FY2021 Project for Ministry of the Environment Japan

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

Promotion of Green Innovation to Realize Zero Carbon City by the Collaboration between DKI-Jakarta and Kawasaki City

Report

March 2022

Nippon Koei Co., Ltd.
Kawasaki City

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

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Report

Table of Contents

Page

List of Tables

List of Figures

List of Attachments

Abbreviations

AFOLU	Agriculture, Forestry and Land Use
ASEAN	Association of Southeast Asian Nations
BAPPEDA	Badan Perencanaan Pembangunan Daerah
BaU	Business-as-usual
BEV	Battery Electric Vehicle
BOD	Biochemical Oxygen Demand
BPPT	Badan Pengkajian dan Penerapan Teknologi
BRT	Bus Rapid Transit
C40	The large Cities Climate Leadership Group
CFF	Cities Finance Facility
CO2	Carbon Dioxide
COD	Chemical Oxygen Demand
COP	Conference of the Parties
CTCN	Climate Technology Centre and Network
DKI-JKT	Special Capital Region of Jakarta
EMS	Energy Management System
EV	Electric Vehicle
FIT	Feed in Tariff
GBCI	Green Building Council Indonesia
GHG	Greenhouse Gas
GIC	Kawasaki Green Innovation Cluster
ICE	Internal Combustion Engine
IDR	Indonesian Rupia
IFC	International Finance Corporation
IGES	Institute for Global Environmental Strategies
IMF	International Monetary Fund
IoT	Internet of Things
IPPU	Industrial Processes and Product Use
JCM	Joint Crediting Mechanism
LoI	Letter of Intent
LULUCF	Land use, land-use change, and forestry
MEMR	Ministry of Energy and Mineral Resource
MOE	Ministry of the Environment, Japan
MOU	Memorandum of Understanding
MRT	Mass Rapid Transit
NDC	Nationally Determined Contributions
NGO	Non-Governmental Organization
NIES	National Institute for Environmental Studies
PCR	Polymerase Chain Reaction
PLN	Perusahaan Listrik Negara
PSBB	Pembatasan Sosial Berskala Besar
PV	Photovoltaics
RAD	Regional Action Plan
RAD-GRK	Regional Action Plan for Reducing Greenhouse Gas Emissions
RAN-GRK	National Action Plan for Reducing Greenhouse Gas Emissions
RE100	Renewable Energy 100
RO	Reverse Osmosis
RPJMD	Mid-term Reginal Development Plan

RPJMN	Mid-term National Development Plan
RPJPD	Long-term Regional Development Plan
RPJPN	Long-term National Development Plan
RPRKD	Climate Resistant Regional Low Carbon Development Plan
RTRW	Rencana Tata Ruang Wilayah
RUPTL	Electricity Supply Business Plan
SDGs	Sustainable Development Goals
ZEB	Net Zero Energy Building
ZEH	Net Zero Energy House
ZEV	Zero Emission Vehicle

CHAPTER 1 BACKGROUND AND OBJECTIVE

1.1 BACKGROUND OF THE PROGRAMME

Paris Agreement, which entered into force in November 2016, mentions the importance of the role of non-state actors such as private companies and local governments, and calls for the acceleration their countermeasures to climate change by non-state actors including local governments and cities in addition to the central government. Also, in "Ministerial meeting of the "Online Platform" on a Sustainable and Resilient Recovery from COVID-19" held in September 2020, necessity of zero-carbon policies of local governments leading to communities directly and importance of development approach by initiatives of local communities were confirmed. In Japan, the Government declared that Japan in aiming to become a zero-carbon society by achieving zero emission of overall greenhouse gas (GHG) by 2050 and the number of municipalities declaring Net-Zero CO2 emissions has jumped to 533, or about 90% of the total population.

Roles of cities and local governments are becoming more important to consider and implement climate change countermeasures and projects in each region. Toward realization of zero-carbon society in the entire globe, it is necessary to accelerate movements to sustainable and zero-carbon society especially in Asia where economic growth is remarkable. Thus, international supports on city's activities have been enforced for realization of zero/low-carbon society where supporting activities for development of society and economy.

Also, under current situation of COVID-19 pandemic, while tackling issues related to the pandemic, cities are required to re-coordinate and consider new policies to achieve sustainable development. From this perspective, it is important to develop new measures and cities by collaboration between cities.

In Indonesia, the Government of Indonesia established National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK), and each regional government enacted Regional Action Plan for Reducing Greenhouse Gas Emissions (RAD-GRK) in 2013. In addition, Grand National Energy Plan 2015-2050 (RUEN) formulated in January 2017, particularly considers promoting energy saving and utilization of natural gas in Indonesia as priority countermeasures. Also, Indonesian Government has promised to reduce 29% of GHG emission compared to Business-as-Usual (BaU), and in case international assistance such as JCM is introduced, their target is 41% in Nationally Determined Contribution (NDC) submitted in 2016, then the NDC was updated with the provision aiming to achieve carbon neutrality by 2060. Following that, DKI-Jakarta developed Governor's regulation 2021/No.90 with the target of achieving carbon neutrality by 2050. Movement for zero-carbon society in Indonesia is currently quite active. In addition, the capital city of Indonesia, the Special Capital Region of Jakarta (DKI-JKT), published action plan for implementation of policies for low-/zero-carbon development, resilient to climate change, in COP26 and announced to support Indonesian Government on meeting the target of NDC.

1.2 OBJECTIVE OF THE PROGRAMME

The objective of "FY2021 City-to-City Collaboration Programme for Zero-Carbon Society" is to realize zero-carbon society in overseas cities through the intercity collaboration between overseas cities and Japanese cities which have experiences and know-how to develop low/zero-carbon city, realization of Decarbonization Domino Effect and also implementation of a feasibility study for installing private companies' technologies in overseas cities contributing to low/zero-carbon society.

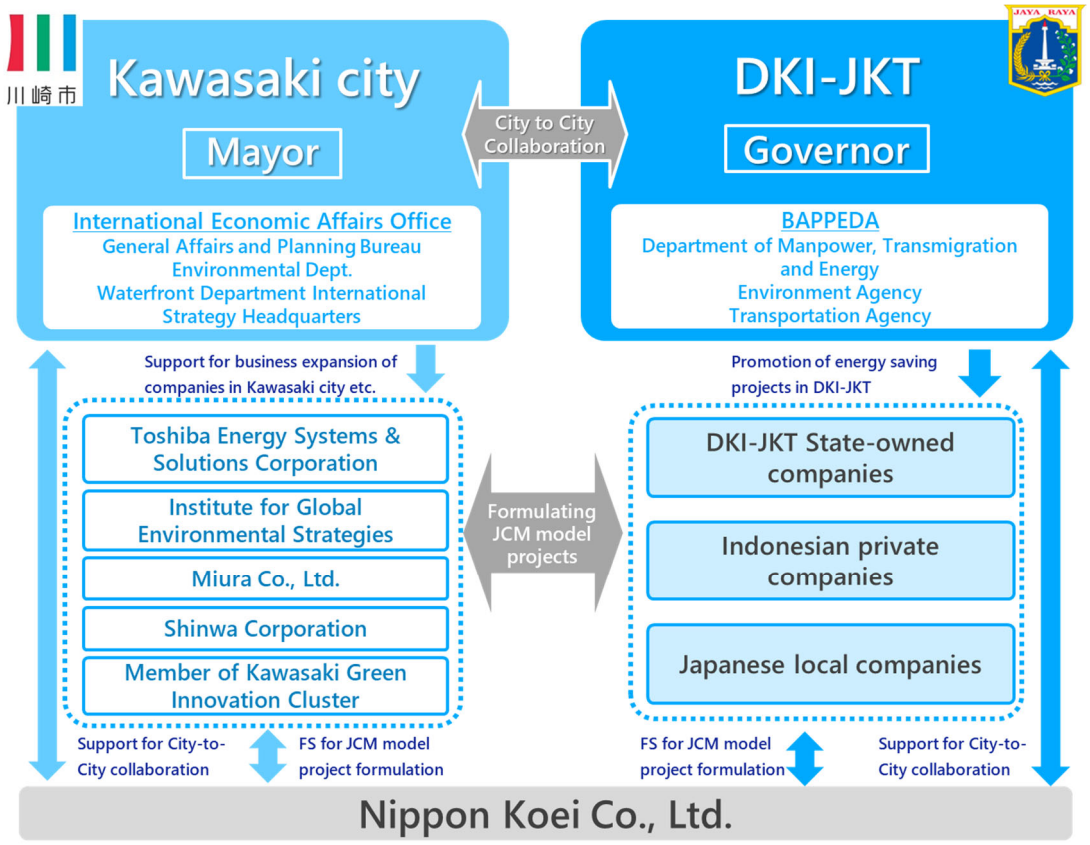
1.3 CITIES PARTICIPATING IN THE PROJECT

DKI-JKT is the capital city of the Republic of Indonesia (hereafter "Indonesia"). DKI-JKT has a population of approximately 10.37 million which makes it the largest city in the country. DKI-JKT is also the center of the country's government, economics, culture, industries, and with surrounding cities forming the Jakarta metropolitan area. The Jakarta metropolitan area has been developed with remarkable economic growth through both domestic and foreign investments since the latter half of the 20th century. During the Asian monetary crisis in 1997, investment to the area temporarily stagnated, but currently the situation has recovered and its development is further expanding. On the other hand, DKI-JKT is now facing serious environmental issues caused by increasing energy demand, serious traffic jams, tons of solid waste, air pollution, and water pollution with rapid economic development.
Kawasaki City, in Kanagawa prefecture. is located next to Tokyo. Kawasaki City serves as one of the hub cities for the Keihin Industrial zone, and the city has experience and expertise in pollution control at citizen level, company level and government level. Many companies in the city use superior environmental technologies. To utilize such experience, expertise, and technologies for developing sustainable cities, Kawasaki City promotes "Green Innovation". Also, the city organized "Kawasaki Green Innovation Cluster" in 2015 which is a platform of industry-academia-government-citizen collaboration for contributing to environmental improvement and industrial development.
Kawasaki City has been conducting "City-to-City Collaboration Programme for Low-Carbon Society" with other cities since 2015 by utilizing its knowledge and experience. DKI-JKT expressed an interest in these activities, so City-to-City Collaboration between Kawasaki City and DKI-JKT was proposed and has started since September 2017.

1.4 IMPLEMENTATION STRUCTURE OF THE PROJECT

The International Economic Affairs Office of Kawasaki City and the Regional Development Planning Agency (BAPPEDA) of DKI-JKT mainly implemented the Project.
From Kawasaki City, departments related to this fiscal year's activities participated in the project such as General Affairs and Planning Bureau, Environmental Department and Waterfront Department International Strategy Headquarters. Similarly, from DKI-JKT, Department of Manpower, Transmigration and Energy, Environment Agency and Transportation Agency participated, as well as SDGs Secretariat concerning sustainable

development goals (SDGs).
Furthermore, studies were conducted in cooperation with private companies such as Enoah Inc. and Hino Motors Asia, and research institutions such as Toshiba Energy Systems & Solutions Corporation and Institute for Global Environmental Strategies (hereafter "IGES") to develop projects utilizing Joint Crediting Mechanism (JCM) in DKI-JKT. Nippon Koei Co. Ltd. (hereafter "Nippon Koei") supported City-to-City Collaboration activities and carried out studies for introducing energy-saving technologies and renewable energy.
The implementation structure of the Project is as follows.



Source: Prepared by Nippon Koei

Figure1.1 Implementation structure of the Project

1.5 PROJECT SCHEDULE

The implementation period of the Project is between August 27, 2021 and March 10, 2022. The Project schedule is as follows.

Activities		2020					2021		
		Aug	Sep	Oct	Nov	Dec	Jun	Feb	Mar
1. JCM Model Project Formulation on Energy Saving in Industrial Sector									
1-1.	Consideration of specification of introduced technologies			■	■	■	■		
1-2.	Formulation of project plan & project evaluation					■	■	■	
1-3.	Coordination of International Consortium							■	■
1-4.	Formulation of MRV								■
2. JCM Model Project Formulation on Installation of Hydrogen Energy in remote islands									
2-1.	Data collection of the target island	■	■	■					
2-2.	Date analysis of energy demand and existing power plant in Sebira Island			■	■	■	■		
2-3.	Consideration of system structure & layout and calculation of annual electricity generation based on 2-2.					■	■	■	
3. JCM Model Project Formulation on Installation of EV bus to Public Transportation									
3-1.	Information collection of EV buses installation in DKI-JKT	■	■	■	■	■	■		
3-2.	Development of plans of JCM Model Project Formulation in FY2021						■	■	■
4. City-to-City Collaboration for achieving SDGs									
4-1.	Sharing knowledges and experiences of Kawasaki City on SDGs				■	■	■		
4-2.	Consideration and Implementation of City-to-City Collaboration for achieving SDGs					■	■	■	
5. Workshop etc.									
5-1.	Workshop on SDGs					●			
5-2.	Workshop for promotion of green innovation						●		
5-3.	Presentation of the City-to-City Collaboration Project		●				●	●	
6. Field Survey, Meetings, Report etc.									
6-1.	Field Survey by cooperating with local staff		■	■	■	■	■	■	■
6-2.	Monthly report to MOE		○	○	○	○	○	○	○
6-3.	Progress meeting with MOE		○			●		●	
6-4.	Meeting with Kawasaki City and related companies	●	●	●	●	●	●	●	
6-5.	Final report					■	■	■	■

■ : Implemented both in Japan and DKI-JKT (Continuously) ● : implemented online (Single)
○ : Implemented in Japan (Single)

Source: Prepared by Nippon Koei

Figure1.2 Project schedule in FY2020

CHAPTER 2 OVERVIEW OF THE CITIES

2.1 DKI-JKT

2.1.1 Overview of DKI-JKT

Indonesia is the world's largest island country, with the capital DKI-JKT, located on the northwest coast of Jawa Island. DKI-JKT is Indonesia's political, economic, cultural and industrial center, as well as one of the largest cities in Southeast Asia with an office of the Association of Southeast Asian Nations (ASEAN) . The city is also an active member of international city networks such as C40 (The Large Cities Climate Leadership Group)1, 100 Resilient Cities, Citynet, and Compact of Mayors.

Its administrative subdivisions consist of five cities (Kota Administrasi) and an administrative regency (Kabupaten Administrasi). The five administrative cities consist of 44 districts (Kecamatan), under which are 267 villages (Kelurahan).

Source: Prepared by Nippon Koei

Figure2.1 Map of Indonesia and DKI-JKT

DKI-JKT's statistical key data is shown in the table below.

Table2.1 Statistical data of DKI-JKT

#	Item	Statistical data
1	Area	664.01 km^2 (2020)
2	Population	10,562,100 (2020)
3	Gross city product (nominal)	IDR 1,792,794 billion (2020)
4	Main language	Indonesian
5	Religion	Islam (84%), Christianity (10%), other
6	Climate	Tropical monsoon climate (dry season from July to October, rainy season from November to June)

Source: Prepared by Nippon Koei based on materials provided by DKI-JKT

DKI-JKT's population has increased every year, by 1.07% in 2018, 1.19% in 2019 and 0.92% in 2020. DKI-JKT's population density is higher than in any other city in Indonesia, with 14,550 people/km^2.

The number, area and population of the region's municipalities and regencies are shown in the

1 https://www.c40.org/

table below.

Table2.2 Statistical data of administrative subdivisions (2020)

#	Administrative cities (Kota/Kab. Administrasi)	Administrative districts (Kecamatan)	Administrative villages (Kelurahan)	Area [km^2]	Population
1	Jakarta Pusat (Central Jakarta)	8	44	52.38	1,056,900
2	Jakarta Utara (North Jakarta)	6	31	139.99	1,778,980
3	Jakarta Barat (West Jakarta)	8	56	124.44	2,434,510
4	Jakarta Selatan (South Jakarta)	10	65	154.32	2,226,810
5	Jakarta Timur (East Jakarta)	10	65	182.70	3,037,140
6	Kep. Seribu (Seribu Islands)	2	6	10.18	27,750
Total		**44**	**267**	**664.01**	**10,562,090**

Source: Prepared by Nippon Koei, based on data from the Indonesian Bureau of Statistics

2.1.2 Regional Medium-Term Development Plan (RPJMD)

Regional Medium-Term Development Plan (RPJMD) is a DKI-JKT's five-year development plan. It is based on the Regional Long-term Development Plan (RPJPD), which was developed in accordance with National Long-Term Development Plan (RPJPN), and also takes National Medium-Term Development Plan (RPJMN) into consideration.
At present, DKI-JKT's RPJMD is targeting five years from 2018 to 2022 and lists 18 strategic issues for promoting the area's development.

Table2.3 DKI-JKT's strategic issues in RPJMD (2018-2022)

#	Sector	Strategic Issues
1	Human development	1) Improving the quality of education 2) Improving the quality of health 3) Strengthening equal access for disability persons 4) Empowerment of women 5) Improving sports infrastructure to encourage youth activities
2	Acceleration of developing economy and infrastructure	6) Strengthening food security 7) Increasing competitiveness of creative industries 8) Reducing economic inequality and expanding job opportunities 9) Prediction of flood and inundation 10) Energy security 11) Development of transportation system 12) Control of urban spatial use
3	Integrity of governmental apparatus	13) Bureaucratic reform 14) Management of development finance
4	Sustainable city	15) Improving the quality of environment, housing, and settlements

#	Sector	Strategic Issues
		16) Environmental protection and management
5	Building Jakarta as a node of growth	17) Development of multicultural city 18) Strengthening reginal innovation and creativity

Source: Prepared by Nippon Koei based on "Table 4.4 Isu-isu Strategis Pembangunan DKI Jakarta Tahun 2017-2022" of "Peraturan Daerah Nomor 1 tahun 2018 tentang RPJMD Provinsi DKI Jakarta Tahun 2017-2022"

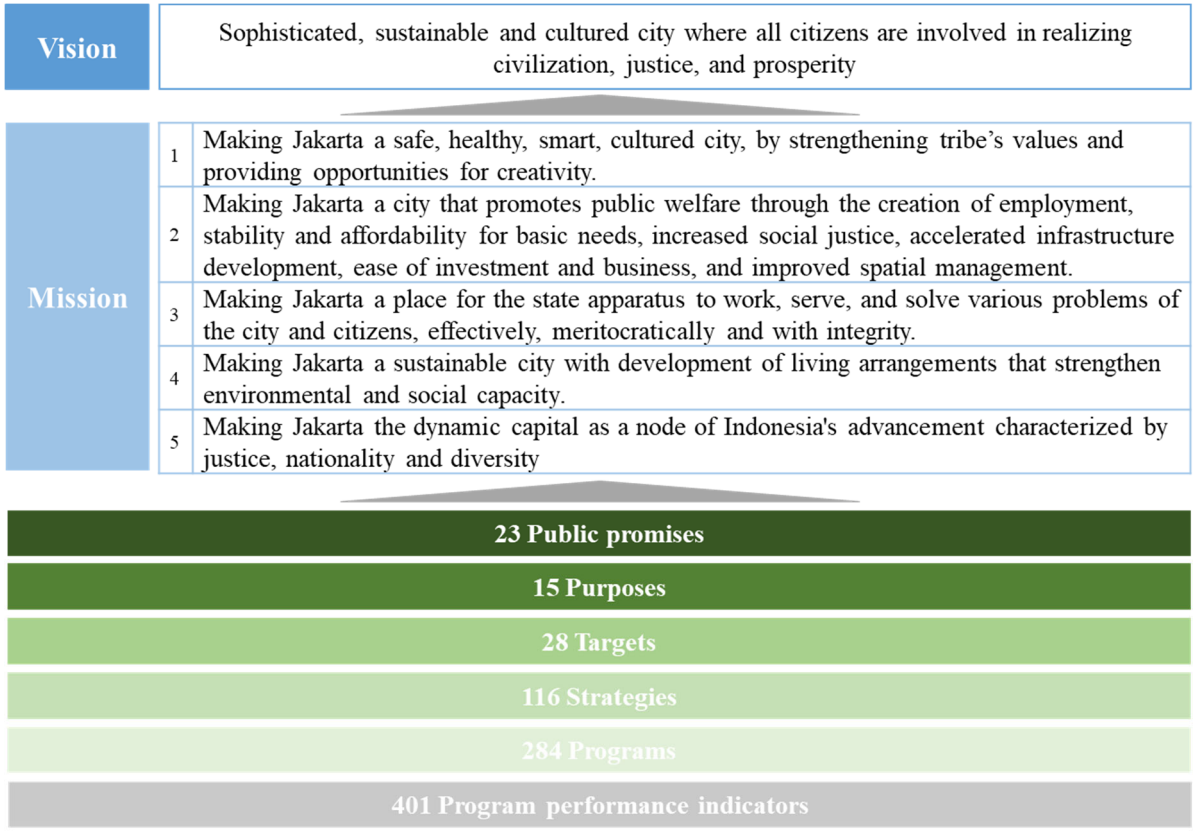
The 18 strategic issues above include those that RPJMN and RPJPD (2005-2025) have focused on. They have been designed based on "RTRW (Spatial Plan DKI-JKT, 2011-2030)", the highest-level spatial plan for whole DKI-JKT, and other factors such as SDGs for the world to achieve.

In RPJMD, to solve the strategic issues and move DKI-JKT development forward, the Governor and Deputy Governor have formulated a vision for the province.

Source: Figure 4.3 of "Peraturan Daerah Nomor 1 tahun 2018 tentang RPJMD Provinsi DKI Jakarta Tahun 2017-2022"

Figure2.2 The background of setting RPJMD's strategic issues

Currently the vision is to make Jakarta: "sophisticated, sustainable and cultured city where all citizens are involved in realizing civilization, justice, and prosperity." RPJMD lists five missions to achieve this vision and 23 public promises and specific implementation programs under the missions. The structure of the RPJMD plan is shown in the figure below. Each item in detail is mentioned in RPJMD.



Source: Prepared by Nippon Koei, based on "Peraturan Daerah Nomor 1 tahun 2018 tentang RPJMD Provinsi DKI Jakarta Tahun 2017-2022"

Figure2.3 Structure of RPJMD

2.1.3 Policy for climate change countermeasures of DKI-JKT

(1) Regional Action Plan for Reducing Greenhouse Gas Emissions (RAD-GRK)

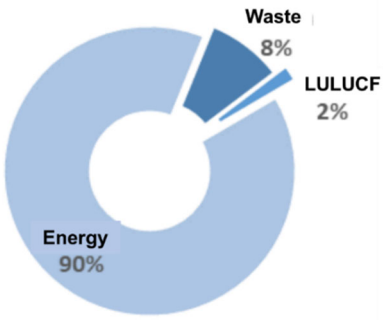
The DKI-JKT Regional Action Plan for Reducing Greenhouse Gas Emissions (RAD-GRK) was enacted in September 2012 as Governor Degree No.131. RAD-GRK aims to reduce 30% (35 million tCO2) of GHG emissions reduction by 2030 compared with Business-as-usual (BaU) scenario of the city (117 million tCO2).

There are three targeted sectors expected to reduce emissions: energy (transport, commerce, households and other); waste; and Land Use, Land-Use Change and Forestry (LULUCF). Each sector's BaU emissions are calculated and then each sector is expected to reduce GHG emission by 30%. In energy sector, low-carbonization of public transport and promotion of green buildings are set as especially high-priority areas.

Table2.4 GHG reduction target by sector

#	Sector	Sub-sector	Target by 2030 [million tCO2e]
1	Energy	Industry	10.8
2		Transportation	9.8
3		Commercial	5.7
4		Household	5.2
5		Others	0.07
6	Waste	Solid	2.6
7		Liquid	0.3
8	LULUCF	Forest	0.6
Total			**35.07**

Source: Prepared by Nippon Koei based on DKI-JKT material



Source: Prepared by Nippon Koei based on DKI-JKT material

Figure2.4 Breakdown of reduction targets by sector

(2) Actions for low-carbon urban transportation

In August 2019, the President of Indonesia, Joko Widodo, announced Presidential Decree (No.55/2019) to accelerate installation of Battery Electric Vehicles (BEV) to road transportation system2. This was the first Decree related to dissemination of BEV.

