient sewage treatment technology by introducing decentralized and space-saving treatment technology within the city. ・ Although storage tanks are installed in each building, Pattaya City does not monitor its operation, so the proper maintenance practices need to be monitored.
3	Rainwater and Brackish Water Management	・ There is frequent heavy rainfall, management techniques are needed to predict rainfall and drain it to the sea. ・ Though brackish water management has not been discussed so far, maintaining brackish water quality will be an issue and measures need to be considered in the future
4	River Management	・ Pattaya City would like to know about how to comprehensively manage the entire river by the city.
5	Land Management	・ A master plan for land use is being developed with EEC, so Pattaya City would like to know how to develop a master plan. ・ To realize a green economy, Pattaya City will aim to implement the plan in accordance with a master plan over one year.

Source : Prepared by Nippon Koei

It was confirmed that Pattaya City, one of the most popular tourist attraction areas in Thailand, has environmental needs, particularly waste management and water management. In response to these environmental needs, Osaka City's environmental policies and the related technologies of companies in Osaka City will be shared as next activities, with the aim of formulating a decarbonization project and realization of decarbonization dominos in Thailand.

3.2.4 Menu D: Strengthening Cooperation with Japanese and Thai Organizations to Build a Zero-carbon Society

During the three years of Phase 1, Osaka City and EEC strengthened their collaboration to build relationships between the two cities and to realize a decarbonized society. In this year, the first year of Phase 2, the Project has expanded its network with related organizations with the aim of forming decarbonization projects utilizing JCM model projects and other schemes. Table 3.4 shows the main target organizations and activities of collaboration in this year.

Table 3.4 Target Organizations and Activities for Collaboration

#	Organization Name	Activities
1	Osaka Chamber of Commerce and Industry（OCCI）	・ On November 21, 2022, OCCI hosted an online JCM seminar for OCCI member companies considering expand overseas of energy-saving and renewable energy technologies in the ASEAN region. There were about 100 participants, mainly from companies in Osaka and Kansai region. ・ Among the seminar participants, a list of environmental technologies of member companies interested in expanding into Thailand was compiled. As a next step, the Project plans to introduce their technologies to EEC to conduct business matching and provide support for the formation of JCM model projects.
2	Japanese Chamber of Commerce Bangkok	・ Exchanged opinions on the trends of Japanese companies in Thailand and future collaboration with Japanese Chamber of Commerce Bangkok.
3	JETRO Bangkok Office	・ Exchanged opinions on possible future collaboration and BOI's investment benefits with respect to the digital sector, which is a focus area of EEC.
4	JICA Thailand Office	・ Exchanged opinions on the energy efficiency needs and the Technical Cooperation projects in Thailand.
5	Thailand Carbon Neutral Network（TCNN）	・ Nippon Koei joined TCNN for the purpose of understanding credit trends and strengthening the network in Thailand. ・ Information was collected through participation in regular meetings and discussions with board members of TCNN.

Source : Prepared by Nippon Koei

3.2.5 Contribution to the Green Recovery by Supporting for the Achieving SDGs Goals Activities

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.

This year, since TSUMUGI@ 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 EEC and three provinces in EEC region from the next fiscal year. Also, the Project is planning to provide support for business emergence related to SDGs.

3.3 Menu E: Activities of the City-to-City Collaboration

To promote the City-to-City collaboration between Osaka City and EEC, various meetings and events with related organizations and companies have been arranged for providing opportunity to exchange opinions, share know-how. In addition, meetings were held with the Ministry of the Environment, Japan to report the progress and results of the activities.

Furthermore, presentations were made at seminars to inform about the City-to-City Collaboration Project and JCM model projects. The details of the City-to-City collaboration activities are shown in Table 3.5 and 3.3.1 to 3.3.6.

Table 3.5 Activities related to City-to-City Collaboration

Date	Event	Activities
16 - 27 Aug. 2022	1st Field Survey	Osaka City and Nippon Koei visited Thailand to hold discussions with EEC, partner companies, the Embassy of Japan in Thailand, JETRO Bangkok Office, JICA Thailand Office, Japanese Chamber of Commerce, Bangkok, Osaka Chamber of Commerce and Industry, and others.
21 Sep. 2022	Kick-off meeting with MOEJ	Reported the planning activities (Policy Dialogue, Workshop, JCM model projects formation etc.)
12 Oct. 2022	1st Regular Meeting	Shared the progress of this year's activities with Osaka City, EEC, and partner companies. Established the networking among partner companies by introducing their companies and activities.
30 Oct. - 5 Nov. 2022	2nd Field Survey	Nippon Koei visited EEC to discuss policy dialogue and workshop scheduled in December. Visited Pattaya City to begin discussions on future collaboration and discussed JCM model projects formation with participating companies. Started contacting new potential companies in Thailand.
21 Nov. 2022	JCM Seminar with OCCI	JCM seminar was held for member companies of OCCI to introduce overview of the City-to-City Collaboration Projects and JCM model Projects and adopted JCM projects. The presentation materials are listed in Attachment 1.
22 Nov. 2022	2nd Regular Meeting	Shared the progress of this year's activities and information on potential companies in Thailand for collaboration with Japanese companies which was identified in the survey.
30 Nov. 2022	Courtesy visit by EEC	EEC Special Advisor visited Japan for an investment event organized by the BOI and made courtesy visit on Osaka City and partner companies.
21 - 28 Dec. 2022	3rd Field Survey	Osaka City and Nippon Koei visited Thailand to conduct face-to-face policy dialogue and workshop (hybrid). Visited EECi, an innovation area in the EEC.
26 Dec. 2022	Policy Dialogue	Held Policy Dialogue between Osaka City and EEC at the director-level. The related documents are listed in Attachment 2.

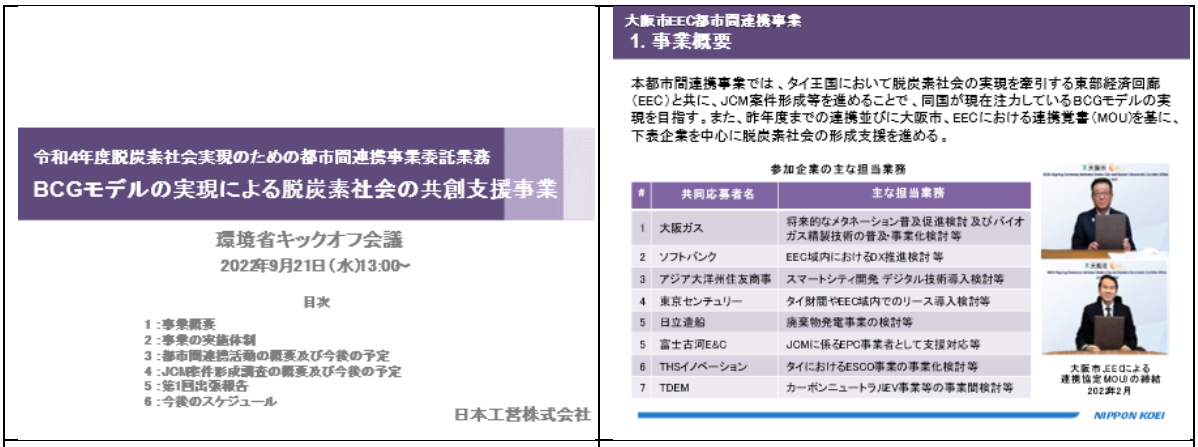
Date	Event	Activities
26 Dec. 2022	Technical Workshop	Held Technical Workshop (hybrid) in Thailand to introduce EEC and Osaka City's environmental initiatives, as well as Japanese companies' technologies (ESCO business using IoT and waste power generation) and Thai companies' needs. The presentation materials are listed in Attachment 3.
13 Jan. 2023	Progress report to MOEJ	Reported the progress of activities (Policy Dialogue, Workshop, JCM model projects formation etc.)
20 Feb. 2023	Final meeting with MOEJ	Reported the results of this year's activities and explained the planned activities for the next year.
1 Mar 2023	Zero Carbon City International Forum 2023	Submitted the presentation of the project at "Zero Carbon City International Forum 2023" organized by MOEJ. The presentation materials are listed in Attachment 4.

Source: Prepared by Nippon Koei

3.3.1 Kick-off Meeting with MOEJ

The main contents of the Kick-off meeting with MOEJ are discussed below and the presentation materials are shown in Figure 3.7.

Day/Time:	21 Sep. 2022 13:00-14:00
Venue:	Online meeting (Webex)
Participants:	Global Environment Bureau, MOEJ : 1 person Environment Bureau, Osaka City Government : 3 people 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 explained with Osaka City. In this year, the Project aims to realize a decarbonization domino in Thailand by sharing Osaka City's expertise on environmental policies at the face-to-face discussions and policy dialogues between Osaka City and EEC. Also, explained the results of the first field survey conducted in August. In response, MOEJ commented that travel had been restricted due to the COVID19, the resumption of travel is expected to accelerate the City-to-City collaboration activities and the formation of JCM model projects this year.



Presentation material-1 (excerpt)	Presentation material-2 (excerpt)

Source: Nippon Koei

Figure 3.7 Presentation Materials of Kick-off Meeting with MOEJ

3.3.2 JCM Seminar with OCCI

In this year, JCM has strengthened cooperation with the Osaka Chamber of Commerce and Industry (OCCI) and held an online JCM seminar hosted by the OCCI to identify companies in Osaka/Kansai region considering expanding overseas in the energy-saving and renewable energy technologies to the ASEAN region. As examples of adopted JCM model projects, Osaka Gas presented the project that is introducing energy-saving equipment to the factory in Thailand, and Aura Green Energy presented the project that is introducing renewable energy equipment in Indonesia. Approximately 100 people attended the seminar, which was the first step in collaborative activities utilizing the OCCI network. In the next year, depending on the interest of participating companies, the OCCI plans to consider introducing technologies in Vietnam and Thailand to support the formation of JCM model projects.

The main contents of the seminar and meeting materials are shown below.

Date and Time: 21 Nov. 2022 15:00-16:30

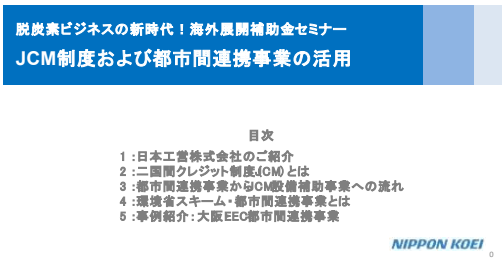
Venue: Online (Zoom)

Participant: Total: 100 people
Host : OCCI, Osaka City
Management: Nippon Koei

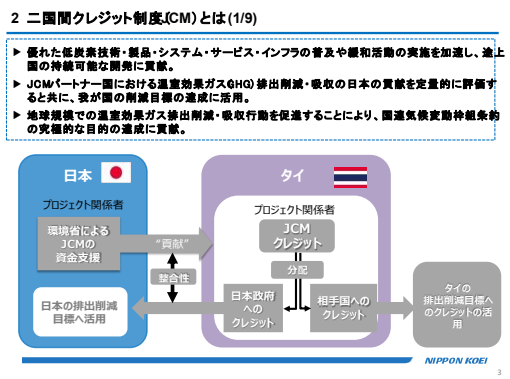
Purpose: To explain JCM model projects overview to OCCI member companies interested in expanding overseas in the energy-saving and renewable energy technologies to the ASEAN region