Also, the Ministry of Energy and Mineral Resource (MEMR) of Indonesia announced Decree No.13/2020 "Provision of Electricity Charging Infrastructure for Battery-based Electric Motor vehicles"3 in August 2020. This Decree regulates general provisions, private and public charging facilities for BEV, electricity price of charging for BEV, roles of national electricity company, Perusahaan Listrik Negara (PLN) etc. in order to development of charging facilities required for dissemination of BEV.

To respond to the movements for dissemination of BEV at national level, the Governor of DKI-JKT, Anies Baswedan positions spread of zero-carbon mobilities as one of the most important tasks. Especially replacement of public buses in DKI-JKT to Electric Vehicle (EV) is prioritized and practical activities for installation of EVs has started in 2020. Details of the plan to introduce EV buses in the Province are presented in Chapter 4 (Section 4.4.3).

In addition to installation of EV buses, DKI-JKT has been proceeding with actions to increase the number of users of public transportation as a countermeasure to air pollution, by cooperating with state-own companies such as PT. Transportasi Jakarta. One of those actions is Jak Lingko. Jak Lingko aims to enforce the convenience of public transportation by installing microbuses for First Mile (home to bus stops/train station) and Last Mile (bus stop/train station to home) to effectively connect to Jakarta Mass Rapid Transit (MRT) and public buses etc.

2 https://policy.asiapacificenergy.org/sites/default/files/Presidential%20Regulation%2055%3A2019%20on%20Electric%20Vehicles.pdf

3 https://jdih.esdm.go.id/storage/document/PM%20ESDM%20No.%2013%20Tahun%202020.pdf

Source: PT. Transportasi Jakrta

Figure2.5 Overview of Jak Lingko

(3) Governor's Degree on green building and related policies

Green Building regulation were enacted by DKI-JKT Governor Degree No.38/2012. The objective of the Green Building regulation is to improve the energy efficiency and water saving of the buildings in DKI-JKT. They were enforced as part of the regulation reform for 30% reduction of GHG emissions by 2030 as stated in RAD-GRK. This regulation targets both new and existing buildings.

Even though the Green Building regulation began in 2013, progress has not been smooth as the importance of Green Building has not been understood enough in Jakarta. Considering this situation, in order to disseminate Green Building, DKI-JKT judged that it is important to make stakeholders understand its importance and to develop grand design as a basic concept to lead to implementations. Thus, DKI-JKT developed Grand Design of Green Building in 2016 with support from International Finance Corporation (IFC). The main concept of the Grand Design is "30:30 Commitment", which aims to cut 30% of energy consumption, 30% of water consumption, and 30% of GHG emissions of all new buildings and 60% of existing buildings. The DKI-JKT government launched a website for Green Building to release details of Grand Design of Green Building and a guideline to contribute to the concept, as well as current progress of energy savings, water savings and reduction of GHG emissions.

Source: Grand Design of Green Building (with some additions by Nippon Koei)

Figure2.6 Targets of 30:30 Commitment

Source: DKI-JKT site (https://greenbuilding.jakarta.go.id/index-en.html)

Figure2.7 Website for DKI-JKT's green building

Source: DKI-JKT

Figure2.8 Green building guideline

(4) Climate Resistant Regional Low Carbon Development Plan (RPRKD)

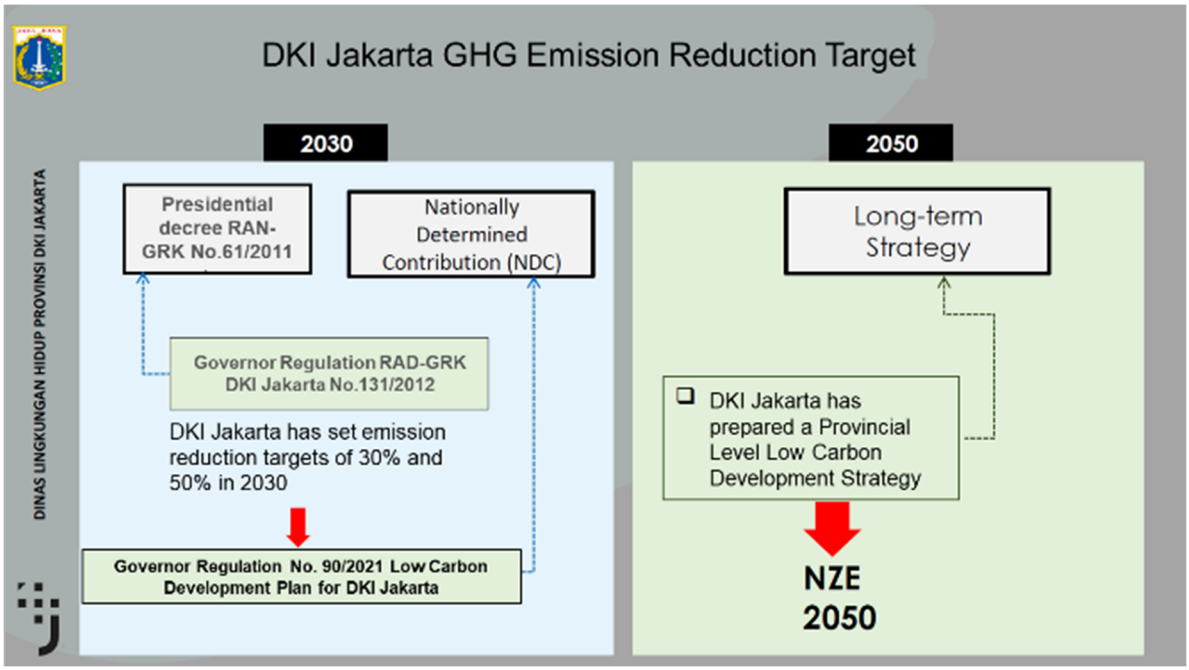
Following the declaration at COP15 in Denmark in 2009 to reduce GHG emissions by 30% by 2030, DKI-JKT has announced various governor's regulations and plans, etc. related to climate change and decarbonization.

In addition, DKI-JKT issued a Governor's Decree (No. 90/2021) in October 2021, announcing the first Climate Resilient Provincial Low Carbon Development Plan (RPRKD) in Indonesia4. RPRKD is a plan for Low/Zero-Carbon, and it also includes consideration for adaptation measures. There has been no explicit law on climate change adaptation measures in Indonesia so far, and RPRKD is innovative as it incorporates both mitigation and adaptation measures.

As for mitigation measures, to contribute to the Paris Agreement and fulfilment of Indonesia's

4 https://jdih.jakarta.go.id/uploads/default/produkhukum/PERGUB_NO._90_TAHUN_2021.pdf

NDCs, the city has set targets of achieving zero carbon in 2050, 30% reduction in GHG emissions by 2030 and 50% reduction in GHG emissions as an ambitious target, and has identified four sectors (energy, waste, AFOLU, and IPPU) as priority areas.
On the other hand, as for adaptation measures, the city aims to eliminate areas in DKI-JKT classified as highly vulnerable to climate change-related disasters by 2030, and has identified eight sectors (health-related initiatives, water resource management, management of remote islands and coastal areas, energy management, food security, adequate housing and settlements, climate resilient infrastructure, and others) as priority areas. In addition, in order to reduce vulnerability and risks pertaining to climate change, the city aims for development that focuses on Goal 3 (Good health and well-being), Goal 8 (Decent work and economic growth), Goal 11 (Sustainable cities and communities), and Goal 13 (Climate action) of the SDGs.



Source: Materials provided by DKI-JKT Environment Bureau (with some revisions by Nippon Koei)

Figure 2.7 GHG emission reduction target of DKI-JKT

Source: Materials provided by DKI-JKT Environment Bureau (with some revisions by Nippon Koei)

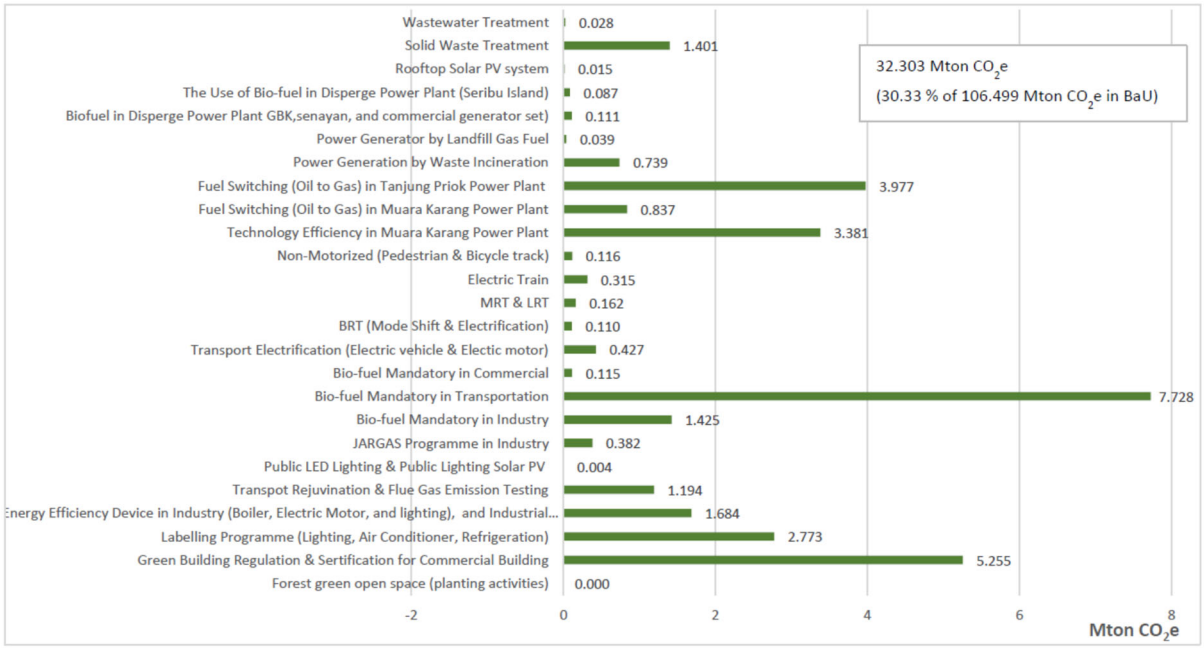
Figure 2.8 Four priority areas for mitigation measures of RPRKD

(5) Long-term strategy for realization of low-carbon society

Paris Agreement requires all parties of the agreement to prepare "Mid-century long-term low GHG emissions development strategy (Long-term strategy)" to achieve 1.5 degree C target, in addition to submission of Nationally Determined Contributions (NDC) with the target of GHG emission reduction. To respond to the requirement, Indonesia has started establishment of long-term strategy by 2050.

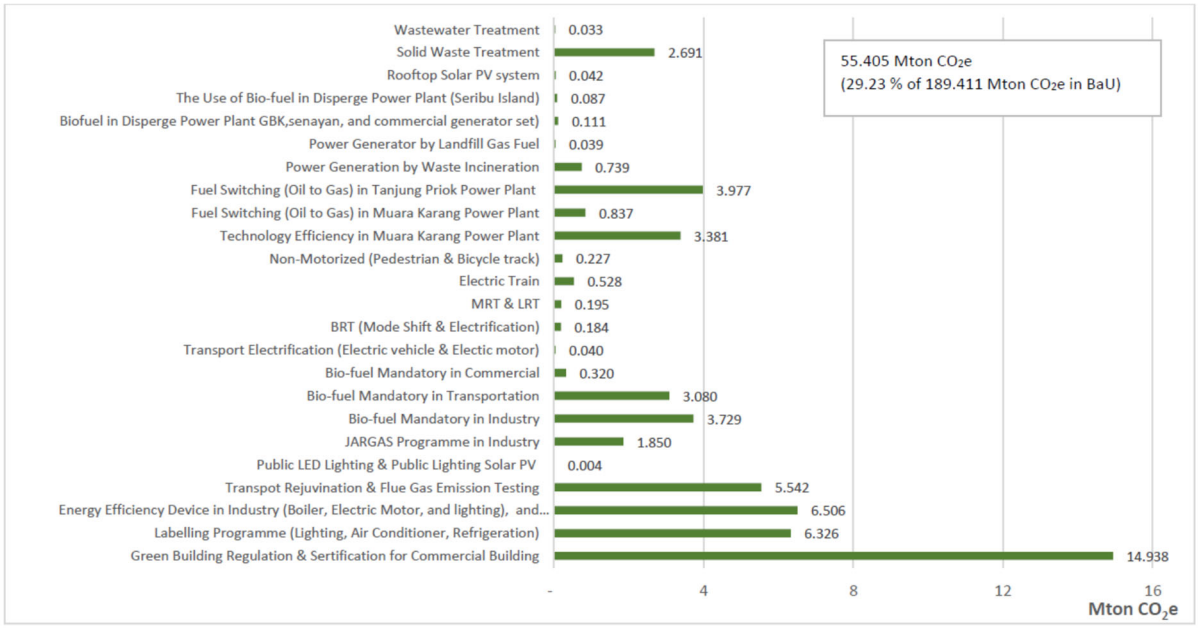
DKI-JKT is preparing for development of provincial long-term strategy in accordance with national long-term strategy being established by the central government. For preparation of long-term strategy, DKI-JKT implemented studies to consider mitigation scenario by 2030 and 2050, with Japanese institutes including National Institute for Environmental Studies (NIES) and IGES. As a result of the studies, it was confirmed that GHG emission from energy consumption in DKI-JKT increase 28.249 million tCO2e in 2010 to 165.274 million tCO2e in 2050 in BaU scenario. On the other hand, in the scenario that climate change countermeasures are implemented, GHG emission in 2050 is predicted to be 121.804 million t CO2e, which means countermeasures will lead to the reduction of 43.470 million tCO2e (22.95%) in comparison with BaU scenario.

Figure2.9 and Figure2.10 show trial calculation of GHG emission reduction potential in each sector in 2030 and 2050. The result of the calculation indicates high potentials in transportation sector and green building both in 2030 and 2050. Thus, it can be expected that technologies considered in JCM Model Project formulation study of the Project supports for climate change countermeasures. This calculation is implemented with assumption that Gross Domestic Product (GDP) of DKI-JKT will increase average 5.7% every year from 2010 to 2050.



Source: IGES (https://www.iges.or.jp/jp/pub/aaa/en-4)

Figure2.9 GHG emission reduction potentials of each sector in 2030



Source: IGES(https://www.iges.or.jp/jp/pub/aaa/en-4)

Figure2.10 GHG emission reduction potentials of each sector in 2050

2.1.4 Activities for achieving SDGs

(1) SDGs Regional Action Plan

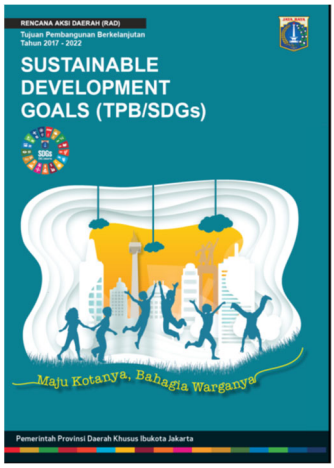
By Presidential Degree No.59/2017 on SDGs, municipalities were directed to develop a five-year Regional Action Plan (RAD) to achieve SDGs. RAD is required to be aligned with RPJMD and its plan is set for RPJMD's target period. Therefore, DKI-JKT's current SDGs action plan targets years 2018-2022, the same as RPJMD.

	Year	2017	2018	2019	2020	2021	2022	2023	2024	2025
National	RPJMN	RPJMN -2019			RPJMN 2020-2025					
	National Action Plan (RAN)	RAN 1st			RAN 2nd					
Regional	RPJMD	-2017	RPJMD 2018-2022					RPJMN 2023-		
	Regional Action Plan (RAD)		RAD 1st					RAD 2nd		

Source: Prepared by Nippon Koei based on the SDGs Regional Action Plan (RAD)

Figure2.11 Relationship between development plans and SDGs Action Plans

DKI-JKT's SDGs Regional Action Plan is structured as follows.



Source: SDGs Regional Action Plan (cover page)

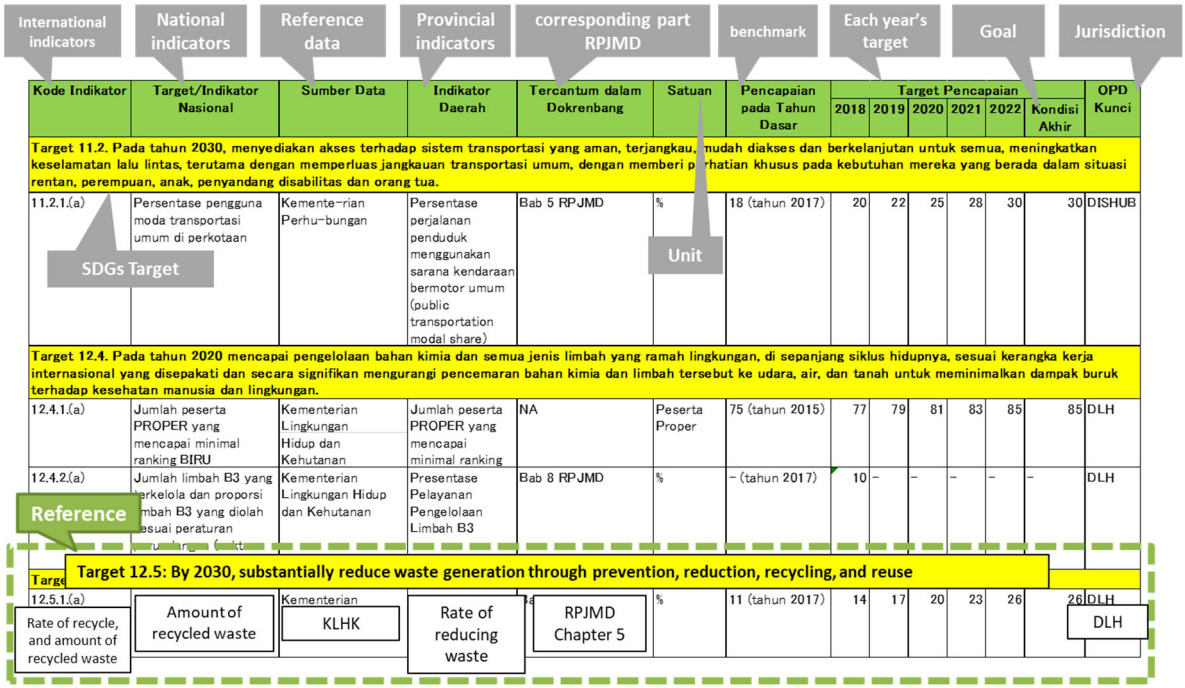
Figure2.12 SDGs Regional Action Plan

Table2.5 Structure of SDGs Regional Action Plan

Chapter	Detail
Chapter 1	Introduction (including SDGs Regional Action Plan's consistency with other plans (such as RPJMD) and implementation policy)
Chapter 2	Requirements and issues to achieve TPB/SDGs (Goal 1-Goal 17)
Chapter 3	Targets and indicators to achieve goals (Goal 1～Goal 17)
Chapter 4	Procedures for monitoring, evaluating and reporting on SDGs implementation
Chapter 5	Epilogue
Attached documents	Legal documents to promote SDGs, and a table summarizing goals, targets, programs, activities, indicators, budget indicators, funding sources and programme period (Goal 1～Goal 17)

Source: Prepared by Nippon Koei based on the SDGs Regional Action Plan

Targets and indicators for Goal 1-Goal 17and five-year target figures are listed in SDGs Regional Action Plan Chapter 3. DKI-JKT lists total 253 indicators (241 international indicators and 319 national indicators). Shown below are examples of the indicators and targets for the goals shown in DKI-JKT's SDGs Regional Action Plan Chapter 3.



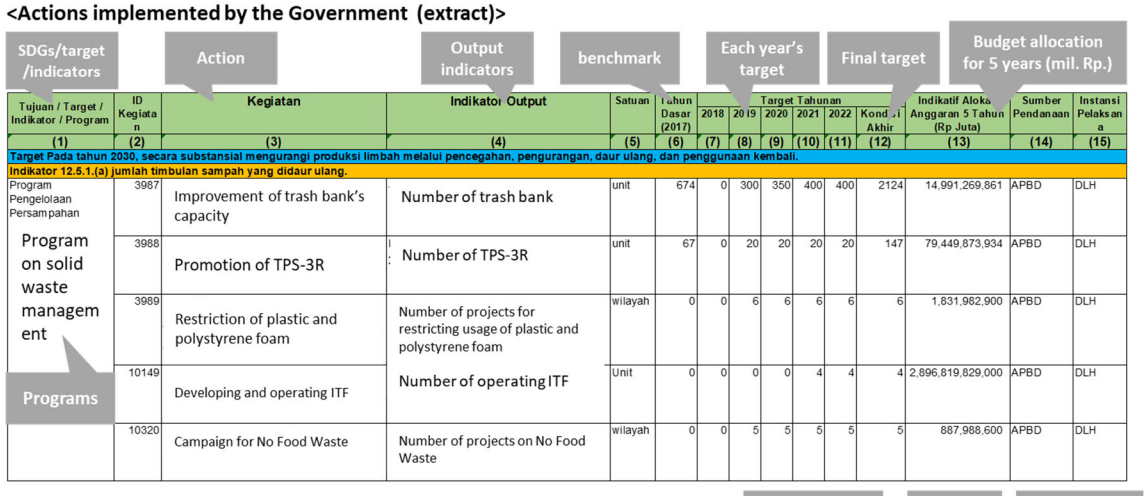
Kode Indikator	Target/Indikator Nasional	Sumber Data	Indikator Daerah	Tercantum dalam Dokrenbang	Satuan	Pencapaian pada Tahun Dasar	Target Pencapaian 2018	2019	2020	2021	2022	Kondisi Akhir	OPD Kunci
Target 11.2. Pada tahun 2030, menyediakan akses terhadap sistem transportasi yang aman, terjangkau, mudah diakses dan berkelanjutan untuk semua, meningkatkan keselamatan lalu lintas, terutama dengan memperluas jangkauan transportasi umum, dengan memberi perhatian khusus pada kebutuhan mereka yang berada dalam situasi rentan, perempuan, anak, penyandang disabilitas dan orang tua.													
11.2.1.(a)	Persentase pengguna moda transportasi umum di perkotaan	Kementerian Perhubungan	Persentase perjalanan penduduk menggunakan sarana kendaraan bermotor umum (public transportation modal share)	Bab 5 RPJMD	%	18 (tahun 2017)	20	22	25	28	30	30	DISHUB
Target 12.4. Pada tahun 2020 mencapai pengelolaan bahan kimia dan semua jenis limbah yang ramah lingkungan, di sepanjang siklus hidupnya, sesuai kerangka kerja internasional yang disepakati dan secara signifikan mengurangi pencemaran bahan kimia dan limbah tersebut ke udara, air, dan tanah untuk meminimalkan dampak buruk terhadap kesehatan manusia dan lingkungan.													
12.4.1.(a)	Jumlah peserta PROPER yang mencapai minimal ranking BIRU	Kementerian Lingkungan Hidup dan Kehutanan	Jumlah peserta PROPER yang mencapai minimal ranking	NA	Peserta Proper	75 (tahun 2015)	77	79	81	83	85	85	DLH
12.4.2.(a)	Jumlah limbah B3 yang terkelola dan proporsi limbah B3 yang diolah sesuai peraturan	Kementerian Lingkungan Hidup dan Kehutanan	Presentase Pelayanan Pengelolaan Limbah B3	Bab 8 RPJMD	%	– (tahun 2017)	10	–	–	–	–	–	DLH
Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling, and reuse													
12.5.1.(a)	Amount of recycled waste	KLHK	Rate of reducing waste	RPJMD Chapter 5	%	11 (tahun 2017)	14	17	20	23	26	26	DLH

Source: Prepared by Nippon Koei based on the SDGs Regional Action Plan

Figure2.13 Examples of the indicators and targets specified by DKI-JKT for SDGs targets

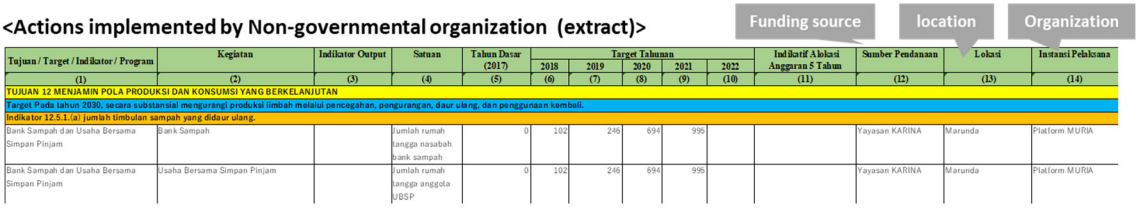
There is also a total of 5,822 action plans to achieve SDGs indicators and targets. The action plans are divided into two, that is activities by the government and ones by non-governmental bodies groups.