Program:

#	Agenda	Presenter
1	Opening Remarks	OCCI Osaka City
2	Introduction of JCM Model Projects	OCCI Nippon Koei
3	Introduction of implementing JCM Model Projects ① Energy-saving / Solar Power ② Renewable Energy	① Osaka Gas ② Aura Green Energy
4	Explaining next activities	OCCI
5	Questions and Answers	—



Presentation material-1 (excerpt)



Presentation material-2 (excerpt)

Source: Nippon Koei

Figure 3.8 Presentation Materials of JCM Seminar by OCCI

3.3.3 Policy Dialogue between Osaka City and EEC

Based on the MOU between Osaka City and EEC signed in February 2022, the first Policy Dialogue was held shown below.

Date and Time: 26 Dec.2022 9:30-11:00

Venue: EEC Office

Participant: EEC: 4 people
Osaka City: 2 people
Nippon Koei: 2 people

Purpose: To create a decarbonized society to realize Thailand 4.0 through dialogue between Osaka City and EEC

Program:

#	Agenda	Presenter
1	Introducing Attendees and Opening Remarks	EEC
2	Opening Remarks	Osaka City
3	Introduction of Revised Decarbonization Plan of Osaka City	Osaka City
4	Introduction of Activities in EEC	EEC
5	Photo Session	—

Outline: EEC Special Advisor stated that Japan's case studies in the areas of sustainability, renewable energy, and decarbonization are good example for EEC. He also expected that this collaboration will be a good investment opportunity for Japanese companies.
The Director General of the Environment Bureau of Osaka City expressed that this City-to-City collaboration project will deepen cooperation between companies in Osaka/Kansai region and EEC, which is promoting the BCG economy model.
Osaka City introduced its Action Plan of Global Warming Countermeasures (Local Program), and EEC asked questions, especially about examples of public-private partnerships utilizing JCM model Projects scheme. EEC introduced the BCG economy model and the incentives for promoting investment in EEC. EEC is promoting various activities in the areas of decarbonization, smart cities, and digital, and both cities agreed to further cooperation in several topics.

Policy Dialogue

Photo Session
Left: Mr. Sihasak, Special Advisor, EEC
Right：Mr. Horii, Director General, Osaka City

Source: Taken by Nippon Koei

Figure 3.9 Photos of Policy Dialogue

3.3.4 Technical Workshop

The Technical Workshop was held on the same day as the Policy Dialogue, both at the venue in Thailand and online. The main contents of the Technical Workshop are listed below.

Date and Time: 26 Dec. 2022 14:00-17:30

Venue:
- Sheraton Grande Sukhumvit, a Luxury Collection Hotel, Bangkok
- Online (Zoom)

Participant: Total: 90 people (Venue: 40 people, Online: 50 people)
- Thai side: EEC, NSTDA, TGO, Ministry of Energy, private companies in Thailand etc.
- Japanese side: Osaka City, MOEJ, Embassy of Japan in Thailand, Osaka Gas, Sumitomo Corporation, Hitach Zosen, Tokyo Century, Fuji Furukawa Engineering & Construction, Toyota Daihatsu Engineering & Manufacturing (TDEM), THS Innovations, GEC, Nippon Koei etc.

Note: NSTDA (Thailand National Science and Technology Development Agency), TGO (Thailand Greenhouse Gas Management Organization)

Purpose: To promote decarbonization and formulation of decarbonization projects through City-to-City Project

Program:

#	Agenda	Presenter
1	Opening Remarks	Osaka City, EEC
2	Photo Session	―
3	Introduction of City-to-City Collaboration Programme	MOEJ
4	Introduction of decarbonization activities in Osaka City	Osaka City
5	Introduction of JCM scheme	Nippon Koei
6	Introduction of decarbonization activities in EEC area	EEC
7	Introduction of decarbonization technologies and achievements by Japanese companies	Japanese companies - THS Innovations - Hitachi Zosen
8	Introduction of decarbonization business needs of Thai companies	Thai companies - SENA Development - Creagy
9	Closing remarks	MC (Nippon Koei)

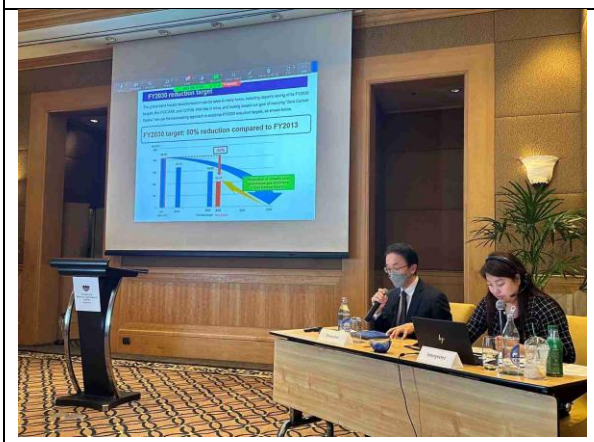
Outline: MOEJ introduced the City-to-City Collaboration Projects, and Osaka City and EEC explained their environmental initiatives. As an introduction of Japanese decarbonized technologies to the Thai companies and other related organizations, ESCO business by THS Innovations and waste to energy technologies by Hitachi Zosen were introduced. In addition, SENA Development, a major developer in Thailand, introduced its environmental initiatives and needs for collaboration with Japanese companies, and Creagy, a Thai consulting firm that supports EEC's policy making gave a detailed presentation on trends in decarbonization in Thailand.