<Actions implemented by the Government (extract)>



Tujuan / Target / Indikator / Program	ID Kegiatan	Kegiatan	Indikator Output	Satuan	Tahun Dasar (2017)	Target Tahunan 2018	2019	2020	2021	2022	Kondisi Akhir	Indikatif Alokasi Anggaran 5 Tahun (Rp Juta)	Sumber Pendanaan	Instansi Pelaksana
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Target Pada tahun 2030, secara substansial mengurangi produksi limbah melalui pencegahan, pengurangan, daur ulang, dan penggunaan kembali.														
Indikator 12.5.1.(a) jumlah timbulan sampah yang didaur ulang.														
Program Pengelolaan Persampahan	3987	Improvement of trash bank's capacity	Number of trash bank	unit	674	0	300	350	400	400	2124	14,991,269,861	APBD	DLH
	3988	Promotion of TPS-3R	Number of TPS-3R	unit	67	0	20	20	20	20	147	79,449,873,934	APBD	DLH
	3989	Restriction of plastic and polystyrene foam	Number of projects for restricting usage of plastic and polystyrene foam	wilayah	0	0	6	6	6	6	6	1,831,982,900	APBD	DLH
	10149	Developing and operating ITF	Number of operating ITF	Unit	0	0	0	0	4	4	4	2,896,819,829,000	APBD	DLH
	10320	Campaign for No Food Waste	Number of projects on No Food Waste	wilayah	0	0	5	5	5	5	5	887,988,600	APBD	DLH

<Actions implemented by Non-governmental organization (extract)>



Tujuan / Target / Indikator / Program	Kegiatan	Indikator Output	Satuan	Tahun Dasar (2017)	Target Tahunan 2018	2019	2020	2021	2022	Indikatif Alokasi Anggaran 5 Tahun	Sumber Pendanaan	Lokasi	Instansi Pelaksana
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
TUJUAN 12 MENJAMIN POLA PRODUKSI DAN KONSUMSI YANG BERKELANJUTAN													
Target Pada tahun 2030, secara substansial mengurangi produksi limbah melalui pencegahan, pengurangan, daur ulang, dan penggunaan kembali.													
Indikator 12.5.1.(a) jumlah timbulan sampah yang didaur ulang.													
Bank Sampah dan Usaha Bersama Simpan Pinjam	Bank Sampah		Jumlah rumah tangga nasabah bank sampah	0	102	246	694	995			Yayasan KARINA	Marunda	Platform MURIA
Bank Sampah dan Usaha Bersama Simpan Pinjam	Usaha Bersama Simpan Pinjam		Jumlah rumah tangga anggota UBSP	0	102	246	694	995			Yayasan KARINA	Marunda	Platform MURIA

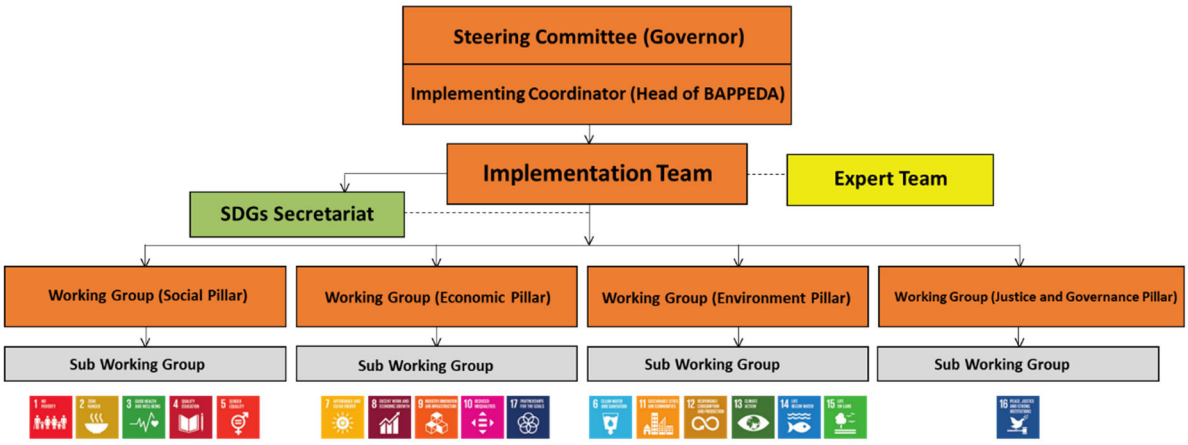
Source: Prepared by Nippon Koei based on SDGs Regional Action Plan

Figure2.14 Examples of action plans for the government and non-governmental bodies

In this way, DKI-JKT is linking the SDGs to its administrative activities and implementing development issues and activities in the province efficiently and effectively.

(2) Implementation structure of SDGs actions

The organization to implement DKI-JKT's SDGs Regional Action Plan consists of Steering Committee, Implementation Team, Expert Team, SDGs Secretariat and Working Groups. The Steering Committee is headed by the Governor of DKI-JKT, with the Head of BAPPEDA managing the committee's activities as an implementing coordinator. For years 2018-2022, DKI-JKT's Public Welfare Agency is appointed to represent the Implementation Team. Under the Implementation Team, the Working Groups for four pillars, "Social Pillar", "Economic Pillar", "Environmental Pillar", and "Justice and Governance Pillar", are positioned.
Each goal of SDGs is categorized to each of these four pillars. Goals concerning zero-carbon and low-carbon society (SDGs 7, 9, 11, and 13) belong to the "Environment" and "Economic" pillars.
DKI-JKT has placed SDGs Secretariat under the Implementation Team. SDGs Secretariat manage the four Working Groups, checks the plans' progress, and gives the groups advices of how to achieve SDGs.
The organizational structure of SDGs Regional Action Plan is shown below.



Source: Provided by DKI-JKT・SDGs Secretariat

Figure2.15 Structure for implementing SDGs Regional Action Plan

(3) SDGs indicators

The 253 indicators above consist of 98 social, 57 economic, 67 environmental, and 31 low and-governance indicators.

Source: DKI-JKT SDGs Secretariat

Figure2.16 The goals for each Working Group and the numbers of respective targets and indicators

Report of activities in 2020 under SDGs Regional Action Plan of DKI-JKT was published in 2021. According to the report, data of 184 (72.73%) out of 253 indicators was sufficient for evaluation but data of the rest, 69 indicators (27.27%) was not enough. The reason is difficulties to collect data of whole province such as Indicator 16.1.4 (Proportion of population that feel safe walking alone around the area they live).

90 (48.91%) out of 184 indicators with sufficient data achieved target figures and 27 indicators (14.67%) improved from previous period. On the other hand, it was found that 67 indicators (36.41%) did not reach at targets of previous period.

Source: the SDGs secretariat of DKI-JKT

Figure2.17 SDGs annual report (2020)

There are 67 indicators for 6 goals related to environmental sector out of which 34 indicators (50.7%) have sufficient data achieved targets and 7 indicators (10.4%) improved from the previous period. The outcome of public transportation and air quality are discussed specially in the environmental sector. Regarding public transport, extension of microbus services by Jak Lingko mentioned above and MRT being operated since 2019 led to convenience of public transportation. The city also won "2021 Sustainable Transport Award " in February 2021 in recognition of the development of a bicycle transport network. With regard to air quality, in addition to the public transportation sector mentioned above, the green industry and green building initiatives have accelerated the improvement of air quality and contributed to the achievement of the goal.

2.2 KAWASAKI CITY

2.2.1 Overview of Kawasaki City

Kawasaki City is a government ordinance city located in the northeast part of Kanagawa Prefecture, next to Tokyo across Tama River.
The city underpins Japan's economic growth as the core city of waterfront Keihin Industrial Zone. Kawasaki, with a history and experience on solving environmental pollutions with citizens, business operators and public services, has attracted many companies with competitive environmental technologies. In addition, the western part of the city boasts large areas of greenery including Ikuta Ryokuchi Park.

Source: Kawasaki City

Figure2.18 Map of Kawasaki City

Table2.6 Statistical data of Kawasaki City

#	Item	Statistical data
1	Area	144.35km2
2	Population	1,538,825 (as of January 1, 2022)
3	Number of households	754,576 (as of January 1, 2022)
4	Gross city product (nominal)	6,381.6 billion yen (2018)

Source: Kawasaki City

Kawasaki City has been active in various activities related to climate change, some of which are explained below.

2.2.2 Policy for climate change countermeasures of Kawasaki City

(1) Kawasaki City Basic Plan to Promote Global Warming Countermeasures

In 2010, based on Kawasaki City Ordinance for Promotion of Global Warming Countermeasures released in 2009, Kawasaki City enacted the Basic Plan to Promote Global Warming Countermeasures (hereafter "Plan 2010") to drive actions against global warming in a comprehensive and systematic manner, and to set reduction target for FY2020. Plan 2010 was revised in 2018 (hereafter "Plan 2018") to set new reduction target for FY2030, and to illustrate plans to achieve the target.
The overview of Plan 2010 and Plan 2018 is shown in Table 2.7. Plan 2018 is currently being revised in line with the declaration of 2050 Zero Carbon City and release of Kawasaki Carbon Zero Challenge 2050.

Source: Kawasaki City

Figure2.19 Basic Plan to Promote Global Warming Countermeasures

Table2.7 Overview of Plan to Promote Global Warming Countermeasures (Plan 2010 and Plan 2018)

Item	Plan 2010	Plan 2018
Period	FY2011-2020	FY 2018-2030
Basic concept	To develop a sustainable low-carbon society based on harmonization and positive cycle of the environment and economy and to preserve positive environment for the next generations.	To develop a low-carbon society with multi-benefit measures against global warming.
Basic policy	1) To develop a social and economic system leading to reduction of GHG emissions effectively. 2) To use locally available energy resources such as renewable and unutilized energy efficiently and effectively. 3) To reduce GHG emissions by business operators, citizens and the city in their respective capacity. 4) To encourage joint activities. 5) To contribute to reduction of GHG emissions worldwide. 6) To contribute to countermeasures to heat island phenomenon.	1) To proceed reduction of GHG emissions. 2) To implement of introduction of renewable energy and optimization of energy consumption. 3) To promote adaptation measures for climate change. 4) To contribute with environmental technologies and industries. 5) To encourage collaboration among citizens, business operators and public sector.
Reduction target	To aim at 25% reduction of GHG emissions compared with FY1990, by FY2020.	To aim at 30% reduction of GHG emissions by FY2030, compared with FY1990 (or 20% compared with FY2013).

Source: Prepared by Nippon Koei based on Kawasaki City Plan to Promote Global Warming Countermeasures

This plan is currently being revised in accordance with the formulation of the 2050 Zero Carbon City Declaration and the "Kawasaki Carbon Zero Challenge 2050" decarbonization strategy, as described below. The following table summarizes the draft of the Kawasaki City Basic Plan for the Promotion of Global Warming Countermeasures (hereinafter referred to as the "2022 Draft Plan"), which was released in December 2021.

Table2.8 Kawasaki City Basic Plan for the Promotion of Global Warming Countermeasures

Item	Proposed Plan for 2022
Duration	FY2022 - FY2030 period
Future Vision	Aim for Net-Zero GHG emissions in the city area by 2050
Basic Concept	“Creating a Zero-Carbon city where future generations can live peacefully” and “Creating a sustainable and powerful industry through a virtuous cycle between the environment and the economy”
Basic direction	I. A city where citizens, businesses, and other entities work toward decarbonization II. A city that contributes to decarbonization of the world through green innovation III. A city that optimizes energy by maximizing the use of renewable energy IV. A city with earth-friendly transportation environment V. A city where the municipal office takes the initiative to achieve

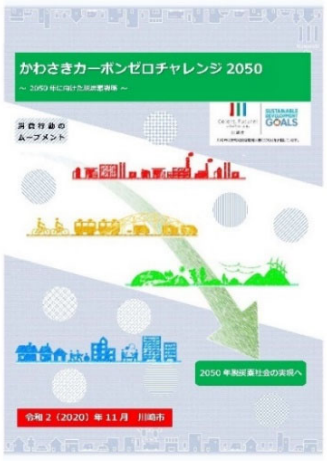
Item	Proposed Plan for 2022
	decarbonization VI. A city that works on resource recycling aiming at decarbonization VII. A city where people can adapt to climate change and lead safe and healthy lives VIII. A city where citizens are connected through diverse forms of greenery
GHG reduction targets	Target for city area: Net-Zero GHG emissions in the city area in 2050 50% reduction by FY 2030 (11.8 million tCO2 reduction compared to FY 2013) Consumer targets (consumer households and consumer businesses): 45% or more reduction by FY 2030 (1.7 million tCO2 reduction compared to FY 2013) Industrial targets (industries, energy conversion, industrial processes): 50% or more reduction by FY 2030 (210,000 tCO2 reduction compared to FY 2013) Municipal office targets (all public facilities in the city): 50% or more reduction by FY 2030 (9.52 million tCO2 reduction compared to FY 2013)
Renewable energy introduction target for FY 2030	Introduction of 330,000 kW or more by FY 2030 (200,000 kW of renewable energy was introduced in the entire city area in FY 2019)

Source: Prepared by Nippon Koei based on the Kawasaki City Basic Plan to Promote Global Warming Countermeasures (Draft)

(2) Zero-carbon strategy "Kawasaki Carbon Zero Challenge 2050"

On February 17, 2020, Kawasaki City announced 2050 Zero Carbon City, stating that by the end of the year, the city will show a future image and a strategy toward zero carbon city. In November, "Kawasaki Carbon Zero Challenge 2050" was released as a starting point for zero carbon initiatives, which illustrates 2030 milestones, basic concept, and leading activities to reduce 100% of net CO2 emission by 2050.

2030 milestone was calculated by back casting the figures required to achieve zero-carbon by 2050. It includes targets from the Basic Plan (reduction of about 2.5 million tCO2 by FY2030 (26% reduction compared with FY2013) and 80% of the emissions by FY2050 compared with FY2013) and aims to reduce additional one million tCO2 in the 10 years to FY 2030. The strategy lists images of achievements of zero carbon society in Kawasaki as shown below.



Source: Kawasaki City

Figure2.20 Kawasaki Carbon-Zero Challenge 2050

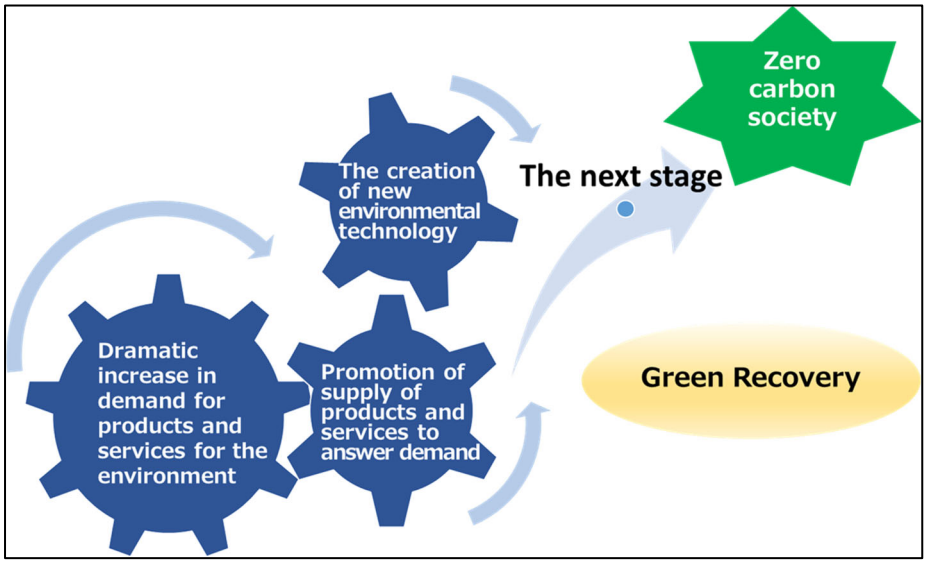
Table2.9 Images of zero-carbon society in Kawasaki in 2050

Sector	Images
Private sector (households and business operations)	(1) Zero-energy buildings (shifting to Net Zero Energy Building (ZEB) and Net Zero Energy House (ZEH)) become general. (2) Power sources based on renewables are widespread, as well as local power supply and consumption by utilizing the potential of the region. (3) Realization of compact city, decarbonization of buildings and realization of urban forest by generalizing wooden buildings. (4) 100% renewable energy utilization for the city's activities and minimization of energy consumption in public facilities.
Transportation	(1) Replacement of vehicles including cars, buses, taxis and trucks with Zero Emission Vehicle (ZEV). (2) Replacement of all official cars with ZEV.
Waste	(1) Transformation of lifestyle such as to stop using single-use plastics, transformation to biomass materials, generalization of behaviors for food loss by generalizing environmentally friendly manners of citizens and companies.
Industry	(1) More companies in Kawasaki turn to decarbonization voluntarily. (2) Innovation and business model of environmental and energy sectors generated in Kawasaki lead industries inside and outside the city. (3) Promotion of renewable energy as main energy. (4) Realization of technological innovation and industrialization to contribute to zero carbon and contributions to zero-carbon lifestyle of citizens by collaborating with companies in Kawasaki. (5) Development of society based on hydrogen energy networks. (6) Generalization of sustainable finance to contribute to decarbonization.

Source: Prepared by Nippon Koei based on Kawasaki Carbon Zero Challenge 2050

The basic approach of Kawasaki City is "to realize zero-carbon society by that consumer activity movement influences on the society. This is based on the role of municipality, "to encourage citizens and companies to act in environmentally friendly manner as a familiar existence in the community" and characteristics and advantages of Kawasaki City "accumulation of environmental technologies, industries and research institutes and existence of a lot of citizens and companies with high awareness on the environment".

"Consumer activity movements" means that consumers select environmentally friendly products and services and dramatically boost their needs (demand). Also, "Influencing society" means to accelerate supply of products and services for zero carbon and to develop new innovations. Furthermore, the city has set three pillars as drivers of these three cogwheels to achieve zero-carbon society by 2050.



Source: Kawasaki Carbon Zero Challenge 2050

Figure2.21 Image of the approach to zero-carbon society

Table2.10 Three activity pillars and unique activities

Activity pillars	Initiatives led by the city (unique activities)
Pillar I (Participation and collaboration of various stakeholders)	Establishment of zero-carbon model district (as a familiar zero-carbon model
Pillar II (Kawasaki City takes initiative)	Introduction of renewable energy to public facilities, thoroughness of energy saving and change of awareness of officers. - To reduce 10% energy consumption in city halls by 2030, by thoroughness of energy saving. - To achieve RE100 in main public facilities such as city halls and ward offices by local generation of renewable energy and procurement of renewable energy.
Pillar III (Promotion of green innovations from Kawasaki)	To consider evaluation supports and evaluation measures for companies implementing activities for decarbonization.

Source: Prepared by Nippon Koei based on Kawasaki Carbon Zero Challenge 2050

Thus, Kawasaki City is actively promoting various activities as a local government in Japan. In addition, in April 2020, the city established the Kawasaki Climate Change Information Center within the National Institute for Environmental Studies, a base for collecting and organizing information and conducting surveys and research on climate change impacts and adaptation in the region. The center is responsible for confirming and disseminating to the public information on rising temperatures, increased frequency of short-duration heavy rain, and increased risk of heatstroke, as well as sharing this information with other concerned parties in the city.

In addition to activities for environmental improvement and preservation, recently Kawasaki City was appointed to be the ambassador of "RE 100 Declaration RE Action", a new framework for small and medium-scale companies, municipalities, and educational and medical

institutions who do not meet the standard for joining RE1005 (the standard of RE100 is over 10 GWh energy consumption a year) to commit to 100% renewable energy. Through the activities as the ambassador, the city is expanding renewable energy initiatives across Japan.
In July 2019, as a result of experience of solving various issues together with citizens and business operators and initiatives for sustainable society were highly evaluated, Kawasaki City was selected by the Regional Revitalization Promotion Office of Cabinet Office as a "SDGs Future City 6". Through such activities and awards, Kawasaki City has been actively promoting climate change countermeasures and SDGs.

(3) Kawasaki Green Innovation Cluster (GIC)

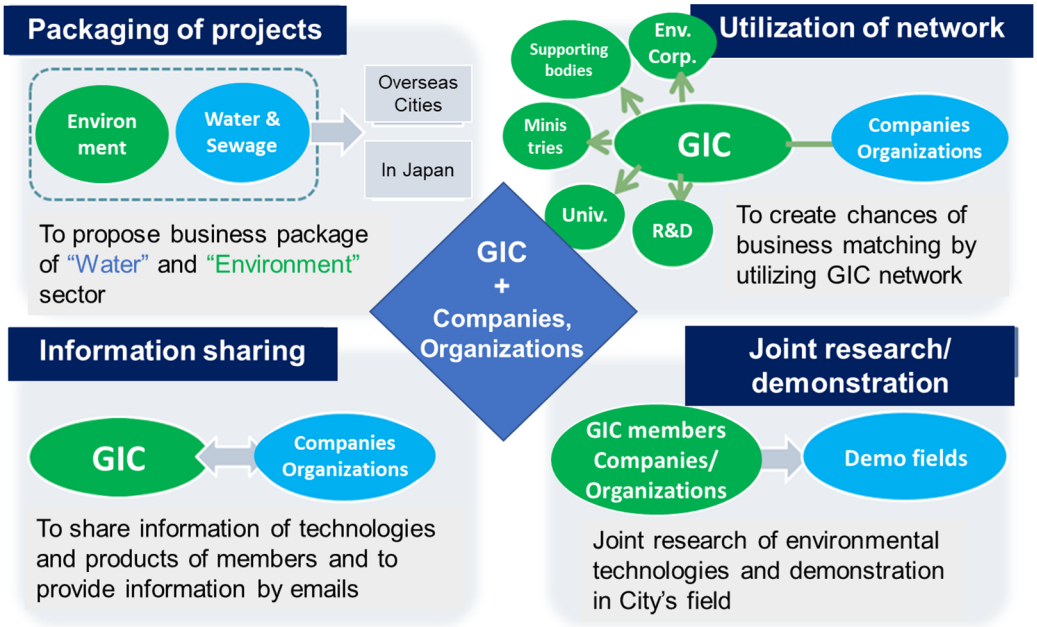
In 2014, Kawasaki City released its Promotion Policy on Kawasaki Green Innovation. It describes basic policies and practices on how to create sustainable cities by taking an advantage of environmental technologies and industries and to develop and extend Green Innovation initiatives more. The four pillars for Green Innovation are:

I. To revitalize local economy by creating and supporting environmental technologies and industries
II. To apply competitive environmental technologies and industries to city life
III. To collaborate with diverse parties to utilize environmental technologies and industries
IV. To contribute to international communities with Kawasaki's environmental technologies and industries

In 2014, Kawasaki Green Innovation Cluster (GIC) was established as a structure to promote these four pillars. It is a network for collaboration among industries, academia, and private and public sectors to improve the environment and to promote industrial development and international contributions. GIC functions to provide "access to utilization of schemes of Kawasaki City and supporting organizations", "promotion and information sharing opportunities" and "support of business development by utilizing environmental technologies, and know-how of public services".