#1_Opening Remarks by Osaka City

#1_Opening Remarks by EEC

#2_Photo Session (Presenter)

#3_Presentation by MOEJ



#4_Presentation by Osaka City

#5_Presentation by Nippon Koei

#6_Presentation by EEC

#7_Presentation by THS Innovations

#7_Presentation by Hitachi Zosen

#8_Presentation by SENA Development

#8_Presentation by Creagy

Source: Taken by Nippon Koei

Figure 3.10 Photos of Technical Workshop

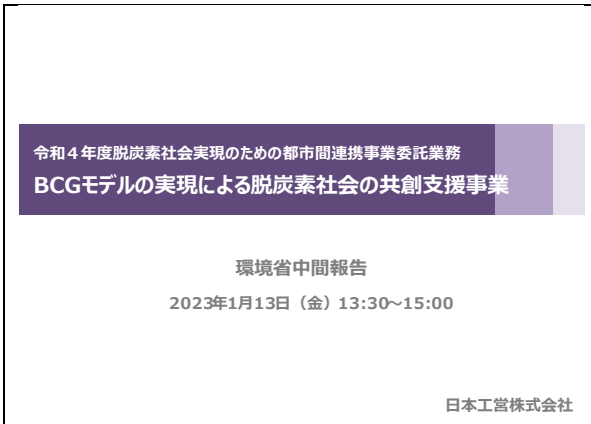
Several Thai companies interested in JCM model projects, which discovered in this year's survey, participated in the workshop, and showed interest in the JCM scheme and Japanese technology. As a next step, individual meeting regarding JCM Model Projects formulation will be held with those Thai companies. For the presentations by Thai companies, two Japanese companies showed a high interest in the presentations, so future collaboration will be considered.

In addition, government officials, companies participating in the city-to-city collaboration, the Thailand Embassy of Japan, and others participated at the local venue, could interact among the participants.

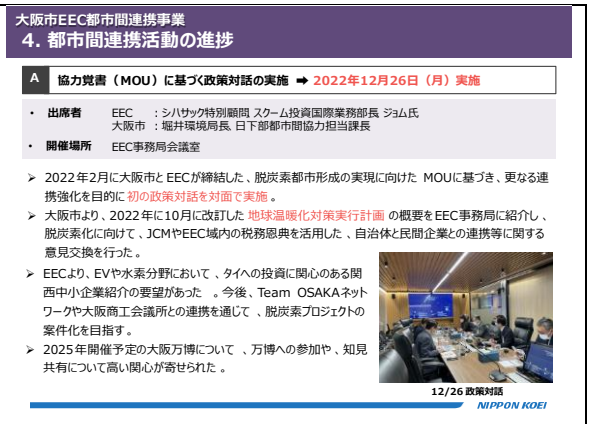
3.3.5 Progress Report to MOEJ

The main contents of the Progress report to MOEJ are discussed below and the presentation materials are shown in Figure 3.11.

Date and Time:	13 Jan. 2023 13:30-15:00
Venue:	Online meeting (Webex)
Participant:	Global Environment Bureau, MOEJ : 1 person Environment Bureau, Osaka City Government : 2 people Nippon Koei : 5 people
Purpose:	To report current progress of activities to MOEJ.
Outline:	The progress of the activities (field survey in Thailand, Policy Dialogue, and Technical Workshop) was reported to MOEJ. In response, MOEJ commented that it expects synergies between DX and the decarbonization sector, particularly in EEC. Decarbonization projects in the DX field will be considered by utilizing the advanced technology owned by Softbank, a partner company in this Project.



Presentation material-1 (excerpt)



Presentation material-2 (excerpt)

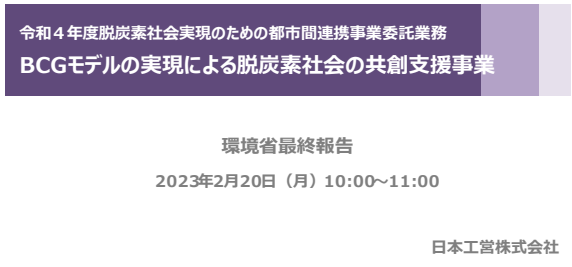
Source: Nippon Koei

Figure 3.11 Presentation Materials of Progress Report to MOEJ

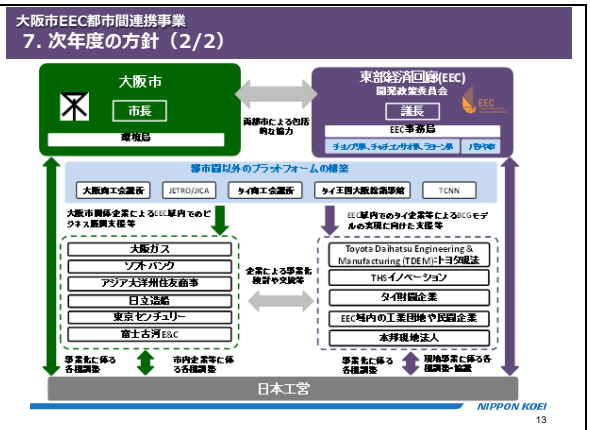
3.3.6 Final Report to MOEJ

The main contents of the final report to MOEJ are discussed below and the presentation materials are shown in Figure 3.12.

Date and Time:	20 Feb. 2023 10:00-11:00
Venue:	Online meeting (zoom)
Participant:	MOEJ : 7 people Environment Bureau, Osaka City Government : 4 people Nippon Koei : 5 people
Purpose:	To report the activities of this year and explain next year's plan to MOEJ.
Outline:	The activities of the City-to-City collaboration projects this year and plans for the following years were reported as follows. As one of the main outcomes of this year's activities, collaboration toward the realization of a decarbonized society has been strengthened through the Policy Dialogue and face-to-face discussions between Osaka City and EEC at the director and officer-level. Two Cities continue to promote collaboration toward decarbonization. Also, the Project has started collaboration with Pattaya City to expand decarbonization domino in Thailand, as well as with the OCCI, TCNN, and others to expand the network based on the collaboration between Osaka City and the EEC. MOEJ commented that it expects the Project to promote activities such as the introduction of JCM model projects combined with the low-interest loan in relation to megabank trends, and activities in the digital and smart city fields.



Presentation material-1 (excerpt)



Presentation material-2 (excerpt)

Source: Nippon Koei

Figure 3.12 Presentation Materials of Final Report to MOEJ

CHAPTER 4 STUDY FOR JCM MODEL PROJECTS FORMULATION

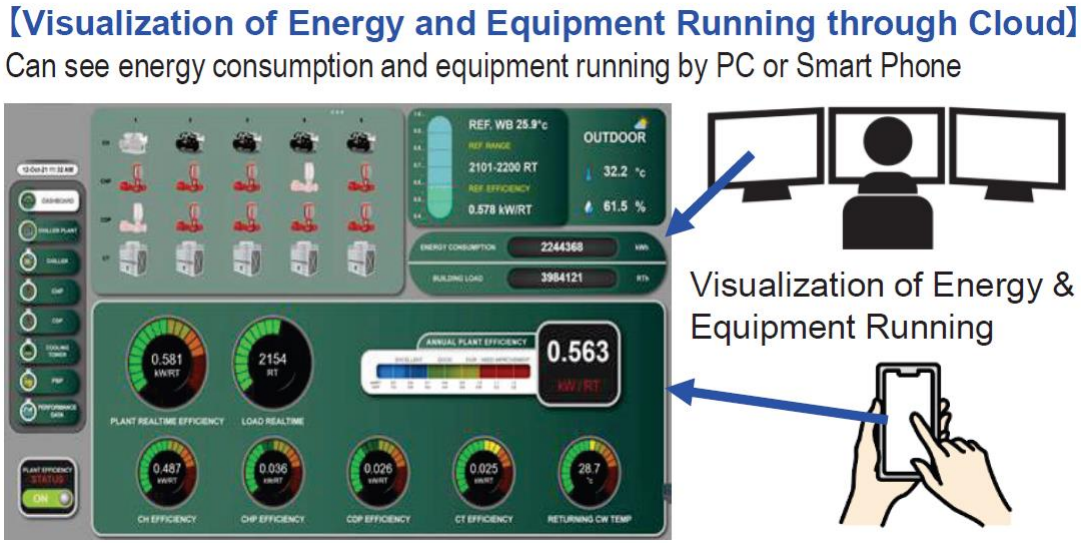
This City-to-City collaboration project consists of two pillars: (i) City-to-City collaboration which is exchange between local governments, and (ii) JCM model projects formation by private companies. This chapter shows the implementation status of JCM model projects formulation by Japanese private companies in this fiscal year.

This year was a year in which the economy recovered from the COVID-19 pandemic, so JCM model projects formation by Japanese companies was generally a slow start. On the other hand, Study Team received various inquiries from Thai companies and Japanese subsidiaries in Thailand due to the demand for new capital investment.

Based on the above, this chapter summarizes the new initiatives implemented as JCM model projects formulation survey this year.

4.1 JCM Model Projects Formulation on ESCO Project Utilizing IoT Technology

THS Innovations Co., Ltd. (THS Innovations) which is joint venture company of Mitsubishi Corporation and AlSOK, and has experiences of ESCO business in Thailand for more than 40 years. THS Innovations has been participating in this City-to-City collaboration projects since this fiscal year.



Source : Presentation material of THS Innovation

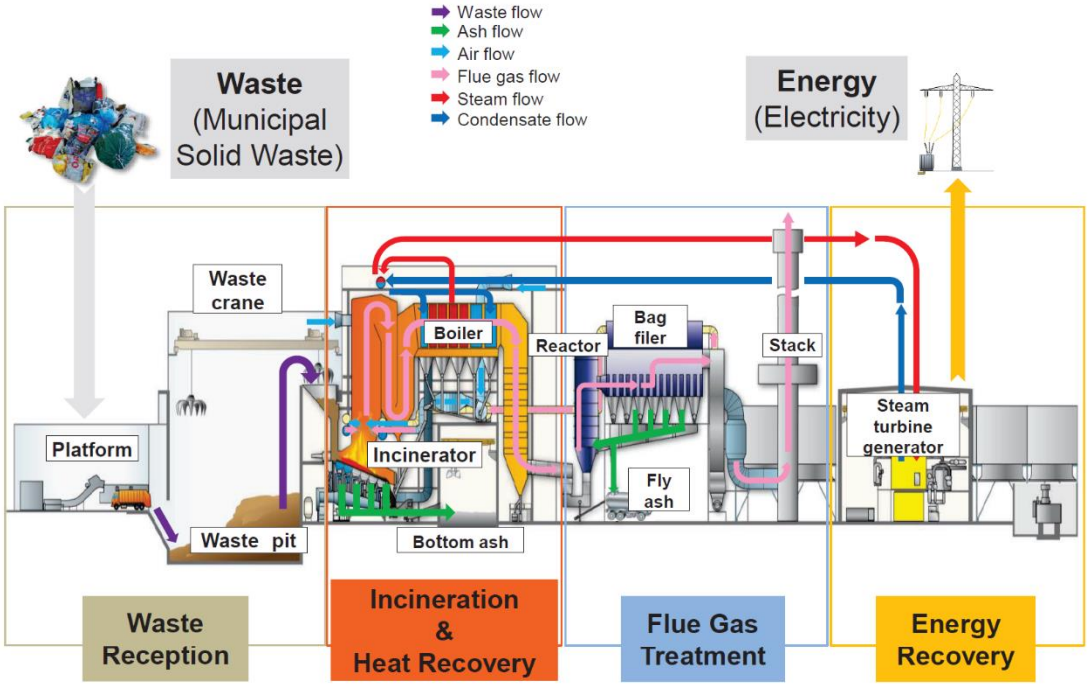
Figure 4.1 Example of ESCO services with IoT