5 RE100 is international business initiative to promote 100% renewable energy consumption by companies, operated by The Climate Group and CDP. RE100 visualizes 100% renewable energy use by companies and aims at promotion of renewable energy. Influential large companies in the world are participating in RE100.

6 SDGs Future City cities and regions with high potential to achieve sustainable development and create new values, especially economic, social and environmental values are chosen from cities and regions promoting the basic and comprehensive activities based on SDGs philosophy, these. In 2019, 31 cities were newly selected (total 60 cities).



Source: Kawasaki City

Figure2.22 Image of activities utilizing GIC

(4) Kawasaki Eco-Town

Kawasaki City positions "Eco-Town Concept" as the basic concept for creating a local circular economy and recognize it as the basis for revitalizing the local community. In 1997, the city developed "the Kawasaki Eco-Town Plan" targeting the entire coastal area of Kawasaki (about 2,800 hectares) and received approval from the government as the first eco-town in Japan. The target areas are working on resource circulation activities, with companies circulating and reusing resources and waste emitted in the city among themselves by taking an advantage of the high concentration of companies and environmental technologies in the coastal area. Also, resource circulation activities are carried out not only in the city, but in wider in Japan and overseas.

Shown below are the four pillars and concrete measures based on the Kawasaki Eco-Town Concept.

Table2.11 The four pillars and concrete measures based on the Kawasaki Eco-Town concept

Pillars of the activities	Measures
Promoting eco-friendly measures by each company	- To organize advanced recycling facilities - To encourage resource circulation based on characteristics and strengths of companies - To realize zero-emission of industrial waste and wastewater
Promoting eco-friendly measures with other companies	- To develop Kawasaki Zero-Emission Industrial Park - To implement joint recycling in the district
Undertaking researches for environment-based, sustainably developing districts	- To research on effective energy usage - To research on advancing Eco-Town initiatives - To vitalize the research and development industry

Pillars of the activities	Measures
Documenting the achievements of the companies and districts and contributing to developing countries	- To provide study tours - To hold Kawasaki International Eco-Tech Fair

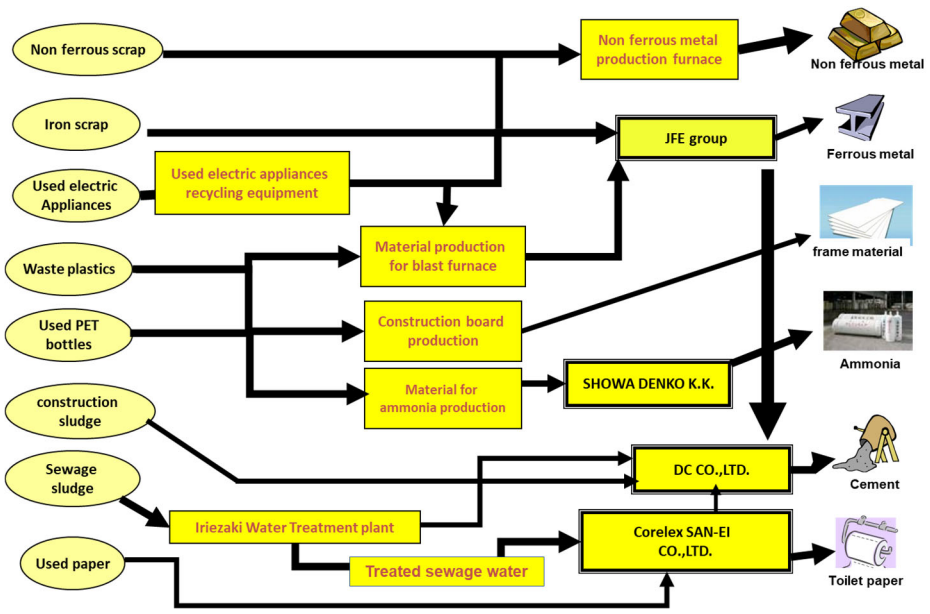
Source: Prepared by Nippon Koei based on Kawasaki City website

In 2002, in Kawasaki Eco-Town target areas, Kawasaki Zero-Emission Industrial Park started operation as a model facility of the Kawasaki Eco-Town Concept. It saves waste from business activities and aims to minimize environmental burden by reusing and recycling resources and utilizing circulated energy.
The concept and concrete measures of the Zero-Emission Industrial Park are as follows.

Table2.12 The concept and concrete measures of Zero-Emission Industrial Park

Concept	Measures
- To set own basic environmental policies by each company. - To set a higher goal (zero-emission) than the emission criteria. - To work together with other companies in the industrial park to make the activities more efficient. - To integrate factors of environmental burden into processes by cooperation among companies. - To realize total zero emission by linking things, difficult to be made zero emission in the industrial park, - with surrounding circulation function	- They set waste reduction targets for and actively save internally generated waste - The industrial park's union collects all paper waste from the companies to be recycled - To reuse waste heat energy from incineration plants - To reuse highly treated water from Kawasaki Iriezaki Water Treatment Center in the industrial park, as well as water treated in the plants - To recycle as much water as possible and reduce the work of waste treatment facilities - To reuse incineration fly ash as a raw material for cement - To compost organic waste from the companies and use as a fertilizer for communal green area in the industrial park - To use rainwater as fire protection water and irrigation water - To share each self-generated power among companies

Source: Prepared by Nippon Koei based on Kawasaki City website



Source: Kawasaki City

Figure2.23 Resources circulation in Kawasaki Eco-Town including Zero Emission Industrial Park

2.2.3 Activities for achieving SDGs

Kawasaki City made public announcement of "Action Policy for Sustainable Development Goals (SDGs) in Kawasaki City" in February 2019, and has started their activities for achieving SDGs. In addition, Kawasaki City has been selected as "SDGs Future City" in July 2019, which is selected by the Regional Revitalization Promotion Office of Cabinet Office/
Kawasaki City aims to be "the happiest city with full of joy for everyone" by 2030. To achieve this goal, the city is implementing several actions in three areas: "economy", "environment", and "social".

Table2.13 SDGs actions in Kawasaki City

Item	SDGs	Issue	Action	
Economic	3,8,9,17	Adaptation to environmental changes of industrial economy	Strengthening of global competitiveness and creation of new industry	• Creating "Green Life welfare Innovation" • Strengthening of research infrastructure
			Promotion of strategic industry accumulation at waterfront area and development infrastructure	• Enforcement of international competitiveness in industrial complex • Development "king sky front" as an international strategy hub
Social	5,10,11,17	Dealing with impact of the	Making the city comfortable to	• Diffusing a vision of "Kawasaki Para

Item	SDGs	Issue	Action	
		falling birthrate, the aging population, and population decrease	live, and providing opportunities to the citizens for great success	Movement" and creating legacy • Promotion of wood utilization by collaboration with suburban cities • Formulation of regional comprehensive care system for all citizens
			Formulation of urban community by the citizens	• Solving local issues by establishing "Machino hiroba (open space for citizens)" • Utilizing "Social design center" for solving local issues by citizens
Environment	7,12,13,17	Effort for solving global issues regarding to environment and energy etc.	Realization of low-carbon and circulatory city	• Promotion of actions for GHG emission reduction by citizen, companies, and local government • Installing hydrogen energy into waterfront area
			International contributions by utilizing knowledge on environmental technologies and administration	• Solving environmental issues in developing countries by utilizing JCM

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

In "environment", actions for GHG emission reduction and utilization of JCM are included, which shows the direction of this Project is same as Kawasaki City.

In addition to the above actions, Kawasaki City made "Kawasaki City's Strategy on Hydrogen Energy (set in March 2015)" as one of the actions to achieve SDGs. This strategy aims to realize "Future-oriented environmental/ industrial city" by installing hydrogen energy and utilizing this energy.

In addition, Kawasaki City started the "Kawasaki SDGs Partner" program from 2021 in the form of registration and certification systems for companies and organizations in the city that are working to achieve the SDGs. The city invites applications every three months under this program.

There are two stages, namely, "Registration", where a company or organization declares its intention to work toward achieving the SDGs, and "Certification", where a company or organization self-evaluates its efforts toward the SDGs and sets goals for the future. The companies and organizations that acquire the registration and certification are called "Kawasaki SDGs Partners" and "Kawasaki SDGs Gold Partners", respectively, and they receive the benefits listed in the table below.

Table2.14 Benefits of being a Kawasaki SDGs Partner

Stage	Benefits
Kawasaki SDGs Partner (Registered)	- Given registration certificate - Can use partner logo - Eligibility to participate in the Kawasaki SDGs Platform - Publication of the organization's name on the Kawasaki City website
Kawasaki SDGs Gold Partner (Certified)	- Given certification certificate - Can use Gold Partner logo - Eligibility to participate in the Kawasaki SDGs Platform - The organization's efforts will be introduced on the Kawasaki City website. - Subsidies for credit guarantee fees under the Kawasaki City Loan Program "Support Loan for SDGs Initiatives - Receive points under the "subjective evaluation system" of the Kawasaki City bidding and contracting system (registration starts in March 2022)

Source: Compiled by Nippon Koei based on Kawasaki City website.

By September 2021, when the applications were called for the third time, 205 organizations had been certified as "Kawasaki SDGs Partners" and 402 organizations as "Kawasaki SDGs Gold Partners".

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

3.1 OBJECTIVE OF THE CITY-TO-CITY COLLABORATION

Kawasaki City and DKI-JKT have started the City-to-City Collaboration Programme for Low-Carbon Society in September 2017, and its goal is "Realization of Sustainable Green Innovation". Both cities agreed in "Letter of Intent for City-to-City Collaboration for Zero Carbon Society" (hereafter "LoI") signed in March 2019. The LoI mentions that utilizing JCM for realization of zero carbon society, and promotion of favorable cooperation to achieve SDGs. This LoI will be valid for three years from the date of signing.
The achievements of the past city-to-city collaboration are as follows.

Table3.1 Achievements of the City-to-City Collaboration

#	Year	Item	Outline
1	Sep. 2017	FY2017 City-to-City Collaboration programme	The City-to-City Collaboration has started between Kawasaki City and DKI-JKT. "Green Building", "Green Industry", "Renewable Energy", "Waste Management", and "Urban transportation" was confirmed as the priority sectors of DKI-JKT.
2	Feb. 2018	Business matching for private companies between Japanese and DKI-JKT	DKI-JKT and Kawasaki city held the business matching in Jakarta area to look for candidate JCM Model Projects.
3	Apr. 2018	FY2018 City-to-City Collaboration programme	Feasibility Study for JCM Model Project formulation focusing on "Green Building" and "Green Industry" was conducted.
4	Oct. 2018	Workshop for DKI-JKT officers	Kawasaki city officer shared their knowledge/experiences with DKI-JKT officers on waste management and promotion of renewable energy.
5	Oct. 2018	Site visit in Kawasaki city	2 delegates from DKI-JKT visited the facilities in Kawasaki city on waste treatment, recycling, and mega-solar system.
6	Mar. 2019	LoI on Technical Cooperation for Zero Carbon Development between DKI-JKT and Kawasaki city	On 22 Mar. 2019, Secretary of DKI-JKT and Mayor of Kawasaki city has concluded the LoI to realize Zero Carbon society in DKI-JKT. The LoI also mentions the promoting activities regarding SDGs.
7	Aug. 2019	Application and selection of JCM Model Project in FY2019	"Introduction of high efficiency boiler system to carton box Factory", which was studied in the previous City-to-City Collaboration Programme, was applied for and selected by the Ministry of the Environment (MOE) as a JCM Model Project.
8	Sep. 2019	FY2019 City-to-City Collaboration Programme for low-carbon society	Study for JCM Model Project development regarding Green Industry and Clean Energy was carried out. Also, City-to-City Collaboration activities for SDGs started.
9	Jan. 2020	Workshop for officers of	Workshop for officers of DKI-JKT was held in

#	Year	Item	Outline
		DKI-JKT	Jakarta. Kawasaki City officers shared with DKI-JKI officers Kawasaki's public services know-how and experience on renewable energy (solar power generation, hydrogen energy generation), low-carbon city transportation (introducing EV buses) and river purification efforts.
10	Jan. 2020	Invitation to Kawasaki and study tours of facilities in Kawasaki	A DKI-JKT officer was invited to Japan to visit and study the operations of recycling facilities, EV garbage collection trucks and mega solar facilities, as well as a food waste processing plant run by a private sector business operator.
11	Sep. 2020	FY 2020 City-to-city Collaboration Project for Realization of a Decarbonized Society	We were selected for the project on the left consecutively for the second fiscal year, and we conducted feasibility studies on "Green Industry" "Clean Energy" and "Low Carbon Urban Transport" for the JCM project. In addition, we carried out city-to-city collaboration activities related to SDGs.
12	Dec. 2020	Workshop for DKI-JKT officers	DKI-JKT and Kawasaki City held an online workshop on the topic of SDGs, with a total of about 60 participants from both cities. Departments in charge of SDGs in both cities introduced their respective plans and activities to promote SDGs, and the Kawasaki City Environment Bureau introduced the outline of the Decarbonization Strategy formulated in November.
13	Jan. 2021	Online Exchange Meeting between GIC Members and DKI-JKT	An online exchange meeting between GIC member companies and DKI-JKT was held during the Kawasaki International Eco-Tech Fair (January 21 - February 5). Four GIC companies participated in this exchange meeting and introduced their technologies and products to the participants from DKI-JKT.

Source: Prepared by Nippon Koei

The objectives of collaboration between Kawasaki City and DKI-JKT are as follows.

1) Dissemination of energy-saving and renewable energy technologies in DKI-JKT by utilizing JCM Model Project
2) Promotion of Green Innovation by utilizing knowledge and experiences of Kawasaki City

The project aimed to materialize a low carbon society in DKI-JKT through JCM Model Project formulation by utilizing energy saving technologies of the companies in Kawasaki City.
Kawasaki City is an industrial city located in Keihin industrial area which has supported the economic growth in Japan. The city has a history of overcoming industrial pollution such as air pollution and water pollution that occurred by rapid industrialization and urbanization in 1960s to 1970s. It succeeded by utilizing superior technology in private companies and efforts of government and citizen. Currently, urban development is rapid in DKI-JKT and it has addressed several environmental problems such as air pollution, water pollution and waste management problem. Therefore, the experience in Kawasaki City can be used to help to solve

the problems in DKI-JKT.

3.2 IMPLEMENTATION APPROACH OF CITY-TO-CITY COLLABORATION

The activities by the two cities were carried out on two pillars: Approach (1) Feasibility studies for JCM Model Project; and Approach (2) City-to-City Collaboration activities. The former includes studies on development of JCM Model Project to introduce Japanese companies' decarbonizing and low-carbon technologies, especially those of GIC companies in DKI-JKI and its suburbs. The latter is to consider and implement activities which Kawasaki can provide in order to support DKI-JKT to overcome environmental issues.
Through discussions with DKI-JKT, it has been confirmed that the six sectors shown in the table below are high-priority sectors for DKI-JKT. The current situation of each sector is as follows.

Table3.2 High-priority sectors in DKI-JKT

Priority sector	Current situations
(a) Green industry	Indonesia has been introducing low-energy measures and renewable energy to industry sector facilities under the Ministry of Industry's Green Industry policy. Multiple industrial complexes have been built in the suburbs of DKI-JKT, housing many plants including those of Japanese companies. These plants have not fully introduced energy-saving technologies. Saving energy in the industry sector is essential not just in DKI-JKT, but nationwide, to reduce GHG emissions.
(b) Clean energy	Equipped with a reliable power network of PLN, the west side of Jawa, where DKI-JKT is located, sees almost no power outages, and enjoys steady power supply. Meanwhile power supply from PLN is insufficient in the Pacific Ocean islands, which are part of DKI-JKT, forcing facilities in the islands under DKI-JKT's administration to rely on power generators. From the standpoint of running and managing the facilities safely, introducing renewable energy is a matter of great interest. Indonesia's Electricity Supply Business Plan (RUPTL) states that the proportion of renewable energy facilities be improved from 12.52% in 2017 to 23% by 2020. Also, in the RPJMD (2018-2022), DKI-JKT clearly states that it will advance renewable energy introduction. Furthermore, DKI-JKT has a strong wish to introduce renewable energy in areas like remote islands. In addition to these, there is potential for renewable energy projects in DKI-JKT as Indonesia has a Feed in Tariff (FIT) system.
(c) Low-carbon city transportation	DKI-JKT is a city with one of the worst traffics in Asia, not just because of cars but the increasing number of motorbike taxis by businesses including Grab, Uber and GOJEK. As it is, the city has recently been limiting traffic in congested areas by the license plate number7. To ease chronic traffic, it is also evaluating improving Transjakarta operation, by introducing EV buses (making all public buses EV by 2030) and building MRT, but the heavy traffic has remained a serious issue to this day.
(d) Green Building	Thanks partly to Indonesia's rapid economic growth in recent years, DKI-

Priority sector	Current situations
	JKT has become one of the most rapidly being developed cities in Southeast Asia. The central area is packed with office buildings and residential skyscrapers, whose energy consumption has become a serious issue for the city. As it is, with support from Green Building Council Indonesia (GBCI), a Non-Governmental Organization (NGO) in Indonesia promoting Green Building, DKI-JKT has released a policy to promote developing energy-saving buildings. However, building owners have shown little interest in saving energy and Green Building has not yet seen many buildings built or spread.
(e) Waste management	DKI-JKT sees an average of 7,000 ton garbage a day due to the recent rapid urbanization. DKI-JKT Environment Agency is taking multiple responses, from separating recyclables to undertaking pre-disposal/recycling treatment and final processing, but it still has not established structured waste management. In addition, DKI-JKT's final waste disposal is just to bury the waste in a processing area in Bekasi, which is far from the city. The Environment Agency is showing a keen interest in Kawasaki's public services for waste management and final processing that involves citizens, including the recyclables separation and recyclables collection system (including 3R) already running in Kawasaki. With insufficient waste management being part of the problem, waste has been illegally dumped in rivers, contaminating water, and becoming a serious issue. Furthermore, companies in DKI-JKT are not equipped with purification equipment (such as septic tanks), resulting in unprocessed industrial wastewater flowing into the rivers. According to the Environment Agency, in the city's 13 rivers, the water quality is monitored only on Biochemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD). As illustrated, river purification is one of the most pressing issues for DKI-JKT, requiring appropriate management and solutions.
(f) SDGs	DKI-JKT's SDGs Action Plan was enacted in 2019, based on the details of the city's five-year plan Regional Medium-Term Development Plan (RPJMD). RPJMD is a development policy / plan of cities and provinces and is based on the National Medium-Term Development Plan. DKI-JKT's latest PJRMD targets five years from 2018 to 2022. The city's current SDGs Action Plan targets the same period, entailing activities for SDGs.

Source: Prepared by Nippon Koei

In addition, Indonesia's policy for the realization of green recovery from COVID-19, which is described in the "Platform for Redesign 20208", clearly mentions the above priority issues, such as "urban transportation" and "clean energy".
With regard to these priority issues, the following activities were organized in this fiscal year as a result of discussions between DKI-JKT and Kawasaki City.

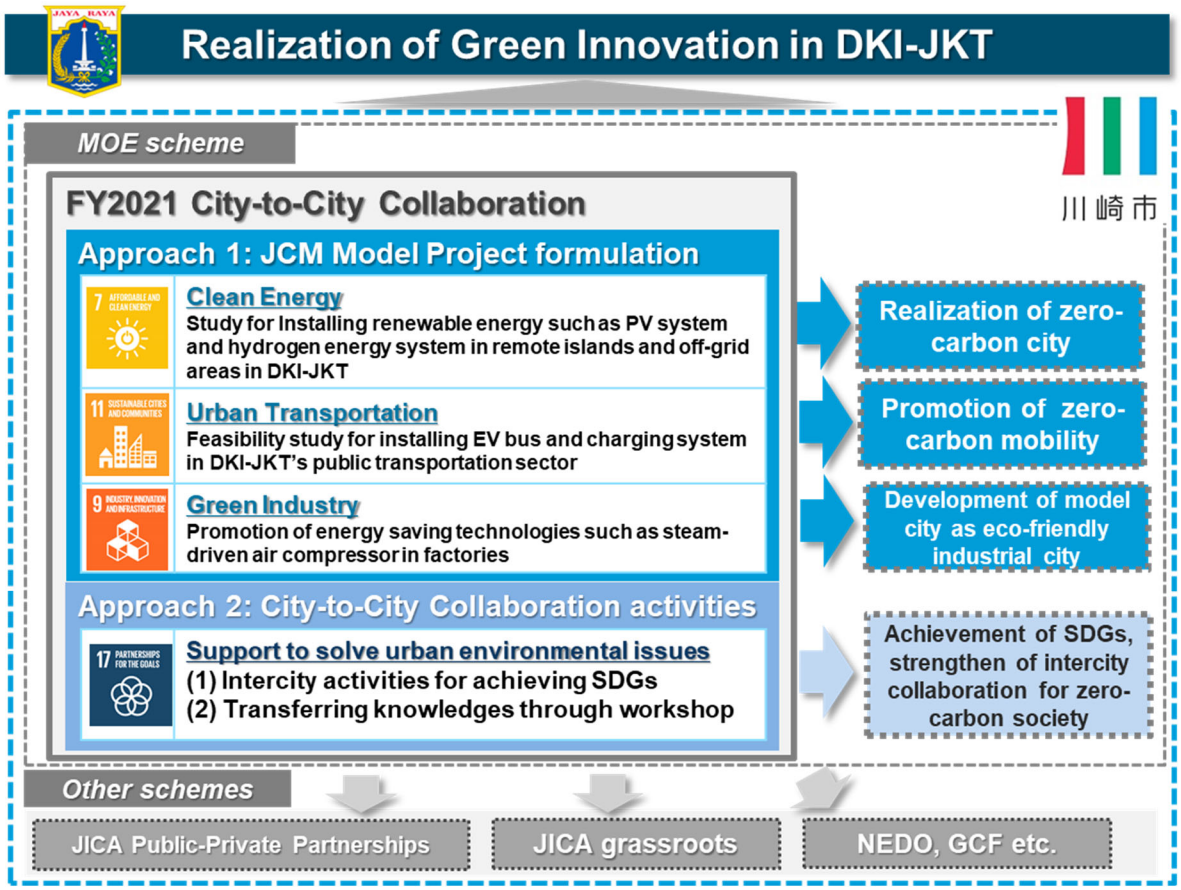
8 Limiting entry of cars to the specific parts of central Jakarta by odd-even rule, restricting entry by the last digit of the car number plate. On days whose last digit is an even number, only cars with car number plate's last digit being an even number are allowed entry.

Table3.3 This fiscal year's main activities

Implementation policy	Priority sector	Overview
Approach (1): Feasibility studies for JCM Model Project formulation	Green industry	Study were conducted at locations including plants in the suburbs of DKI-JKT on introducing energy-saving technologies such as steam-operated air compressors.
	Clean energy	Following the previous fiscal year, a study was conducted on introducing hydrogen energy supply systems in remote islands. In addition to the study on Sebira Island conducted in the previous fiscal year, a new investigative study on Pramka Island was conducted during the current fiscal year in cooperation with the Department of Energy and Mining Resources.
	Low-carbon city transportation	Together with PT. Transportasi Jakarta , a company run by DKI-JKT, information was collected to launch a JCM Model project on EV buses and power-charging systems from the next fiscal year onward.
Approach (2): City-to-City Collaboration activities	Environmental measures	Through online workshops and other measures, both cities shared their decarbonization strategies for 2050 and Kawasaki City got the opportunity to introduce to DKI-JKT the insights gained through its concrete efforts toward zero carbon, and exchange opinions.

Source: Prepared by Nippon Koei

The image of City-to-City Collaboration is as follows.



Source: Prepared by Nippon Koei

Figure3.1 Image of City-to-City Collaboration

Details of approach (1) feasibility studies for JCM Model Project formulation are illustrated in Chapter 4. Overview and results of approach (2) the City-to-City Collaboration activities are explained in the next section (3.3).

In addition to these, discussions were held to renew the LoI since this is the expiration year of the LoI mentioned above (valid until March 2022).

3.3 RESULTS OF CITY-TO-CITY COLLABORATION ACTIVITIES

3.3.1 Overview of the activities

The details of this fiscal year's activities such as meetings and workshops with DKI-JKT are summarized in the table below.

Table3.4 Activities for City-to-City Collaboration

Activities	Date	Overview
Participating in and speaking at the Kawasaki GIC member exchange meeting	September 13, 2021	Nippon Koei participated in an exchange meeting for members of the Kawasaki Green Innovation Cluster (GIC), for which, the International Economic Affairs Office, Economic and Labour Affairs Bureau serves as the secretariat, and introduced the Jakarta project to member

Activities	Date	Overview
		companies. Several companies contacted us through individual exchange meetings and we held interviews with them.
MOE's kick-off meeting	September 21, 2021	An online kick-off meeting was held by MOE, Kawasaki City, and Nippon Koei. Nippon Koei reported on the progress since MOE's pre-kick-off meeting in June and the schedule of future studies.
Visit and meeting at the Indonesian Embassy in Japan	October 4, 2021 October 13, 2021	Nippon Koei visited the Embassy of Indonesia in Japan with Kawasaki City on October 4, and had an online meeting on October 13, and the embassy said that they would actively cooperate in city-to-city collaboration, especially for the signing of the LoI.
Kick-off meeting between DKI-JKT and Kawasaki City	October 19, 2021	A kick-off meeting for this project was held and about 30 people from DKI-JKT and Kawasaki City attended the meeting. In this kick-off meeting, in addition to the discussion with Kawasaki City on the renewal of the LoI, Nippon Koei outlined the current fiscal year's activities and the upcoming schedule.
Workshop for DKI-JKT officers	December 23, 2021	DKI-JKT and Kawasaki City held an online workshop on the theme of sharing of the decarbonization strategies of both cities, with a total of about 90 participants from both cities. The environment bureaus of both cities introduced their plans and activities for zero-carbon by 2050, and Nippon Koei introduced the SDGs diagnostic tool for municipalities. After the introduction of efforts by both cities, there was a lively exchange of opinions and a Q&A session about their respective activities
Online exchange meeting of GIC members with DKI-JKT and Pekanbaru City9	December 23, 2021	An online exchange meeting was held between Kawasaki GIC member companies and DKI-JKT and Pekanbaru City. Four GIC companies participated in this exchange meeting and introduced their respective technologies and products to participants from DKI-JKT and Pekanbaru City.
MOE's interim report meeting	January 5, 2022	MOE, Kawasaki City, and Nippon Koei conducted an online interim report meeting. Kawasaki City and Nippon Koei reported on the progress since MOE's kick-off meeting in September and the upcoming study schedule.
Final report meeting with MOE	February 24, 2022	This fiscal year's activities and plans for the next fiscal year's activities were reported to MOE
International Forum on Decarbonized Cities hosted by MOE	March 9, 2022 March 10, 2022	The "2nd International Forum on Decarbonized Cities" hosted by MOE will be held online, where Kawasaki City is also scheduled to participate and speak about the city-to-city collaboration. A report on the results of this city-to-city collaboration is expected to be presented online during the forum.

Source: Prepared by Nippon Koei

9 Pekanbaru City is located in the Riau province of Indonesia, and is a municipality that carries out inter-city collaboration activities with Kawasaki City under the "FY 2021 City-to-City Collaboration Project for the Realization of a Carbon Free Society"

3.3.2 Signing of LoI

The LoI between Kawasaki City and the Jakarta Special Administrative Region will expire in March 2022, and the process of signing and renewing the LoI was started based on the agreement between the two cities during the kick-off meeting.

In Indonesia, the "Government Regulation on Regional Cooperation (No. 28/2018)" was enacted in 2018 as a regulation on regional cooperation, and more detailed procedures are stipulated in the "Ministry of Home Affairs Regulation on Procedures for Regional Cooperation with Overseas Local Governments and Overseas Organizations (No. 25/2020)". The outline of each regulation and mainly the points related to the signing of the LoI are summarized below.

Table3.5 Summary of Provisions on Regional Cooperation

Item	Contents
Outline (Government Regulation Clause 1; Ministry of Home Affairs Regulation Clause 1)	Regional cooperation refers to the cooperation between local governments in Indonesia, between local governments in Indonesia and overseas local governments, or between local governments in Indonesia and overseas organizations for the effective and efficient provision of public services and mutual benefits. Regional cooperation with overseas local governments is referred to as KSDPL, while regional cooperation with overseas organizations is referred to as KSDLL.
Areas covered by KSDPL (Government Regulation Clause 23, Ministry of Home Affairs Regulation Clause 4)	a. Development of science and technology b. Cultural exchange c. Improvement of technical capabilities and management capabilities of the government d. Promotion of regional potential e. Others that do not violate legal provisions
Requirements for KSDPL (Clause 27, Ministry of Home Affairs Regulation Clause 5)	a. There must be a diplomatic relationship. b. The cooperation activities must be carried out by local governments. c. The local governments must not open representative offices overseas. d. The overseas local governments must not interfere with the government of the country. e. The activities must be in line with national and local policies and plans. f. Administrative status/territorial equality must be maintained. g. The two cities must complement each other. h. The cooperation must strengthen the relationship between communities.
Stages of KSDPL implementation (Government Regulation Clauses 24, 26 and 28, Ministry of Home Affairs Regulation Clause 9)	1. Assessment of regional cooperation **2. Declaration of the intent to cooperate (Signing of LoI)** 3. Preparing cooperation plan 4. Approval by DPRD (Regional People's Representative Council) 5. Verification 6. Preparing draft MoU 7. Discussion on MoU 8. Approval by Minister 9. Signing of MoU 10. Implementation
Required Items and	Required items:

Item	Contents
Procedures for LoI (Ministry of Home Affairs Regulation Clauses 13 and 14)	a) Title, b) Areas covered under cooperation, c) Objectives and goals, d) Scope of cooperation e) Period of validity (within one year after signature) f) Place and date of signature Procedure for signing the LoI: 1. The Mayor must coordinate and consult with the Ministers of Home and External Affairs prior to signing the LoI. Coordination and consultation shall be conducted by submitting a written request for response to the Ministers. 2. After receiving the request, the Ministers shall submit a written response. 3. The Mayor shall sign the LoI. The same LoI as submitted to the Home Minister shall be signed.

Source: Prepared by Nippon Koei based on the "Government Regulation on Regional Cooperation (No. 28/2018)" and the "Ministry of Home Affairs Regulation on Procedures for Regional Cooperation with Overseas Local Governments and Overseas Organizations (No. 25/2020)"

As shown in the table above, it is necessary to conclude documents in line with the regulations for collaboration activities with a local government in Indonesia, that is, LoI as the first step and MOU as the second step are required. However, LoI made between Kawasaki City and DKI-JKT in 2019 has three years of valid period (until March 2022) because it was made before and after establishment of the regulations.

Since it is updating timing of LoI and it is necessary to re-conclusion of LoI in accordance with the regulations, Kawasaki City and DKI-JKT agreed to implement procedure to make new LOI for the period of FY2021 and FY2022. Also, although contents of the new LoI is based on previous LoI, new needs of DKI-JKT also would be included in.

New support needs of DKI-JKT, which was confirmed in FY2021 are as follows;

Support on river purification and air pollution countermeasures in terms of both soft and hard aspects.

- Support on promotion of public participation in waste management.
- Support on zero-carbon development of blue infrastructure (river, ponds, etc.)
- Support on implementation of RPRKD

At first, LoI contents will be fixed based on the support needs above and procedure for conclusion will be carried out. On the other hand, MoU needs to include more concrete collaboration activities. Thus, contents of MoU will be also continuously discussed between the two cities.

Implementation of the procedure for LoI and MoU was explained to Indonesian Embassy in Japan and they agreed to support Kawasaki City and DKI-JKT when necessary.

3.3.3 Kick-off meeting between Kawasaki City and DKI-JKT

The kick-off meeting for this year's city-to-city collaboration project was held online on October 19. In this kick-off meeting, we received opinions from DKI-JKT for the renewal of the LoI with Kawasaki City. Also, Nippon Koei explained the outline of current fiscal year's activities, the upcoming schedule, and requests made to DKI-JKT.

DKI-JKT showed a keen interest in renewal of the LoI. DKI-JKT also requested Kawasaki City to share the latest technology and knowledge concerning various innovations in addition to the JCM project.

[Overview of the meeting]
Date: October 19, 2021 (Tue), 14:00-15:00 (Jakarta Time)
Location: Online meeting
Participants: DKI-JKT (BAPPEDA, etc.)
Kawasaki City (International Economic Affairs Office, Economic and Labour Affairs Bureau)
Nippon Koei
2 interpreters (Japanese ↔ Indonesian),
Total of about 30 participants

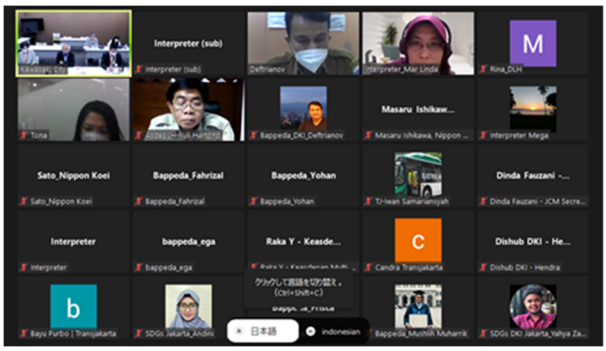
Table3.6 Agenda kick-off meeting between Kawasaki City and DKI-JKT

#	Time	Program	Speaker
1	16:00-16:05	Opening and Introduction of participants	Nippon Koei
2	16:05-16:10	Opening remarks	BAPPEDA, DKI-JKT
3	16:10-16:15	Opening remarks	Manager, International Economic Affairs Office, Kawasaki Cit
4	16:15-16:30	Explanation of FY2021 City-to-City Collaboration project between DKI-JKT and Kawasaki City	Nippon Koei
5	16:30-16:45	Discussions for LoI Update	Manager, International Economic Affairs Office, Kawasaki City
6	16:45-16:55	Request for DKI-JKT	Nippon Koei
7	16:55-17:00	Closing remarks	Manager, International Economic Affairs Office, Kawasaki City

Source: Prepared by Nippon Koei

Presentation materials of this meeting are attached as Attachment 2.


Participants from Kawasaki City



Participants of the online meeting

3.3.4 Workshop for DKI-JKT officers

An online workshop was held by DKI-JKT and Kawasaki City on the topic of sharing of the decarbonization strategies of both cities. Kawasaki City Environment Bureau introduced the specific initiatives taken for "Kawasaki Carbon Zero Challenge 2050". On the other hand, DKI-JKT Environment Bureau explained DKI-JKT's zero-carbon strategy centering on the "Climate Resistant Regional Low Carbon Development Plan (RPRKD)" announced in October 2021. In addition, CSD Co., Ltd., one of the members of Kawasaki GIC, gave an overview of their technology called the Energy Management System (EMS), and Nippon Koei introduced the SDGs diagnostic tool for municipalities.
In addition, based on the situation at the COVID-19 Disaster, an online site tour (video showing) on consumer appliance recycling technology at JFE Urban Recycle was conducted to share the information to DKI-JKT, in order to realize and share the environmental response by companies in Kawasaki City to the DKI-JKT related parties.
Presentation materials of this workshop are attached as Attachment 2.

[Overview of the meeting]
Date: December 23, 2021 (Thu), 10:00-11:45 (Jakarta Time)
Location: Online meeting
Participants: DKI-JKT (BAPPEDA, SDGs Secretariat, Environment Agency, Department of Manpower, and Transmigration and Energy, and others)
Kawasaki City (International Economic Affairs Office, Economic and Labor Affairs Bureau, Environmental Department)
Nippon Koei
2 interpreters (Japanese ↔ Indonesian)
Total of 90 participants

Table3.7 Agenda of the workshop for DKI-JKT officers

#	Time	Program	Speaker
1	12:00-12:05	Opening and Introduction of participants	Nippon Koei
2	12:05-12:10	Opening Remarks (1)	BAPPEDA, DKI-JKT
3	12:10-12:15	Opening Remarks (2)	Manager, International Economic Affairs Office, Kawasaki City
4	12:15-12:30	Introduction of “Kawasaki Carbon Zero Challenge 2050”	Assistant Manager, Global Environment & Sustainability Office, Kawasaki city
5	12:30-12:45	Introduction of Strategy for Zero Carbon by DKI-JKT	Environment Agency, DKI-JKT
6	12:45-13:00	Introduction of EMS technology	CSD
7	13:00-13:10	Introduction of “TSUMUGI@ (SDGs assessment tool)”	Environmental Dept. Kawasaki City
8	13:10-13:25	Online site tour on Home Appliance recycle center (Video Viewing)	JFE Urban Recycle
9	13:25-13:40	Q&A	---

#	Time	Program	Speaker
10	13:40-13:45	Closing remarks	Manager, International Economic Affairs Office, Kawasaki City

Source: Prepared by Nippon Koei

DKI-JKT asked many questions on Kawasaki City's activities, including the issues for realization of zero carbon city, how to involve citizens, companies and other stakeholders to achieve SDGs, and whether there are penalties and rewards to companies working for zero carbon . Main discussions in Q&A sessions are as follows.

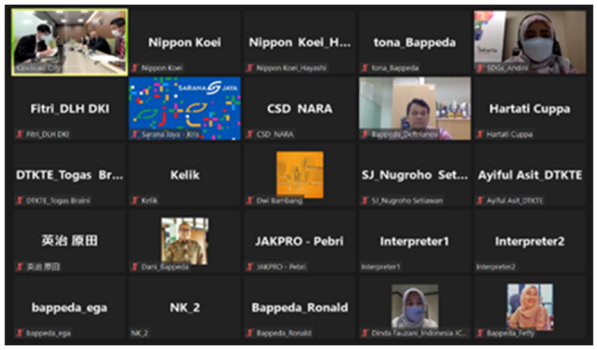
Table3.8 Q&A in the workshop for DKI-JKT officers

#	Question	Answer
1	Are Kawasaki City's initiatives, such as reducing energy use at City Hall by 10% and introducing renewable energy at its facilities, financed from government funds or through other schemes involving the private sector? (Department of Manpower, and Transmigration and Energy)	When installing energy-saving equipment in public facilities, the city utilizes various government subsidy programs. As there are no government subsidies, etc. for switching to 100% renewable energy, all costs are covered by city's budget. In addition, in August 2021, the city issued its first green bond (a bond that is issued only for projects that improve the environment), and the funds are being used for the reconstruction of the city hall and other projects. (Kawasaki City)
2	I would like to know information on beneficiaries, the form and mechanism of central government subsidies for energy saving and related projects. (BAPPEDA)	Beneficiaries are decided by public bidding. (Kawasaki City)
3	What is the current rate of renewable energy use? How many years did it take to reach the current rate? (BAPPEDA)	The usage rate of renewable energy in whole city cannot be monitored at present because there is no method for it. We have made a trial calculation of the potential of renewable energy in the city area, and the figure is 9% even in 2050. The city aims to contribute to the decarbonization of the Tokyo metropolitan area including Kawasaki, by promoting the procurement of renewable energy from outside the city and switching fossil energy to carbon-free energy in the coastal area, which is the energy supply base for the Tokyo metropolitan area, based on the premise of maximizing the use of limited renewable energy. (Kawasaki City)
4	How can TSUMUGI@ address differences in regional/city characteristics of SDGs indicators? Also, are there any website to learn more about TSUMUGI@? (DKI-JKT SDGs Secretary)	At present, it is designed to assess and diagnose comprehensive trends in local governments, but questions can be customized to fit the characteristics of each city. It is currently under development and the beta version will be completed in March 2022. If you are interested, we can introduce the application to you after April 2022. (Nippon Koei)
5	I would like to ask how cooperation among the city governement, private sector, and	The followings are two examples of collaborative efforts by citizens, businesses, and the city government. 1) Kawasaki Global Warming Countermeasures Promotion

#	Question	Answer
	local community, is implemented to achieve GHG emission reduction targets, and what results have been achieved so far. (DKI-JKT Environment Agency)	Conference (CC Kawasaki Eco Conference) The CC Kawasaki Eco Conference was established as an organization for citizens, businesses, and the city government to work together on global warming countermeasures, and as of March 2021, 110 companies and organizations are members. To promote global warming countermeasures in the city, the association is working to disseminate information domestically and internationally, share information among members, and build a network. As an initiative in cooperation with Kawasaki City, the association is holding the "Smart Lifestyle Award" to recognize outstanding efforts by citizens and businesses to reduce CO2 emissions. 2) Decarbonization Action Mizonokuchi To act for decarbonization intensively and have citizens participate in familiar initiatives, promoting initiatives in cooperation with citizens' groups and businesses in order to promote behavioral transformation and create a movement for consumption behavior to realize the effects and convenience of decarbonization initiatives. (Kawasaki City)
6	We would like to know if there are any activities being made with central government subsidies, etc., in the Zero-Carbon strategy of DKI-Jakarta. (Kawasaki City)	Utilization of specific subsidies are under consideration. As for incentives, subsidies to promote green building, simplification of permits and licenses, tax reduction, etc. are being considered. The central government is also considering the same. At the same time, they are also considering disincentives. In fact, in the case of parking lots, they have already introduced a system where parking fees are higher for cars without gas emission inspection. (BAPPEDA) Supplement: Efforts to achieve the 2030 and 2050 targets are being made at all levels (central and local government). The central government is organizing consultations, forums, and discussions. Local governments and regional units are also working on what they can do. Energy is being shifted from fossil fuels to electricity, and GHG measurement methods are being explored. (DKI-JKT Environmental Agency)

Source: Prepared by Nippon Koei

Remarks by BAPPEDA representative



Participants of the online workshop

3.3.5 The 14th Kawasaki International Eco-Tech Fair

(1) Online exhibition booth

In order to publicize the activities of this city-to-city collaboration and to encourage more companies in Kawasaki to participate in the city-to-city collaboration project, the booth was exhibited at the 14th Kawasaki International Environmental Technology Exhibition held from November 16 (Tue) to 26 (Fri), 2021, to promote this project.
A total of more than 50 people visited the online booth. See Attachment 3 for exhibition materials.

(2) Online Business Seminar of GIC members with DKI-JKT and Pekanbaru City

An online business seminar of GIC member companies with DKI-JKT and Pekanbaru City was held on December 23, 2021.
In this business seminar, the International Economic Affairs Office in Kawasaki City introduced GIC and the Kawasaki International Eco-Tech Fair,and explained how to participate in the fair. The participants from DKI-JKT and Pekanbaru City were encouraged to visit the archived pages of the fair. Soushow Co., Ltd., Kujo Company, Asian Gateway Corporation, and one other company participated in the event as GIC member companies and introduced their respective technologies and products,and held a Q&A session with the participants from DKI-JKT and Pekanbaru City to discuss the possibility of using the introduced technologies locally. The contents of the Q&A session are shown in Table3.10, and the presentation materials of each company are shown in Appendix 3.

[Overview of the meeting]

Date:	December 23, 2021 (Thu), 13:00-14:30 (Jakarta Time)
Location:	Online meeting
Participants:	DKI-JKT (BAPPEDA, Environment Agency, Transportation Bureau, Department of Manpower, Transmigration and Energy, SDGs Secretariat, and others) Pekanbaru City (Cooperation Bureau, Transportation Bureau, and others) Kawasaki City (International Economic Affairs Office, Economic and Labour Affairs Bureau) GIC member companies (Soushow Co., Ltd., Kujo Company, Asian Gateway Corporation, and one other company) Tenayan Industrial Estate (Pekanbaru City) Tepia Corporation Japan Co., Ltd. (GIC Secretariat) Nippon Koei 2 interpreters (Japanese ↔ Indonesian) Total of about 60 participants

Table3.9 Agenda in the online exchange meeting of GIC members with DKI-JKT and Pekanbaru City

#	Time (JST)	Program	Speaker
1	15:00-15:05	Introduction	International Economic Affairs Office, Kawasaki City
2	15:05-15:10	Green Innovation Initiatives in Kawasaki City	International Economic Affairs Office, Kawasaki City
3	15:10-16:10	Introduction of private companies in Kawasaki city (GIC member) that contribute to the needs of DKI-JKT and Pekanbaru City	Kawasaki GIC member companies
4	16:10-16:25	Q&A	All participants
5	16:25-16:30	Closing remarks	Manager of International Economic Affairs Office, Kawasaki City

Source：Prepared by Nippon Koei

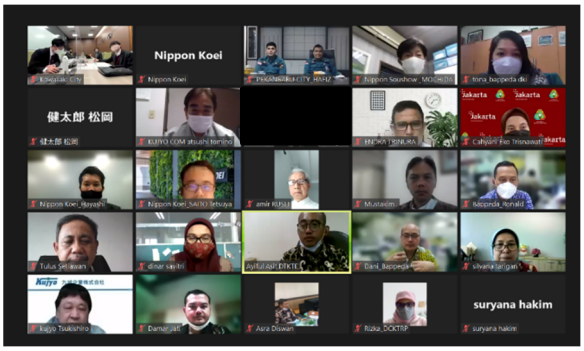
Table3.10 Q&A in the online exchange meeting of GIC members with DKI-JKT and Pekanbaru City

1. Soushow: Introduction of Heat reflecting film	
Question	*Answer*
What are the technical differences between your film and the films normally used in Indonesia? Also, are there similar products in Indonesia? (BAPPEDA, DKI-JKT)	The film sold by Soushow is called "DTEC", and I think "V-KOOL" is used in Indonesia, but it is difficult to answer this question since we don't have any information on films used in Indonesia. We don't have presence in Indonesia yet. (Soushow)
In tropical regions such as Indonesia, the air conditioner is constantly in use for ventilation when riding a car. Can power consumption be reduced in such a case? (BAPPEDA, DKI-JKT)	It is difficult to answer the question about equipment used inside vehicles, such as air conditioners, because it is the domain of other companies, but it seems to me that energy consumption can be reduced by raising the temperature of the air conditioner. (Soushow)
Are you considering using the film in buildings that are more spacious than vehicles, and what would be the effects? (Department of Housing and Settlement Areas, Pekanbaru)	The film is very effective for buildings as well, and in general, the higher the degree of sealing and the larger the number of windows, the greater the energy-saving effect. (Soushow)
2. KUJYO Company: Introduction of energy saving device (LORENTZ MG)	
Question	*Answer*
Is there any price difference between customers in the industrial and residential sectors? For example, even if the residential sector saves 10% energy, it may be very difficult to achieve the target return on investment (ROI). (BAPPEDA, DKI-JKT)	The return on investment varies depending on the electrical load factor. Generally, the more the amount of electricity used, the faster the return. This is the area that cannot be determined by price alone. (Kujo Company)
Is the working principle same as that of the capacitor bank?	The function is totally different from that of a capacitor bank. While the capacitor bank improves the

(Manpower, Transmigration and Energy Agency, DKI-JKT)	lagging power factor, the Lorentz MG uses the reactance of the coil and reduces the current value without generating a loss. A leading power factor can also be brought closer to 1 by connecting Lorentz MG in series with the capacitor bank (improving the energy saving effect). (Kujo Company)
Are there certain maintenance costs associated with the introduction of Lorentz MG? Is it possible to provide fast-moving parts to Indonesia? (Department of Housing and Settlement Areas, Pekanbaru)	Maintenance is free for seven years. When you say fast-moving parts, you are probably referring to moving parts of an automatic voltage regulator, which are not there in Lorentz MG. There are no mechanical parts in the device. (Kujo Company)
Can areas with high electrical strain affect the life of the equipment? (Department of Housing and Settlement Areas, Pekanbaru)	There is no problem even in areas of high harmonics. The iron core absorbs the harmonics. (Kujo Company)
How effective can we expect Lorentz MG to be in industries that use very noisy engines and motors? (Pekanbaru City)	It depends on the type of motor; however, if there is no fixed torque, then Lorentz MG is effective in reducing the rotation speed, thereby reducing the noise. (Kujo Company)
3. Asian Gateway: Introduction of sharing mobility project	
Question	*Answer*
What is the biggest advantage of using this service in Indonesia, where most of the people who have a license have a personal motorcycle? Wouldn't a privately owned motorcycle be more cost effective? (BAPPEDA, DKI-JKT)	A motorcycle can be privately owned or rented. Of course, the first priority is to reduce costs. Fuel costs can be reduced to about 1/6th, and operating costs can be dramatically reduced. In addition, the incentives provided by connected bikes, is an advantage. (Asian Gateway)

Source: Prepared by Nippon Koei

Presentation by Kawasaki City



Participants of the online workshop

3.3.6 Wrap-up Meeting between DKI-JKT and Kawasaki City

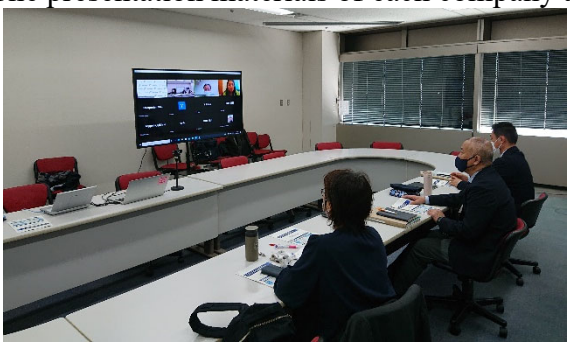
The wrap-up meeting for this fiscal year's City-to-City Collaboration Project was held online on February 18. In this wrap-up meeting, Nippon Koei reported this year's activities and received comments from DKI-JKT. In addition, both cities discussed proposed activities for the next fiscal year and beyond.