In order to realize ESCO services, it is necessary that the level of energy prices in the target country and interest in reducing maintenance and management costs are aligned. In Thailand, where there is increasing interest in energy-saving operations in commercial facilities and industrial facilities (factories etc.), ESCO business is expected to become a ways of business management tconsidering decarbonization and BCG in the future.

4.2 JCM Model Projects Formulation on Waste to Energy

Hitachi Zosen Corporation (Hitachi Zosen) has been participating in this City-to-City collaboration projects since this fiscal year. The company has experiences of delivering a waste to energy project in Rayong Province in 2021 as an EPC business operator together with a private business operator. Based on this achievement, Hitachi Zosen is proposing a power generation business using refuse-derived fuel (RDF) in the EEC region.

Through this City-to-City collaboration, Hitachi Zosen has implemented promotion of RDF power generation etc., which conducts actual introduction of facilities along with the realization of decarbonization, together with waste management operation by Osaka City Government.



Source : Presentation material of Hitachi Zosen

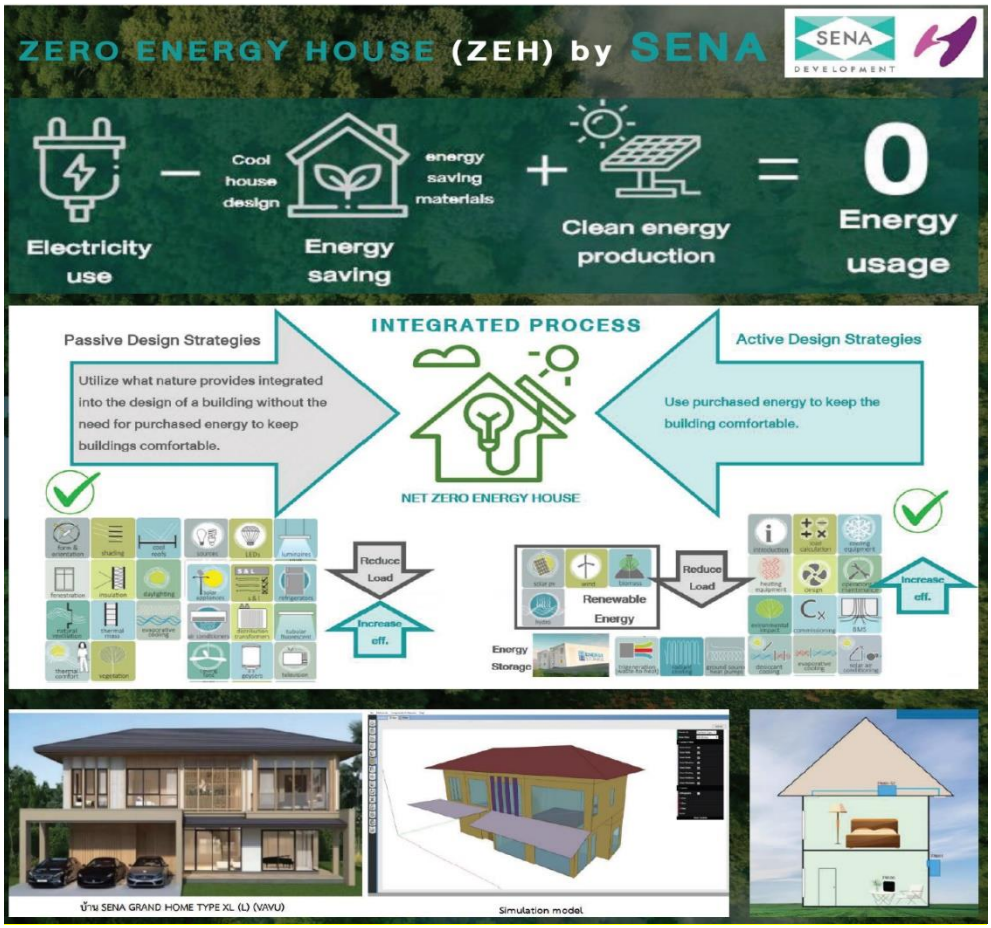
Figure 4.2 Project Image of Waste to Energy

4.3 JCM Formulation on Residential Area

This fiscal year, the Project has not only conducted JCM model projects formulation based on the seeds of Japanese companies, but have also advanced various discussions based on the needs of Thai companies.

As an example, the Project has exchanged opinions with SENA Development, which is a residential developer in Thailand and has much experience in terms of installing roof-top solar power generation systems.

At this moment, there are many solar power generation projects implemented in Thailand. Therefore, the Project continues holding discussions with SENA Development on JCM model projects formulation in technologies other than solar power generation.



Source : Presentation material of Sena Development

Figure 4.3 Zero Energy House by Sena Development

Since there are many companies inclusing SENA Development that are interested in the decarbonization activities in the industrial sector in Thailand, the Project plans to continue to support the formation of JCM model projects for these companies in the next fiscal year.

4.4 Conducting Surveys on Decarbonization Technology Needs and Market Trends in Thailand

Thailand is one of the attractive economic areas in Southeast Asia. Therefore, as part of the JCM model projects formation potential survey, the Project has implemented interview survey to Thai local companies about their interest in JCM.

Interviewee : 15 Thai companies in EEC area (interviewed 5 companies)
Items : Status and interest in decarbonization activities
Interest in collaboration with Japanese companies
Interest in formulation the JCM model projects, etc.

Based on the above interview survey, the Projects have already confirmed interest in JCM commercialization with several Thai companies. Therefore, it is planning to consider and prepare specific applications for JCM model projects from the next fiscal year onwards.

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

In the Project, JCM model projects formulation has been promoted mainly based on the consultation with Japanese company (JCM seeds) and it will be continued in the next fiscal year. Through this City-to-City Project, needs from Thailand will be grasped as well.

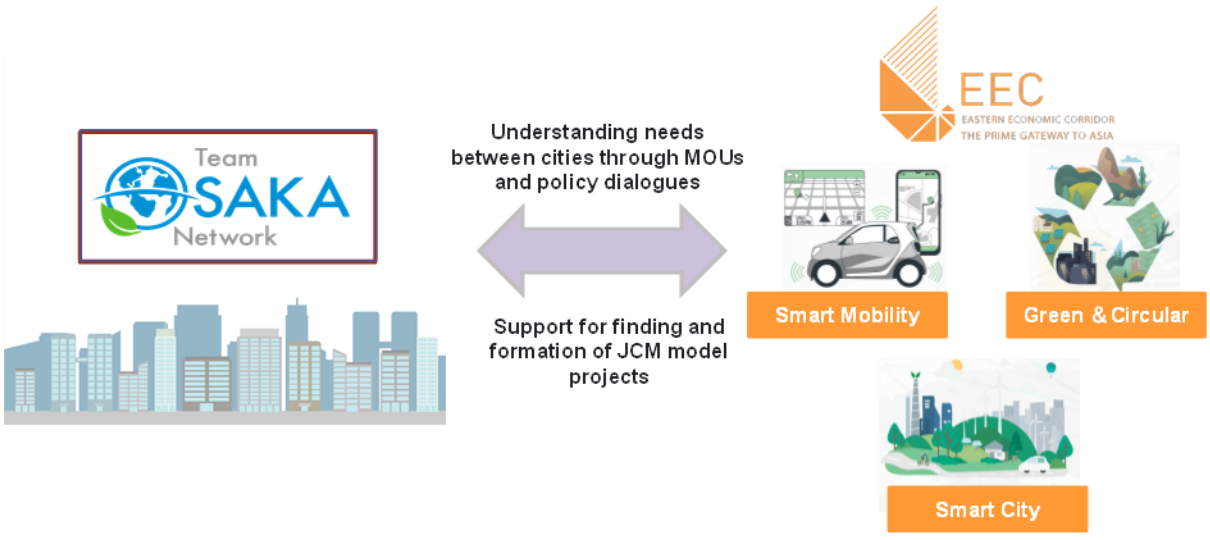


Figure 4.4 Grasp of EEC Needs with Osaka's Initiative

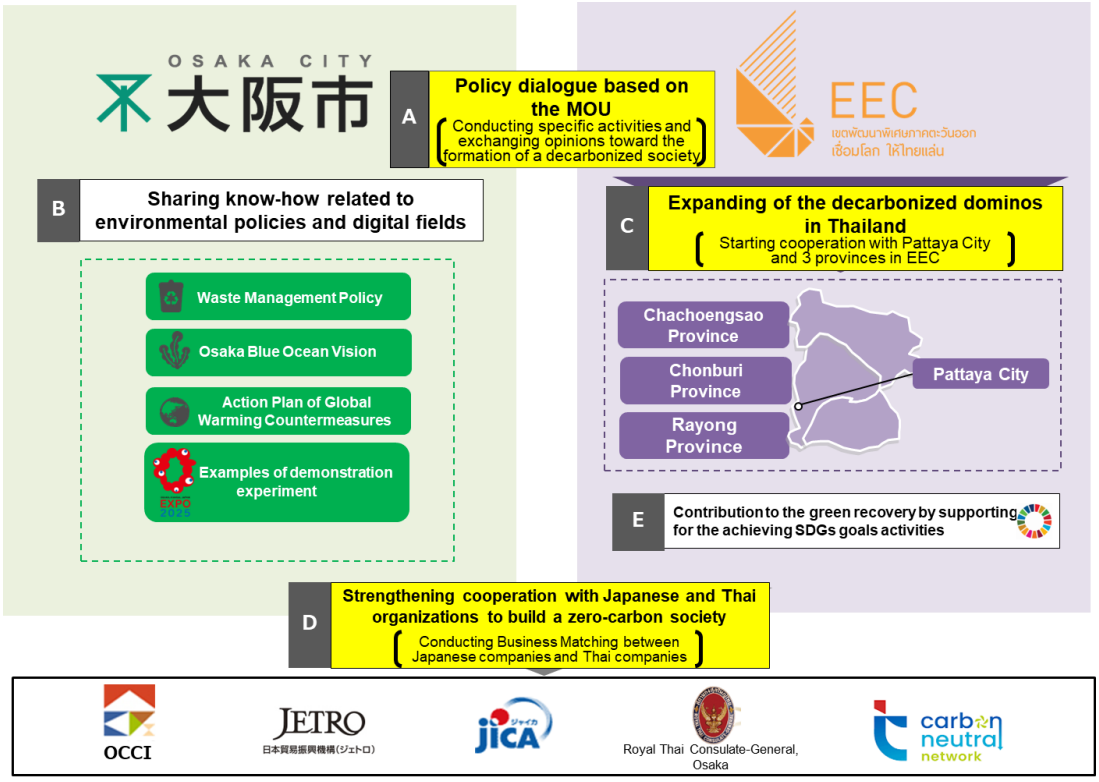
CHAPTER 5 FUTURE ACTIONS

This fiscal year, based on the results of the JCM model projects formulation survey and City-to-City collaboration activities conducted, the Project plans to conducts the following activities in the next fiscal year and beyond.