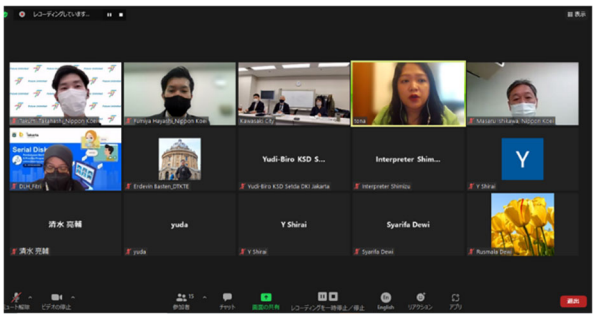
DKI-JKT commented that the workshop and the online business seminar with GIC member

companies were very meaningful and that they would like to continue the cooperative relationship with Kawasaki City in the future. Also, DKI-JKT mentioned that they would like to hold an internal meeting first, then to discuss specific activities with Kawasaki Ciy for the next fiscal year.

[Overview of the meeting]
Date: February 18, 2022 (Fri), 9:00-10:00 (Jakarta Time)
Location: Online meeting
Participants: DKI-JKT (BAPPEDA, Environment Agency, Department of Manpower, Transmigration and Energy, Cooperation Agency and others)
Kawasaki City (International Economic Affairs Office, Economic and Labour Affairs Bureau)
Nippon Koei
2 interpreters (Japanese ↔ English)
Total of about 15 participants

The presentation materials of each company are shown in Appendix 5.


Participants from Kawasaki City


Participants of the online meeting

3.3.7 Introduction on the City-to-City Collaboration to GIC Member Companies

Through the current year's GIC exchange meetings and online business seminar of GIC member companies with DKI-JKT and Pekanbaru City, interviews were held with several companies to introduce this city-to-city collaboration. The table below shows the companies that we interviewed this fiscal year.

Table3.11 The companies interviewed this fiscal year

#	Date and Time	Company Name
1	September 13, 2021 (Mon) 2nd GIC exchange meeting	MT Aquapolymer, Inc. TEPIA Environmental International Co., Ltd. Miyamatsu SOC Co., Ltd. Geo-style Co., Ltd. Anzaikantetsu Co., Ltd.
2	November 25, 2021 (Mon) 14:00-16:00 (JST)	ISUZU Co., Ltd. ELCOM Co., Ltd. And one other company
3	December 3, 2021 (Fri)	Asuene Inc.

#	Date and Time	Company Name
	14th Kawasaki International Eco-Tech Fair Face-to-face Business Meeting	VARIOSTOR Corporation Tierraponica, Inc.
4	December 23, 2021 (Thu) Online exchange meeting between GIC member companies, and DKI-JKT and Pekanbaru City	Soushow Co., Ltd. Kujo Kigyo K.K. Asian Gateway Corporation And one other company
5	January 24, 2022 (Mon) Introduction by International Economic Affairs Office, Economic and Labour Affairs Bureau in Kawasaki City	Hitachi Zosen Corporation
6	February 3, 2022 (Thu) 3rd GIC exchange meeting	Routrek Networks, Inc. Mikuniya Corporation Chitose Laboratory Corp.

Source: Prepared by Nippon Koei

CHAPTER 4 FEASIBILITY STUDY FOR JCM MODEL PROJECT FORMULATION

4.1 CONSIDERATION OF INSTALLING A STEAM-DRIVEN AIR COMPRESSOR

4.1.1 Overview of the feasibility study

Generally, air compressors account for 20% to 30% of the electricity consumed by an entire factory. The steam-driven air compressor manufactured by Miura, which was the subject of this year's survey, can take in decompressing steam and use the steam expansion energy to turn a screw and generate compressed air. This technology leads to a significant reduction in the electricity bill for the entire plant and a reduction in the peak power load.

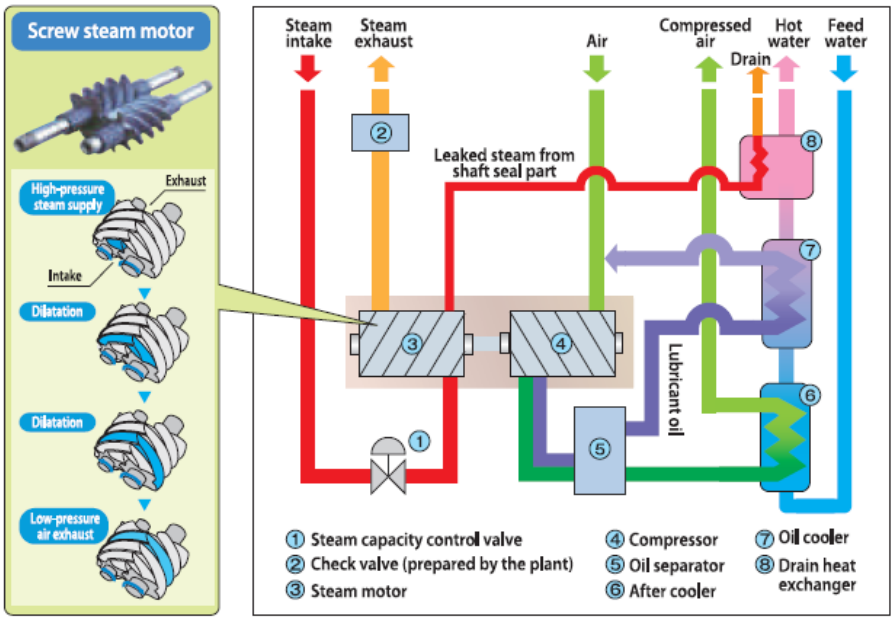
Photo: Miura

Figure4.1 Steam-driven air compressors

In addition, waste heat from the shaft seal leakage steam, lubricating oil, and compressed air generated during air compression can be recovered as hot water at high efficiency and used for boiler feed water preheating and other purposes, enabling a significant reduction in running costs and CO2 emissions in conjunction with the steam boiler.

This technology has been installed in about 200 units in Japan, and the performance of the equipment has been highly evaluated, winning the Chairman's Award of the Japan Machinery Federation at the Excellent Energy-saving Equipment Awards and the Special Award of the Judging Committee at the Japan Industrial Technology Awards.

The steam-driven air compressor SD-C, which will be introduced in this study, has been adopted in various industries, mainly in the food and chemical industries.



Source: Prepared by Miura

Figure4.2 Internal flow diagram of a steam-driven air compressor

4.1.2 Conducting surveys to understand market trends

As in the previous fiscal year, we continued to distribute questionnaires to nine local companies that have factories in sectors where steam-driven air compressors have been widely installed, such as food (four companies), chemical (one company), and furniture manufacturing (three companies), in order to collect information on companies that can be local entity to form JCM projects contributing to energy efficiency and conservation technologies in the industrial sector. The following table summarizes the main companies to which the questionnaires were distributed, including their company profiles, response status, and the possibility of forming JCM projects.

Table4.1 Information related to where the questionnaire is distributed

Name	Sector	Status of questionnaire collection
Company A	Food	Project team is waiting for their answer.
Company B	Food	Project team is waiting for their answer.
Company C	Food	Project team is waiting for their answer.
Company D	Food	Project team is waiting for their answer.
Company E	Chemicals	Collected their answer.
Company F	Interior material	Project team is waiting for their answer.
Company G	Interior material	Project team is waiting for their answer.
Company H	Interior material	Project team is waiting for their answer.

Source: Prepared by Nippon Koei

Due to the effects of the pandemic, it took some time to confirm the means of contacting each company and to introduce the technical staff, and we were unable to obtain sufficient responses to the questionnaire. A summary of the responses is shown in the table below.

Table4.2 Answers by chemical plants

#	Question	Answer
1	Which equipment do you have in your facility?	Boiler, Central air conditioning system (ex. chiller), Air compressor, Water treatment system, Electricity generator
2	Which equipment and manufacturing process consume energy/electricity the most in your facility?	Boiler, AC
3	Which fuel is mainly consumed for operation of equipment and manufacturing process?	OTHERS (Electricity from Industrial park)
4	Are you interested in installation of energy-saving technologies (including highly efficient equipment) to your facility?	Yes

Source: Prepared by Nippon Koei

4.1.3 Study on the reduction effect of steam-driven air compressors

We studied the reduction impact of steam-driven air compressors. Based on Miura's past experience, it is possible to reduce 90% of the annual power consumption by switching from regular electric-driven compressors. We calculated the amount of reduction based on a case where one steam-driven compressor (output: 75 kW, discharge air volume: 13.1 m^3/min) was installed in a chemical plant. The results of the trial calculation are shown in the table below.

Table4.3 Assumed reduction for steam-driven air compressors

#	Contents	Figure	Unit	Remarks
a	Electricity consumption (Reference)	511,330	kWh/year	Electric air compressor (Output 75 kW)
b	Emission factor	0.877	tCO_2/MWh	JCM model project (Energy saving, Jamali)
c	CO2 emission (Reference)	448.4	tCO_2/year	=a x b
d	CO2 emission (Steam-driven air compressor)	44.8	tCO_2/year	= c (1-0.9) (90% reduction from electric air compressor)
e	Annual GHG reduction	403	tCO_2/year	= c - d

Source: Prepared by Nippon Koei based on the document from Miura

4.1.4 Plan for feasibility study in FY2022

In the next year's survey, we plan to examine the possibility of introducing this product to the chemical factories that responded to this year's survey, and to consider their specific participation in the JCM equipment subsidy project by calculating more specific GHG emission reductions.

4.2 STUDY FOR INSTALLATION OF CLEAN ENERGY IN REMOTE ISLANDS

4.2.1 Overview of the feasibility study

Indonesia is an island country which has more islands than any other nation in the world. Hence, supplying stable energy and utilizing clean energy are most important issues for these islands. RUPTL specifies that total power generation capacity rate of renewable energy will be increased from 12.52% as of 2017 to 23.2% by 2028.

DKI-JKT plans to install renewable energy system into the remote islands and some areas which need dispersed power source, and the city has strongly requested the cooperation about this issue under the City-to-City Collaboration.

Especially, several islands of the Pulau Seribu under the control of DKI-JKT are not connected to the PLN's grid, and the electricity in the islands is supplied by diesel power generation system. Thus, they have serious problems such as stable electricity supply and environmental burden. The Pulau Seribu means "thousand islands" in Indonesian language, and it is a name of the northern part of DKI-JKT which have approximately 110 islands. This area is a sightseeing spot as beach resort; however, 11 islands out of 110 islands are residential areas.

According to the request from DKI-JKT, in cooperation with Enoah Inc. (hereinafter referred to as "Enoah"), a company in Kawasaki City, we have started a JCM project feasibility study on the introduction of renewable energy in the Pulau Seribu Islands. In this study, we examined the introduction of hydrogen energy supply systems. This year, based on the results of last year's study, more detailed information was collected and examined for the introduction of this system.

In the last year's survey, we collected information on the Pulau Seribu Islands with the support of DKI-JKT. As a result, Sebira Island was selected as a candidate island for the introduction of the renewable hydrogen energy storage system because it is not connected to the PLN's electricity grid system and diesel power generation is used to supply electricity on the island.

In this year's survey, we collected and analyzed information on the electricity demand of Sebira Island and the operation status of the existing diesel power generation system, and based on the results of the analysis, we studied the equipment configuration, layout, and annual power generation of the system to be introduced.

In addition to Sebira Island, DKI-JKT requested us to consider Pramka Island as a new candidate site, which is already supplied with electricity by PLN submarine cable, but there are local governmental office, hospital, schools, and hotels on the island, thus needs more stable electricity demand than Sebira Island, so the island was considered as a candidate site for the introduction of a renewable hydrogen storage system. The main survey items and outline are as follows.

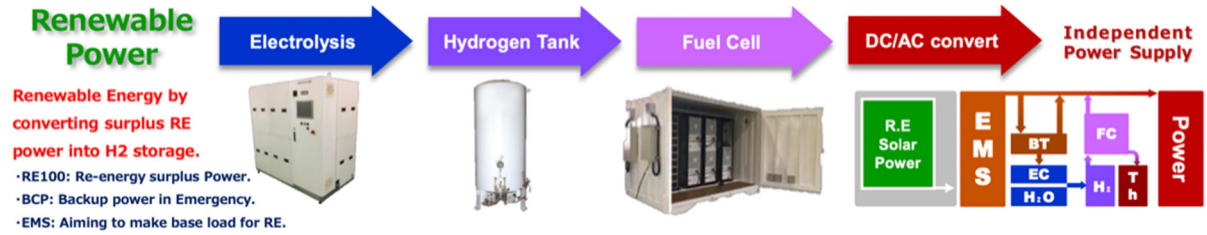
Table4.4 Study items for installation of clean energy

#	Study Items	Overview
1	Data collection of the candidate island	Electricity demand, operation status of existing diesel generators, weather, topographic information etc. of Sebira Island and Pramka Island were collected cooperated with Department of Manpower, Transmigration and Energy of DKI-JKT.
2	Consideration of system design regarding hydrogen energy supply system	Based on the data from DKI-JKT, system design, layout, and annual production of electricity were considered.
3	Support for installing clean energy by the City-to-City Collaboration	During the workshop for DKI-JKT officers which was held in December 2021, Kawasaki City officers introduced their actions for promoting hydrogen energy supply system. The details are described in Chapter 3.

Source: Prepared by Nippon Koei

4.2.2 Technology to be installed (Hydrogen Energy Supply System)

The renewable energy hydrogen storage system manufactured by Enoah consists of (i) a water electrolysis unit and power supply, (ii) a hydrogen tank, (iii) a fuel cell, (iv) a power converter, and (v) energy management control in order to stably and inexpensively supply renewable energy to remote islands and unelectrified areas. In other words, it is a one-stop energy supply system for hydrogen production, storage, and power generation.



Source: Prepared by Enoah

Figure4.3 Image of the renewable hydrogen energy storage system produced by Enoah

The control of this system is managed by the AI, which can produce hydrogen according to the amount of electricity supplied by the PV system and control the fuel cell operation according to the electricity demand to maintain the optimal operating conditions of this system.
The main features of this system are summarized in the table below.

Table4.5 Outline of renewable hydrogen energy storage system

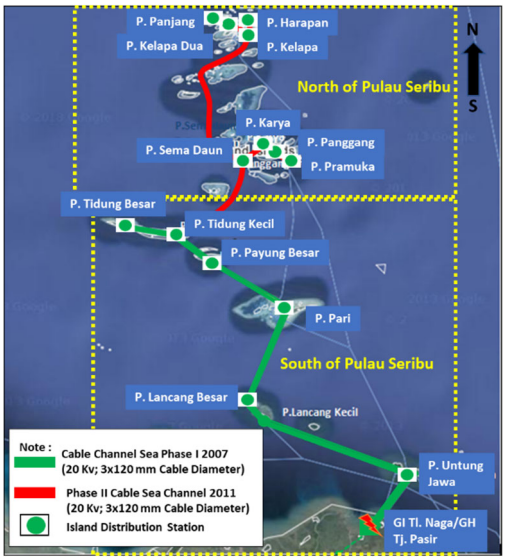
#	System	Outline
(i)	Utilization of surplus renewable energy	Promoting the effective use of renewable energy by converting surplus electricity from renewable energy sources into hydrogen for storage
(ii)	Power time-shifting	Eliminating the time mismatch between renewable energy generation and consumption
(iii)	Emergency power source for disasters	In the event of a disaster, the stored hydrogen can be used to supply the electricity needed for daily life through independent

#	System	Outline
		power generation.

Sourse: Prepared by Nippon Koei based on the documents from Enoah

4.2.3 Data collection about Sebira Island and result of its analysis

Based on the result of the last year's study, it was confirmed that several islands in the Pulau Seribu already have submarine cables which connect to PLN's electricity grid. The green line in the following figure is the cable constructed in 2007, the red line is in 2011. On the other hand, there is no undersea cable at the northern area of Pulau Seribu, and they use a diesel generation to supply electricity to the residents.



Source: Department of Manpower, Transmigration and Energy of DKI-JKT with minor revision by Nippon Koei

Figure4.4 Current situation of undersea cable in Pulau Seribu

Source: Department of Manpower, Transmigration and Energy of DKI-JKT with minor revision by Nippon Koei

Figure4.5 Location of the Sebira Island

For considering system design of hydrogen energy supply systems, collecting more detail data on candidate site, Sebira Island, was conducted in FY2020. Hence there is no grid connection on Sebira Island, electricity is provided by an existing diesel generator and a solar power system installed by the PLN and the Ministry of Mineral Resources and Energy in 2020.With the installation of these solar power systems, the power usage from the diesel generators has been reduced to 40% of what it used to be.

Photo: Solar System on Sebira Island (Photo provided by DKI-JKT)

Photo: Solar System on Sebira Island (Photo provided by DKI-JKT)

The information obtained from the Department of Manpower, Transmigration and Energy of DKI-JKT regarding the electricity demand of Sebira Island and the estimation of the hydrogen system installation is shown below. Based on this information, we estimated the amount of excess renewable energy generation that could be used for hydrogen generation in considering the introduction of a renewable energy hydrogen storage system on Sebira Island.

Table4.6 Overview of electricity at Sebira Island

1. Demand of electricity at Sebira Island				
Item		**Data**		
1	Total monthly demand10 [kWh/month]	32,027		
	For households [kWh/month]	24,953		
	For industry [kWh/month]	7,074		
2	Average daily demand [kWh/day]	1,033		
3	Average demand [kW]	43		
4	Peak demand [kW]	70		
2. Amount of electricity generated by existing diesel generators in Sebira Island (as of 2020)				
		DG1	**DG2**	**DG3**
1	Generation capacity [kW]	100	100	200
2	Cortical power [kVA]	125	125	250
3	Power factor	0.8	0.8	0.8
4	Operational hour [h/year]	4,380	4,380	For backup
5	Operational hour [h/day]	12	12	For backup
3. Operating costs of existing diesel generators on Sebira Island (as of 2020)				
Item		**Data**		
1	Power generation cost [IDR/year]	1,719,774,003		
2	Annual fuel consumption [L/year]	144,000		
3	Fuel price [IDR/L]	10,200		
4. Overview of PLN-installed solar power system on Sebira Island				
Item		**Data**		

10 Based on the data in August 2020

1	System capacity	400 kWp
2	PV module manufacture	Sky Energy
3	PV module specification	Model Type ST72M-330VA, Maximum Power 330VA, Power Tolerance ±3%, Maximum power voltage 38,6V, Maximum power current 8,6A, open circuit voltage 45,4V, short circuit current 9,1Aweight 25,8kg, temperature -40C-+85C
4	Inverter manufacture	SMA
5	Inverter specification	Sunny Island Model SI8.0H-12 Serial No. 300656072 Sunny Tripower Model STP 50-40 Serial No. 3003861414

5. Power generated from solar power system on Sebira Island

Item		Note
1	System capacity11 [kWp]	415
2	Estimated annual power generation amount12 [MWh/year]	589
3	Estimated daily power generation amount [kWh/day]	1,614

6. Surplus renewable energy generation available for hydrogen generation on Sebira Island

Item		Data	Note
1	Average daily demand [kWh/day]	1,033	
2	Average estimated daily solar energy production amount [kWh/day]	1,614	
3	Daily electricity consumable amount from solar system [kWh/day]	238	(a) Average daily demand (1,033 kWh/day) x Annual sunshine hours (2,022.4 h/year) / 365 days / 24 hours
4	Daily electricity surplus amount [kWh/day]	1,376	(b)-(c)

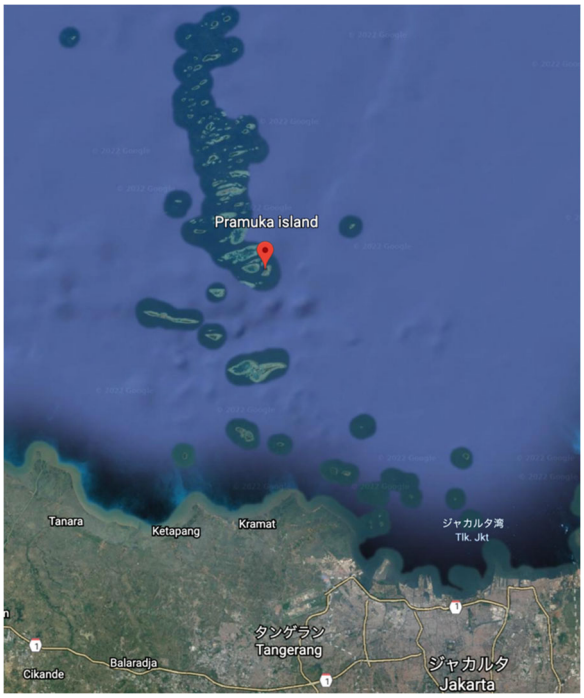
Sourse: Prepared by Nippon Koei based on the data from DKI-JKT

4.2.4 Data collection about Pramka Island and result of its analysis

In this year's survey, DKI-JKT requested us to consider Pramka Island as a new candidate site in addition to Sebira Island. Pramka Island is already supplied with electricity by PLN's submarine cable, but there are government agencies, hospitals, schools, and hotels on the island, which require a more stable power supply than Sebira Island. Since there is no backup power supply in case the submarine cable is cut, the island was considered as a candidate site for the introduction of a renewable hydrogen energy storage system.

11 400kWp×1(PLN)、15kWp ×1(Ministry of Mineral Resources and Energy)

12 Global Atlas https://globalsolaratlas.info/map?c=-5.20456,106.460531,11&s=-5.20456,106.460531&m=site



Source: Google Earth

Figure4.6 Location of Pramka Island

Source: Google Earth

Figure4.7 Location of High School No. 69

Since there is a plan to install a 15kWp photovoltaic system on the roof of High School No. 69 on the island in 2022, the introduction of a renewable hydrogen storage system using surplus electricity was considered. The electricity demand of High School No. 69 and the estimated amount of electricity generated from the photovoltaic system are shown in the table below.

Table4.7 Overview of electricity at High School No. 69 in Pramka Island

Item	Data	Note
1. **Electricity Demand for High School No. 69**		
Electricity demand [kVA]	53	
(A)Average electricity demand [kW]	42.4	Power factor: 0.8
(B) Average electricity consumption [kWh/day]	1,018	(A)×24
Peak demand [kW]	70	Estimation in last year
2. **Estimated power generation of the solar power system to be installed in High School No. 69**		
System capacity [kWp]	15	Installation in 2022
Estimated annual power generation amount [MWh/year]	21.1	Calculated by Nippon Koei with Global Atlas13
(C) Estimated daily power generation amount [kWh/day]	57.8	
(D) Daily electricity consumable amount from PV	235	(B) x 2022.4[14] / 365days / 24h

13 Global Altas: https://globalsolaratlas.info/map?c=-5.729969,106.583616,11&s=-5.74453,106.613868&m=site&pv=small,0,10,15

14 Annual sunshine hours: Calculated by Nippon Koei based on WMO data https://data.un.org/Data.aspx?d=CLINO&f=ElementCode%3a15

system [kWh/day]		
Daily solar electricity surplus amount [kWh/day]	0	(C)-(D)
3. **Maximum capacity of solar power system that can be installed in High School No. 69**		
(E) Total roof area [m²]	2,982	Calculated by Nippon Koei with Google Earth
(F) Maximum area for installing PV module [m²]	2,385	(E) Assumed to be 80% of total area
(G) Required area per solar panel [m²]	1.93	Sky Energy ST72M-330VA
(H) Number of solar panel [pieces]	1,235	(F) / (G)
(I) Maximum system capacity [kWp]	407	(H) x 330Wp

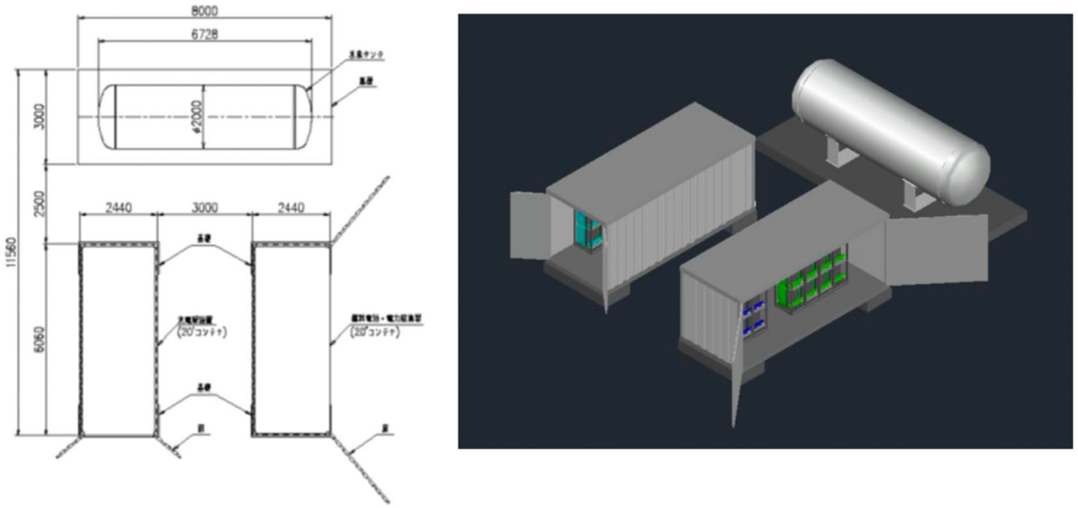
Sourse: Prepared by Nippon Koei based on the data from DKI-JKT

From the above calculations, it became clear that the 15kWp solar power system that is currently planned to be installed will generate almost no surplus power, and that all the power generated will be consumed within the school. Therefore, it can be concluded that it is unrealistic to install a renewable hydrogen energy storage system on Pramka Island at this time. However, the roof area of the school has enough space to install a larger-capacity photovoltaic system, and if photovoltaic panels were to be installed on almost all of the roof area, a large amount of surplus electricity would be generated, in which case the installation of a renewable hydrogen energy storage system could be considered.

Considering a system balance of hydrogen energy storagesystem

The system configuration of the renewable hydrogen energy storage system was studied based on the estimated annual electricity demand trend. In addition, we confirmed that 400 kWp of photovoltaic power generation systems have been installed by PLN and 15 kWp by the Ministry of Mineral Resources and Energy in 2020, and the Department of Manpower, Transmigration, and Energy proposed to use existing solar power system when installing the renewable hydrogen storage system, therefore the system was examined based on the assumption that the surplus power from the photovoltaic power generation system would be used.

The equipment configuration in this case is as shown in the figure below.



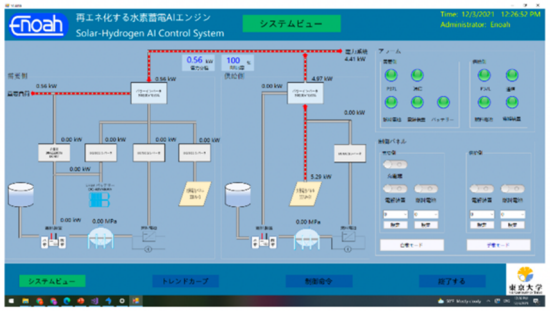
Sourse: Prepared by Enoah

Figure4.8 Image of the system configuration of the renewable energy hydrogen storage facility

This system will be housed in two 20-foot containers, with only the hydrogen tank installed outdoors. The water electrolysis system will be mounted in container 1, and the fuel cell, power converter, and control panel will be mounted in container 2. The site area required for the installation of this system is 12 meters × 8 meters in length and width.
Since fresh water is scarce on Sebira Island, it is necessary to desalinate seawater for hydrogen production. It is also necessary to have equipment to prevent salt damage. The auxiliary facilities that are expected to be necessary for the introduction of this system to Sebira Island are as follows.

Table4.8 Overview of auxiliary facilities for renewable energy hydrogen storage facilities

#	System	Outline
(i)	Pure water production for water electrolysis from seawater *Power requirement: 1.5kW at 100L/h	● Seawater desalination equipment: Separates seawater into fresh water and highly concentrated salt water ● Pure water production: Seawater desalination equipment → RO membrane + ion exchange resin → Pure water (conductivity controlled)
(ii)	Salt damage prevention	● The penetration of wind and rain containing salt causes corrosion and rust inside electrical equipment, resulting in failure. ● Countermeasures: Make outdoor enclosures airtight and install salt damage filters at outdoor air intake points.
(iii)	Visualization of power flow	● The following figure shows an example of a configuration with a renewable energy power supply side and a demand side. ● Rationalization of facility management through Internet sharing

#	System	Outline
		
(iv)	Energy management control by AI engine [Under development]	● Select decarbonized operation or sale of renewable electricity ● Establishment of green power business base by aggregators

Sourse: Prepared by Nippon Koei based on the documents from Enoah

The amount of hydrogen produced and generated by this system using surplus electricity from the existing solar power system on the island of Sebira was calculated. (Results of the calculation was not disclosed)

4.2.5 Plan for feasibility study in FY2022

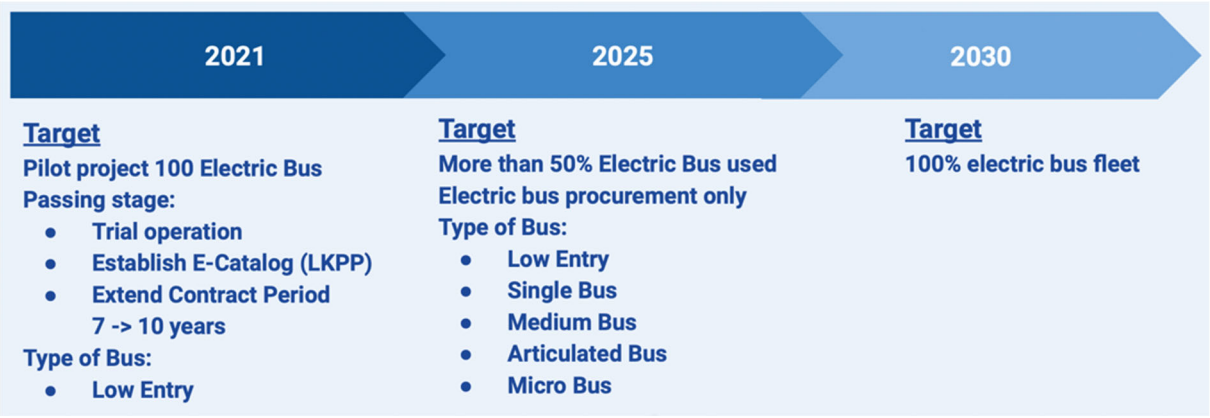
As a result of the study, it was found that some extent of hydrogen storage can be done by using electricity from existing soler PV system, which showed the usefulness of the hydrogen storage system. On the other hand, on Pramka Island, it is difficult to install the system with the planned solar power generation capacity, so it is necessary to consider the expansion of the planned solar panels. In the next fiscal year, we will continue to discuss with the DKI-JKT Labor, Migration and Energy Department, and proceed with specific studies for the introduction of the project on both islands and other candidate sites.

4.3 STUDY FOR INSTALLATION OF EV BUS AS PUBLIC TRANSPORT

4.3.1 Overview of the feasibility study

DKI-JKT has been facing to serious traffic jams, and it is necessary to find effective countermeasures for solving air pollution due to exhaust gas by cars. Recently, also with the view of climate change countermeasures, shifting to environmentally-friendly urban transportation systems attract high attention. To respond to the trend, the Governor of DKI-JKT positions prioritizing the shift to Zero-Carbon mobility as the most important issue. Particularly, EV buses plan to be installed as a public transportation in DKI-JKT on a priority basis, and this plan has just started actively since 2020.

In 2019, the Governor of DKI-JKT announced his participation in C40's Green & Healthy Streets Declaration, an international inter-city initiative to take action on climate change. In this declaration, DKI-JKT set a goal that all new buses introduced will be zero-emission by 2025, and that all buses traveling on DKI-JKT will be zero-emission by 2030.



Sourse: Prepared by PT. Transportasi Jakarta

Figure4.9 The plan to introduce EV buses in DKI-JKT

This will be followed in 2020 by the announcement of a tax exemption for battery-powered vehicles, including EVs, from the vehicle name change tax. In 2021, above mentioned Regulation 90/2021 "Climate Resistant Regional Low Carbon Development Plans (RPRKD)" was released. This regulation is a comprehensive set of climate change actions at the provincial level, and is positioned as a contribution to the Indonesian government's NDC achievement. In the last fiscal year, we conducted a survey on the plans and progress of the introduction of EV buses in DKI-JKT with the aim of forming JCM projects for the introduction of EV-related technologies owned by Japanese companies. In this fiscal year, we further studied the application for the JCM program in the next and subsequent fiscal years in detail and provided support to promote the introduction of EV buses by Hino Motors Asia. The main survey items and outline for this fiscal year are as follows.

Table4.9 Study items for installation of EV buses

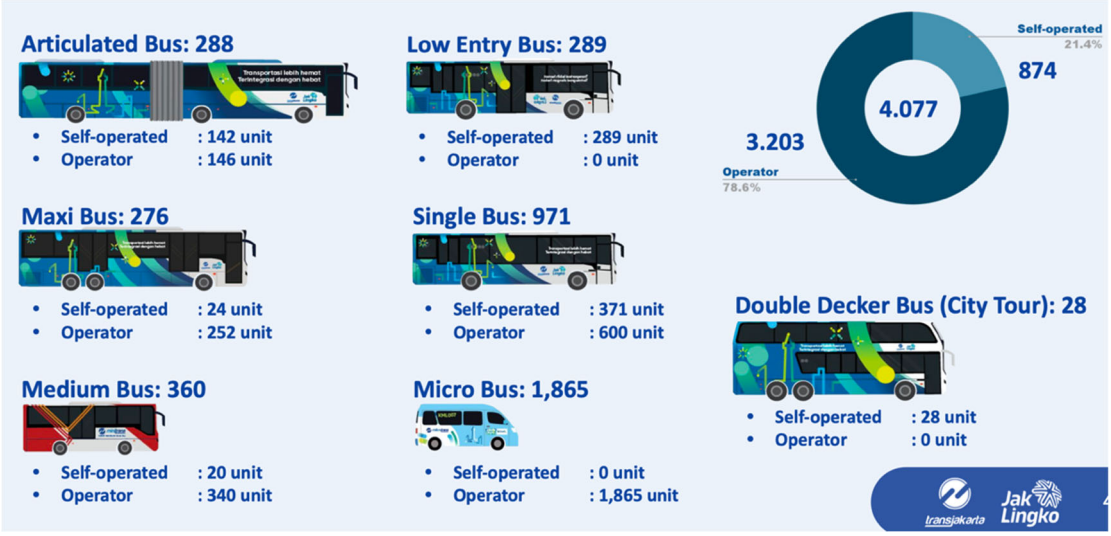
#	Study items	Overview
1	Collecting information on the introduction of BEV buses and agreeing on a participation scheme for their introduction	To collect necessary information to confirm DKI-JKT's plan for installing EV buses and their progress, discussion with DKI-JKT and PT. Transportasi Jakarta was implemented.
2	Preparation for and participation in the trial phase	We examined the specifications of the bus in preparation for participation in the trial phase. In addition to the issues related to the specifications, several issues such as how to respond after the project operation period were confirmed and discussed.

Source: Prepared by Nippon Koei

4.3.2 Public transportation system in DKI-JKT

Public buses run in DKI-JKT and nearby cities (Depok, Tangerang, Bekasi etc.) are generally called "Transjakarta" in Indonesia. The numbers of buses operated by Transjakarta have been increasing year by year with the increase of its users, and currently 4,077 units in 2021.

Currently, there are 13 corridors and 258 bus stops.15
Part of Transjakarta is owned by PT. Transportasi Jakarta which is a state-own company of DKI-JKT, however, mostly owned and operated by several private companies that PT. Transportasi Jakarta consigns a bus operation to. There are 9 private operation companies as of 2020.16
The type of Transjakarta and the numbers of each buses owned by PT. Transportasi Jakarta and private operation companies are as follows.



Source: Prepared by PT. Transportasi Jakarta

Figure4.10 Type of Transjakarta and their number (as of 2021)

Table4.10 Buses owned by PT. Transportasi Jakarta

Type of bus	Owned by Transportasi Jakarta	Owned by private operating companies
Articulated Bus	142	146
Low Entry Bus	289	0
Maxi Bus	24	252
Single Bus	371	600
Medium Bus	20	340
Double Decker Bus	28	0
Micro Bus	0	1,865

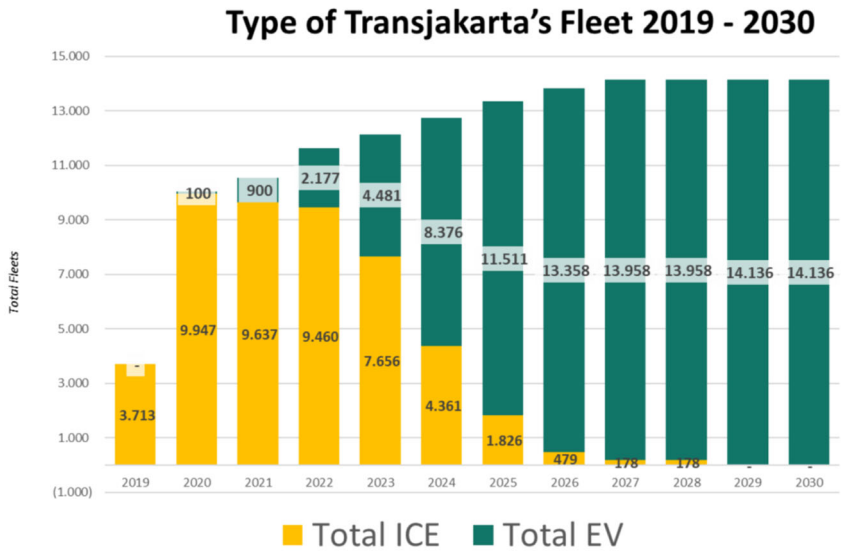
Source: Prepared by Nippon Koei based on the information by PT. Transportasi Jakarta

4.3.3 The plan on installing EV buses in DKI-JKT

According to PT. Transportasi Jakarta, it plans to increase its current fleet of about 4,000 public buses to about 14,000 by 2030, and plans to convert all of them to EVs.
The figure below shows PT. Transportasi Jakarta's plan for the introduction of EV buses from

15 http://transjakarta.co.id/produk-dan-layanan/infrastruktur/koridor/
16 https://statistik.jakarta.go.id/media/2021/11/20211221_DKI_Jakarta_Provincial_Government_Sectoral_Statistical.pdf

2019 to 2030. According to the original plan (shown in the figure below), 100 EV buses were to be introduced by the end of 2020, but due to the delay caused by the new coronavirus, only 30 EV buses have been introduced as of the end of 2021. However, there are no plans to change the plan. They will gradually make up for the delay and convert all public buses to EVs by 2030.



Source: PT. Transportasi Jakarta (2019)
ICE: Internal Combustion Engine

Figure4.11 The plan to install EV buses in DKI-JKT by 2030

Currently, about half of the public buses are microbus (11 seats/unit), inclusive of microbuses made by Japanese companies such as Suzuki and Daihatsu. As for installing EV buses, firstly large buses such as Bus Rapid Transit (BRT) plan to be changed to EV buses, secondly medium buses (approx. 7-8 m) will be changed to EV buses, and finally microbuses will be EV buses. After 2023, existing buses will be also replaced.

As mentioned above, private operation companies own and manage public buses, however, currently only 3 companies (as of September 2020) have a license to operate EV buses because different condition from operating existing buses are needed to operate EV buses in technical, financial, and manpower aspect. To achieve that all buses will be changed to EV buses by 2030, it is essential to build capacities of the private operation companies.

Table4.11 Challenges in Introducing EV Buses

#	Challenges	Note
1	Human resources	・Training for technicians ・Training for driver development ・Operation training for staff
2	Technical requirements	・Setting of technical specifications for EV buses ・Formulate regulations on technical specifications for EV buses
3	Charging infrastructure	・Develop business plans for charging equipment providers ・Construction of charging infrastructure and implementation of safety

#	Challenges	Note
		measures
4	Bus operation	・Formulate operational methods for EV bus service ・Examination of boarding methods ・Ensuring safety in EV bus operations

Source: Prepared by Nippon Koei based on the documents from Institute for Transportation & Development Policy

4.3.4 Support by other countries on installing EV buses

DKI-JKT has received several types of support from international donors or other countries to install EV buses as a public transportation.

(1) Technical support by Climate Technology Centre and Network (CTCN)

Ministry of Environment and Forestry, Indonesia has submitted a request paper to Climate Technology Centre and Network (CTCN) on technical support (project title: Support for e-mobility transition in Jakarta) in June, 2019 to install EV buses in DKI-JKT. According to the request, CTCN has already started their support to DKI-JKT, and it was completed in 2021. Main contents of the support are described as follows.

Identifying essential policies of both National level and regional level, and necessary infrastructure to install EV buses

Preparing an investment plan and a document for fund procurement

Evaluating a possibility of application of charging systems utilizing renewable energy

Source: Provided by IGES

Figure4.12 Request paper to CTCN

(2) Support by C40 Cities Finance Facility

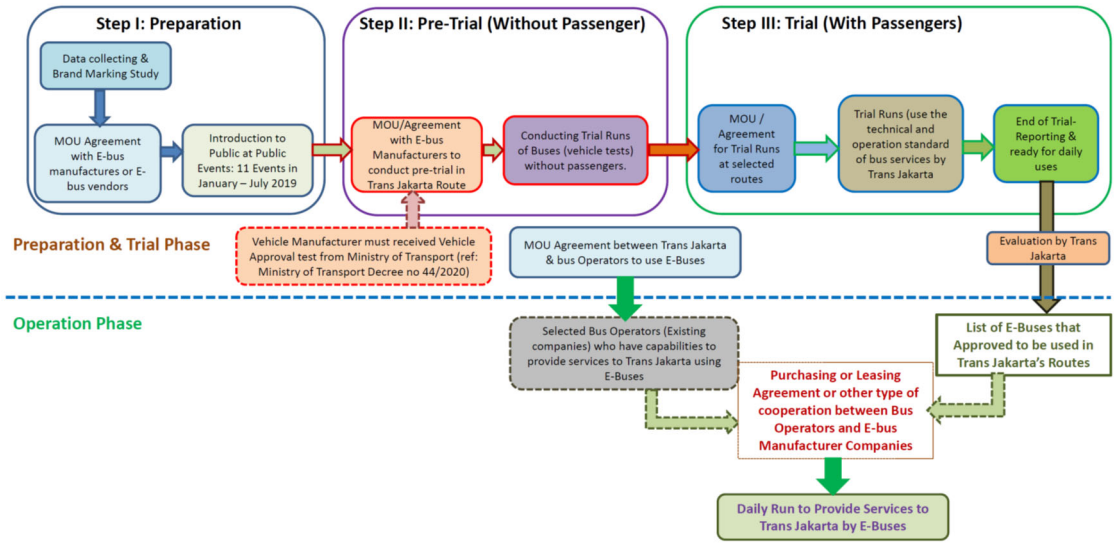
C40 which DKI-JKT also joins has mainly 2 types of support, “Networks” and “Programmes”, and these supports provide various services to member countries. One of the Programmes is called “C40 Cities Finance Facility (CFF)[6]” which supports fund procurement to implement a project regarding climate change countermeasure in developing countries, and DKI-JKT has been received this support to install EV buses. The brief contents of support are as follows[7]. The CFF’s support mainly aims to confirm the best way of procuring 100 EV buses for trial runs, and it was completed in 2021.

a) Advise technology/system options and technical set-up of EV buses operations as well as associated knowledge management on technical and economic parameters of EV buses operations.
b) Develop a business case which can advise the financial feasibility of 100 EV buses trials by taking into account all relevant cost parameters, e-bus km tariff, contract parameters (risks, compensation and duration) and subsidy requirements.

c) Identification of applicable/feasible financing options.
d) Procurement strategy for 100 EV buses trials.

4.3.5 Progress of trial run for installing EV buses

In order to install EV buses as public transportation, a trial run in several routes is being conducted to check technical validation and necessary procedure for the operation. There are mainly 3 processes by the time when EV buses are provided as transjakarta. Regarding to trial run, 2 types of trial run, first is "Pre-Trial" which is conducted without passengers and second is "Trial" which runs with passengers. The following figure shows a flow chart to install EV buses in DKI-JKT.



Source: Provided by IGES

Figure4.13 Flow chart to install EV buses in DKI-JKT

The table below summarizes the objectives and duration of each of the test runs, the subsequent pilot phase, and the full-scale operation phase.