5.1 Image of Future City-to-City Collaboration

Based on the memorandum of understanding signed by the cities in February 2022, various activities centred on policy dialogues have been implemented since this fiscal year.

Exchanges opinions and activities in both cities are implemented in a medium- to long-term perspective, so it will continue to be implemented in the next year and beyond. Through the actual discussions in this year, the Project is planning to make new efforts (Figure 5.1) from the next fiscal year.



Source : Nippon Koei

Figure 5.1 Image of City-to-city Collaboration in the Next Year

This fiscal year, as the first year of Phase 2 (four years in total), the Project has contacted and discussed JCM application not only collaborate with the members at the start of the project (Osaka City, the EEC secretariat, and private companies), but also with various companies and organizations newly joined.

As a result, the Project could create new collaborations and exchange opinions not only with Japanese companies, but also with companies seeking some kind of action in response to the

interests of Thai companies such as decarbonization and the realization of a BCG economy. Therefore, next year, the Project plans to take advantage of this opportunity and promote various initiatives.

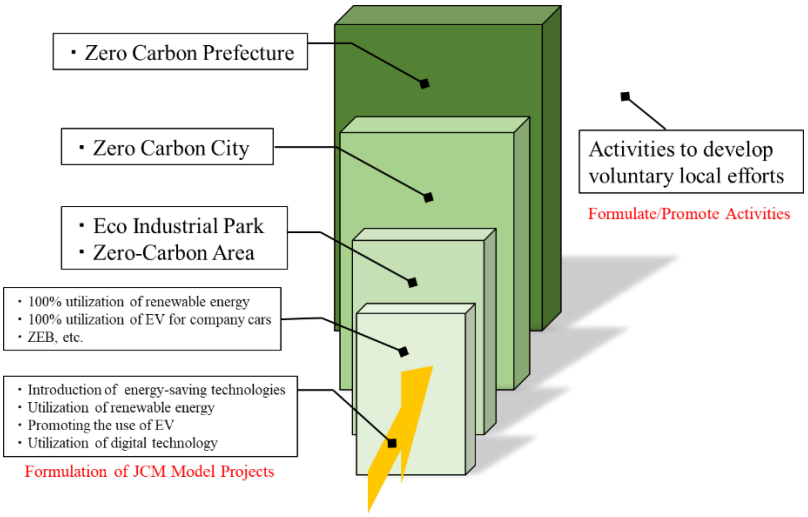
In addition, the Project that supports co-creation of a decarbonized society through the realization of the BCG model will continue in the next fiscal year. By positioning and utilizing it as a platform for realizing the BCG economy, it is expected that Osaka City Government and Japanese organizations will participate in the BCG economic society that the EEC is aiming for, and cooperate with a WIN-WIN approach. In that sense, the Project anticipates further deepening our collaboration with OCCI, which has participated in this City-to-City collaboration since this fiscal year.

5.2 Plan for City-to-City Collaboration in the Next Fiscal Year

Based on the image of City-to-City collaboration from the next fiscal year onward in the previous section, the following Table shows an overview of City-to-City collaboration and JCM model projects formation from the next fiscal year.

Table 5.1 Plan of Activities for the Next Fiscal Year

Activity and Policy	Reasons of activity etc.
City-to-City Collaboration Implementation of information/opinions exchange for the realization of the BCG economy utilizing the knowledge and achievements of Osaka City	In the MOU signed by Osaka City Government and the EEC secretariat, the following cooperation is specified. In order to realize these goals, Osaka City Government and the EEC secretariat has started activities in e) since this year, and exchanged opinions about their interests and requests for the other city. From the next fiscal year onwards, the Project will continue to maintain this dialogue in order to make it meaningful. 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 From this year, the Project has started a discussion with Pattaya City, a major city in the EEC region. EEC secretariat is in a position to drive the future economic growth of Thailand, but it is not a local government. For this reason, the Project will continue to pass on various efforts related to decarbonization to Pattaya, etc., to realize a Thai version of decarbonization domino.

Activity and Policy	Reasons of activity etc.
	Specifically, the Project will take actions on deepen cooperation with three prefectures in the EEC region (Chonburi, Chachoengsao, and Rayong) by introducing specific examples of initiatives such as the climate change action plan "Zero Carbon Osaka" that Osaka City is working on.  Source : Nippon Koei **Figure 5.1 Image of Decarbonization Domino in EEC**
JCM Project Formulation Formulation of JCM model projects based on EEC needs	Taking the local needs into consideration, the Project has supported JCM applications with the JCM seeds that overseas business development ideas from Japanese companies. As a result, the EEC's market potential and response to needs were not sufficient. Based on the above, this fiscal year, the Project is reviewing the local needs again and have begun to formulate JCM projects. Then, the Project will continue this activity in the next fiscal year and promote the formation of new JCM model projects. ・ Introduction of Japanese technology and products for Thai factory ・ Implementation of energy-saving projects by ESCO, etc. ・ Participation in smart city projects such as EECi ・ Promotion of new energy project in the EEC region such as green hydrogen

Source: Nippon Koei