Table4.12 EV bus introduction phase

#	Phases	Purpose	Period	Note
1	Test run (Equivalent to Step I and II on Figure4.18)	Product/quality check	3-5 months	Initiated by OEM, 1 unit test (chassis CBU available)
2	Pilot (Equivalent to Step III on Figure4.18)	Confirmation of operation and tentative conclusion of contract	2 years	Conclude contract between Transjakarta and operator, confirm CPK, negotiate revision. Local assembly is a requirement.
3	Full operation (Equivalent to Operation Phase on Figure4.18)	Full-scale operation and contract execution	8 years	Contract signed between Transjakarta and operator, one type of bus per route in operation. Local assembly is a condition.

Source: Prepared by Nippon Koei based on the documents from Hino Motors Asia

For conducting trial runs, PT. Transportasi Jakarta has been collecting data from EV manufacturers, and preparing to trial runs. The following table shows the part of study result by PT. Transportasi Jakarta conducted from 2019 to 2020. It seems that Chinese manufacturers show their high interest in the EV project in DKI-JKT in the fact of situation of MOU and Pre-Trial.

Table4.13 Study result for implementing trial runs of EV buses (2019-2020)

No	E-bus providers/companies	Type of Buses			Document and Progress			Target of Pre-trial E-Bus	Remarks
		Micro	Medium	Single	Brochure	Schedule	MOU		
1	BYD (China)	1	1	1	√	√	√	October 1st, 2019	Finished Trial in Oct, 2020
2	ITB	-	2	-	√	√	√	16 Dec, 2019	
3	PT Mobil Anak Bangsa (MAB)	-	-	1	√	√	√	Don't join trial	Don't join the trail phase
4	RAC-Danfoss (China)	-	-	1	√	√	√	01 February 2020	
5	Mitsui – Caetano Bus (Japan)	-	-	1	√	-	-	01 Nov, 2019	Preparing MOU
6	Volvo	-	-	1	√	-	-	-	-
7	GAZ	-	-	1	√	-	-	-	-
8	SCANIA	-	-	1	√	-	-	-	-
9	SKYWELL (China)	1	1	1	√	-	-	Dec, 2020	Start trial in December 2020 –
10	MITSUBISHI (Japan)	-	-	1	√	-	-	-	-
11	KINGLONG (China)	-	1	1	√	-	-	January 2021	HIGER bus, trial in January 2021
12	University of Indonesia	-	-	1	√	-	-	-	-
13	HINO (Japan)	-	-	1	√	-	-	-	-
14	Winnerway	-	1	1	√	-	-	15 July, 2019	-
15	Institute of Technology Surabaya (ITS)	-	-	1	√	-	-	-	-
16	Mercedes Benz	-	-	-	√	-	-	-	-
17	Toyota (Japan)	-	-	-	√	-	-	-	-
18	ZHONGTONG (China)	-	1	1	√	-	-	2020	-
19	ZTE (China)	1	1	1	√	-	-	2020	-

Source: Provided by IGES

The current progress of trial runs (Pre-Trial and Trial) from 2020 to 2021 is as follows.

(1) Trial run by BYD (China) and PT Bakrie Autoparts (Indonesia)

Table4.14 Case of trial run (1)

Schedule of Pre-trial	3 months, started from July 6, 2020 and finished in early of October 2020
Operation	10:00 – 22:00, every day
Route	Blok M – City Hall
Bus type	BYD K9 (Length: 12 m, Wide: 2.5 m, Height: 3.3 m), Battery: 324 kwh BYD C6 (Length: 7 m, Wide: 2.1 m, Height: 3.0 m), Battery: 135 kwh
Charging time	4 hours
Travel distance of bus	250 km

Source: Prepared by Nippon Koei based on the data from IGES

Case of trial run (1) photo1

Case of trial run (1) photo2

BYD has already teamed up with PT Bakrie Autoparts, a local company, and completed the trial phase with large and medium buses. Thirty completed vehicles have already arrived at DKI-JKT for the next phase of pilot implementation.
As a result of the test run, it was reported that the air conditioner inside the vehicle could not meet the required temperature (below 25 degrees Celsius) and that the automatic BMS condition reader was not installed.

(2) Trial run by SKYWELL (China) and PT Kendaraan Listrik (Indonesia)

Table4.15 Case of trial run (2)

Schedule of Pre-trial	Pre-trial is not needed because specification of their buses has already followed the general specification of buses for Transjakarta (height of doors, number of doors, seating arrangements etc.)
Schedule of Trial	Started from 22 December 2020
Route	Several corridors
Bus type	NJL 6126 BEV (length: 12 m, weight: 16 ton), Battery: 256 kwh
Charging time	2 hours
Travel distance of bus	260 km

Source: Prepared by Nippon Koei based on the data from IGES

Case of trial run (2) photo1

Pre-Trial completed on large, high-floor model; preparing to conduct trial. Preparing for trial (as of May 2021).

(3) Trial run by PT INKA (Indonesian national railway manufacturer)

Table4.16 Case of trial run (3)

Schedule of Pre-trial & Trial	From 23 December 2020 to 6 April 2021 (Pre-trial: 2 weeks, Trial: 3 months)
Bus type	E-Inobus (Medium size bus, length: 8 m) Max speed: 90km/h,max grade ability: 14%)
Travel distance of bus	200 km

Source: Prepared by Nippon Koei based on the data from IGES

Case of trial run (3) photo1

Case of trial run (3) photo2

Pre-Trial completed on 8-meter medium bus; preparing to conduct trial. Preparing for trial (as of May 2021).

(4) Trial run by HIGER (China)

Table4.17 Case of trial run (4)

Schedule of Trial	3 months from early January 2021
Bus type	Single bus (length: 12 m, weight: 13 ton), Battery: 385 kwh
Travel distance of bus	300 km

Source: Prepared by Nippon Koei based on the data from IGES

Case of trial run (4) photo1

Case of trial run (4) photo2

Pre-Trial completed for large and low-floor models. Preparing for trial (as of May 2021).

4.3.6 Study of EV bus introduction by Japanese companies

According to PT. Transportasi Jakarta, the trial will be closed once the provision of vehicles from several companies is secured. However, PT. Transportasi Jakarta has also requested Hino Motors Asia, a Japanese company with experience in diesel and CNG vehicles in Indonesia, to participate in the test run of the EV bus introduction, and the company has already made a decision to participate in the test run.

Hino Motors Asia recognizes that the key to promoting this tender is to establish the conditions necessary for this bid (vehicles to be introduced, local assembly, sales methods such as leasing, etc.) and to acquire the operational know-how of EV buses (after-sales service specific to electric buses, etc.). By doing so, the company is considering the possibility of proposing EV

buses as a package to PT. Transportasi Jakarta and operating companies.

4.3.7 Consideration of charging facilities

In this trial, the development and provision of charging infrastructure is one of the roles of chassis manufacturers like Hino Motors Asia. It is known that PT. Transportasi Jakarta intends to use two different types of charging facilities, normal charging and quick charging, for the operation of EV buses. For buses that mainly run within the city, they will use normal charging at night, and for high-floor buses that run within and outside the city, they will use quick charging.

Table4.18 Basic requirements by Transportasi Jakarta for EV bus charging

Operating hours	5:00～22:00
Running distance	200～250km/day
Battery life	8 years

Source: Prepared by Nippon Koei

Table4.19 EV bus charging system

	Normal charging (Overnight Charging)	Quick charging (Opportunity Charging)
Provider	OEM	Transportasi Jakarta
Applied model	Large low-floor buses, large high-floor buses	Large high-floor bus (long-distance operation)
Charging model	Charging at night when buses are not in service	Charging during off-peak hours during operation
Place, management entity	Managed by the operator at the operator's bus stop	The location, number of installations, and management entity are under consideration.
Note	Transportasi Jakarta is considering reducing the initial investment burden on operators by investing in charging equipment itself.	Regarding the installation of charging stations, Transportasi Jakarta is basically open to collaborating with other companies.

Source: Prepared by Nippon Koei based on the documents from Hino Motors Asia

During the current test run phase, the bus operating companies are considering the specifications, standards and EMS of the charging equipment. Hino Motors Asia plans to follow the standards for charging equipment adopted by the bus operators.

4.3.8 Plan for feasibility study in FY2022

Based on the results of the information collected in this fiscal year, we will continue the JCM project development study for the introduction of EV buses in DKI-JKT in the next fiscal year. In addition, we have confirmed with DKI-JKT that the purchaser of the EV bus is a private bus operator, not PT. Transportasi Jakarta. Therefore, in the next fiscal year, we will start discussions not only with PT. Transportasi Jakarta but also with private bus operators that meet the requirements for introducing EV buses. As soon as we are able to confirm the high level of

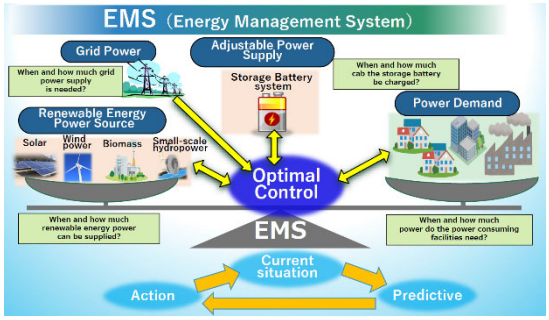
interest and feasibility on the part of DKI-JKT for the project proposed by Japanese companies, we plan to discuss the international consortium and business plan for applying for the JCM program.

4.4 STUDY ON THE INTRODUCTION OF EV BUS CHARGING OPTIMIZATION BY IOT

4.4.1 Overview of the feasibility study

This study provided support to CSD Co., Ltd. (hereinafter referred to as "CSD"), a GIC member and a company in Kawasaki City, to examine the possibility of introducing their EMS technology to optimize the EV bus recharging system. This study examined the possibility of introducing the company's EMS technology to optimize the EV bus charging system. Although specification confirmation of charging and discharging system and interface with EV bus was planned at the beginning of this study, they have not been done since the progress of plan shown in 4.3 has been taking time.

EMS is a system that optimally controls the entire energy system by assessing the current status of when and to what extent grid power is needed, renewable energy sources can be supplied, storage batteries can be charged and discharged, and how much power is needed by power-consuming facilities.
CSD is mainly engaged in the development of environmentally and safety-conscious systems using EMS technology.



Source: Prepared by CSD

Figure4.14 Image of EMS technology

The main survey items and summary for this year are as follows.

Table4.20 Study items and outline for optimization of EV bus charging system

#	Study item	Overview
1	Commercialization study of EV bus charging optimization	A simulation study was conducted on the usefulness of EMS technology and renewable energy for optimizing the EV bus charging system.
2	Sharing of basic knowledge and know-how on EMS to local communities	CSD joined the workshop as one of the speakers for DKI-JKT staff held on December 23 2021, and shared their basic knowledge of EMS technology.

Source: Prepared by Nippon Koei

4.4.2 Results of the study on the introduction of EMS technology into the EV bus charging system

In order to study the possibility of applying EMS technology to the EV bus charging system in DKI-JKT, we calculated the GHG reduction. Each value was calculated by referring to local

information from PT. Transportasi Jakarta and other sources, and using hypothetical data for information that was not available. In discussions with DKI-JKT and related organizations, we have not received any requests to introduce EMS technology for EV bus charging systems. Therefore, we have considered the introduction of EMS technology based on the assumption that the technology will be used by CSD and that EMS will be widely used in the DKI-JKT area in the next fiscal year and beyond.

The results of the calculations are shown in the table below and the figure below. When discussing the effect of EMS, it is common to include the effect of adopting solar power generation in the evaluation, and the effect of only EMS in this case is

- Reduction of purchased electricity by storage batteries: 3-6% (depending on the size of the storage batteries)
- Reduction in electricity consumption by control: approx. 10% (varies depending on control target and content)

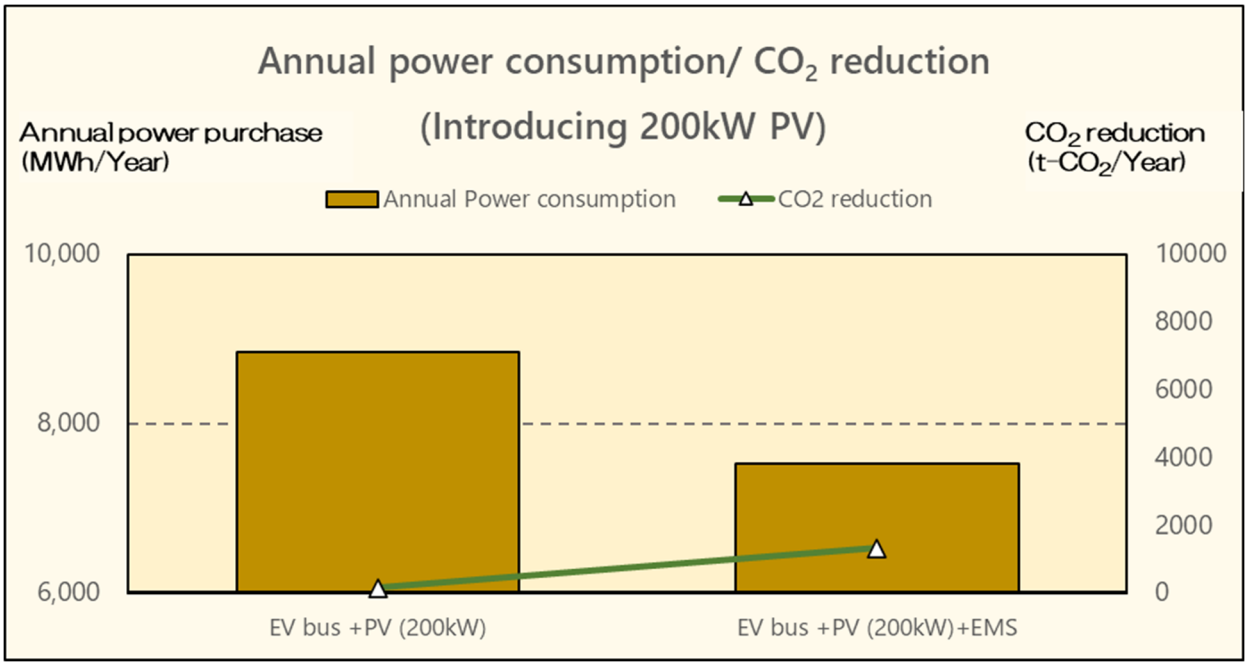
The overall effect was assumed to be 15% in this study.

Table4.21 Results of the study on the introduction of EMS technology into the EV bus charging system

#	Contents	Figure	Unit	Remarks
a	Annual electricity consumption (Introduction EV bus)	9,125	MWh/Year	Number of EV bus: 100 Milage per an EV bus: 250 km/day Electricity efficiency: 1 km/kWh
b	Annual power generation (PV system)	272	MWh/Year	Solar power capacity: 200 kW Source: Global Solar Atlas17
c	Annual electricity consumption (EV bus + PV system)	8,853	MWh/Year	= a－b
d	Emission Factor	0.613	t-CO2/MWh	JCM model project (Renewable Energy, Jamali)
e	Annual GHG reduction (PV system)	167	t-CO2/Year	= b×d
f	Reduction effects (Storage batteries + EMS (PV optimal control))	15	%	Storage batteries capacity: 250 kWh Hypothesis data
g	Emission Factor	0.88	t-CO2/MWh	JCM model project (Energy saving, Jamali)
h	Annual electricity reduction (EV bus + PV system + Storage batteries + EMS)	1,600	MWh/Year	= a－(c×(1－f /100))
i	Annual GHG reduction (PV system + Storage batteries + EMS)	1,335	t-CO2/Year	= e + (c×f /100) ×g

Source: Prepared by Nippon Koei based on the documents provided by CSD

17 https://globalsolaratlas.info/map?c=-6.200629,105.80658,8&s=-6.177176,106.823888&m=site&pv=ground,0,9,200



Source: Prepared by Nippon Koei based on the documents provided by CSD

Figure4.15 Results of EMS installation study for EV bus charging system

From a~e of Table4.21, the annual GHG emissions reductions when a 200 kW solar power system is installed for an EV bus system are 167 t-CO2. In addition, the annual GHG emission reductions when EMS and storage batteries besides on the above solar power system are installed is 1,600 t-CO2, assuming a 15% reduction effect, indicating the reduction effect of EMS. This information has already been shared with the DKI-JKT side.

4.4.3 Plan for feasibility study in FY2022

This year's study has confirmed the GHG reduction effects of CSD's EMS technology. However, no needs for the introduction of EV bus charging systems have been identified.
Hence this technology (EMS technology) is highly versatile and CSD is positive about entering the Indonesian market, we will continue to formulate projects in the next fiscal year with a view to expanding not only to EV bus charging systems, but also to building air conditioning and street lighting.
In particular, since the effectiveness of EMS increases comparatively when combined with renewable energy sources such as solar power generation, we will survey needs in various sectors in the next fiscal year and explain the effects of the introduction of EMS, with the aim of developing a JCM equipment subsidy project.

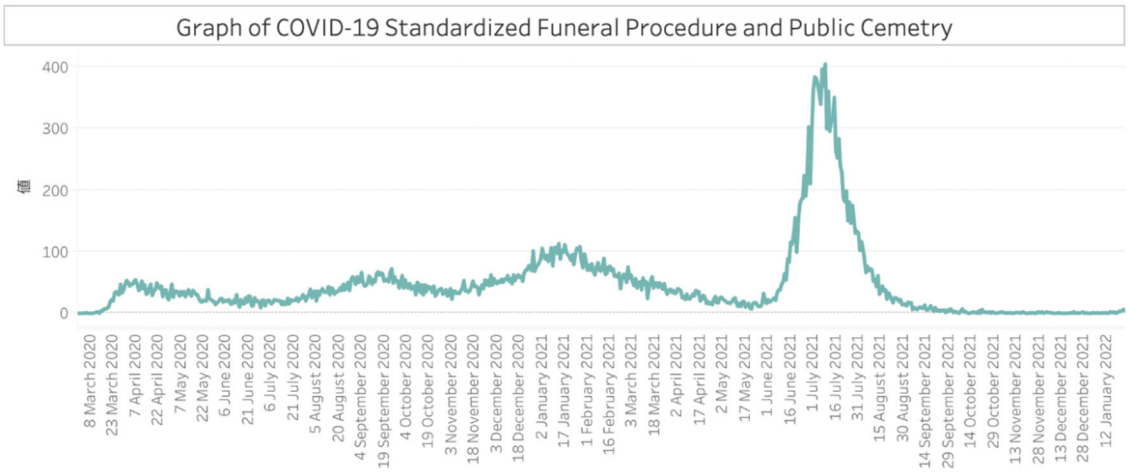
CHAPTER 5 ISSUES AND INGENUITY IN CONDUCTING THE PROJECT AGAINST THE BACKDROP OF COVID-19

The field surveys, consultations between the two cities, local workshops, City-to-City Collaboration seminars, etc., which should have been major activities if 2021 were a normal year, were held completely online and conducted under physical restrictions due to the impact of the spread of COVID-19 after January 2020 in the City-to-City Collaboration programme of FY2021. However, some of the activities were carried out with ingenuity or replaced by alternative activities even against the backdrop of the COVID-19 pandemic. Also, some activities were postponed until FY2022. Those activities are summarized below for reference in FY2022.

5.1 IMPACT OF COVID-19

According to a report by the International Monetary Fund (IMF) (January 2022), the global economic growth rate is expected to slow to 5.9% in 2021 and 4.4% in 2022 due to the global spread of the new coronavirus.18

As of January 2022, the total number of people infected with the new coronavirus in Indonesia exceeded 4.29 million, making Indonesia one of the countries with the highest number of infected people in Southeast Asia. Although the peak of infection by the delta strain in July 2021 has been surpassed, as of January 2022, there is a concern that the number of people infected by the Omicron strain is on the rise.



Source: The special site of DI-JKT to provide information on COVID-19 (https://corona.jakarta.go.id/en)

Figure5.1 Shift of the number of newly infection cases in DKI-JKT

In response to the spread of the disease, the governor of DKI-JKT has intermittently implemented the PSBB since April 2020, which requires people to work from home in industries other than the 11 that are directly related to the lives of the people, thereby

18 IMF website: https://www.imf.org/ja/Publications/WEO/Issues/2022/01/25/world-economic-outlook-update-january-2022

discouraging the movement of people. The 11 industries that are exceptions to the restriction are (1) health, (2) food, food and beverage, (3) energy, (4) communications and information technology, (5) finance, (6) logistics, (7) hotels, (8) construction, (9) strategic industries, (10) basic services, public benefits, industries related to the country's most important facilities and specific facilities, and (11) daily necessities. (11) daily necessities.
The spread of the disease did not stop in 2021, and PSBB was implemented from January 11, 2021 to February 22, 2021. The PSBB was implemented from January 11, 2021 to February 22, 2021, after which it was replaced by the more relaxed Micro-based PPKM, which was repeatedly extended until June of the same year. Furthermore, in July of the same year, the number of infected people and deaths skyrocketed due to the spread of the delta strain. DKI-JKT was categorized as "Level 4", the most serious infection, and the restrictions were extended until August of the same year. At the end of October, DKI-JKT was further reduced to "Level 2" and then to "Level 1" in November, but the restrictions remained in place until January 2022. At the end of October, DKI-JKT was further reduced to "Level 2", and since November to "Level 1", but the restrictions are still in place as of January 2022.

5.2 INGENUITY IN CONDUCTING THE PROJECT SMOOTHLY UNDER COVID-19

In FY2021, it was difficult to carry out field survey and face-to-face meetings with DKI-JKT officials and relevant persons since overseas travel has been restricted due to COVID-19 spreading. Thus, city-to-city collaboration activities, discussions for JCM project formulation, workshop, etc. were necessary to be carried out by online or new way.
The Project was implemented on two pillars: Approach (1) City-to-City Collaboration activities and Approach (2) JCM project formulation studies. The following table shows main difference between activities before COVID-19 pandemic and ones in the with-COVID-19 era including FY2021.

Table5.1 Activities of the Project considering COVID-19 situation

Activities	Before COVID-19	With-COVID-19
Approach 1: City-to-City Collaboration activities		
Workshop	• Face-to-face workshop in DKI-JKT's meeting room • Once per year, half-day or one-day workshop • Sharing knowledge from Kawasaki City on SDGs actions, and also other priority sectors (e.g. urban transportation) based on the request from DKI-JKT.	• Online • Once per year, 2 hours • Focusing on 2 themes (SDGs and zero-carbon strategy), and transferring knowledge on them from Kawasaki City
Training in Kawasaki City	• Inviting two DKI-JKT's officials to Kawasaki • Once per year, 7-8 days training • Site visit to the leading	• Online • Once per year, 2 hours • Introduction of GIC companies' technologies

Activities	Before COVID-19	With-COVID-19
	facilities in Kawasaki City, and training on technical and political aspects.	• Introduction of and participation in Kawasaki International Eco-Tech Fair
JCM City-to-City Collaboration seminar organized by MOE in Japan	• Inviting two DKI-JKT's officials to Japan • Once per year, 2 days seminar	• Online • Once per year, 2 hours • On-demand video viewing to introduce the Project
Approach 1: Feasibility study for JCM Model Project formulation		
Data collection	Interview investigation to DKI-JKT and local companies directly	• Data collection and review by cooperating with staff of PT. Indokoei International and local consultants and by utilizing local networks • Online meeting with relevant entities of DKI-JKT
Meeting with local companies	Face-to face meeting in DKI-JKT	• Online meeting

Source: Nippon Koei

As shown in the table above, implementation methods of the city-to-city collaboration was changed a lot due to COVID-19 spreading.

Regarding the feasibility studies for JCM Model Project formulation, the data (e.g. basic information of Sebira Island and Pramuka Island) which was listed in the original plan could be smoothly collected as planned by collaborating with Nippon Koei's local subsidiary (PT. Indokoei International) and local consultant.

On the other hand, it was a bit difficult to find new local companies as a partner company of JCM Model Project, and also communicate with them, compared with companies who had been contacted since the past fiscal years.

Regarding City-to-City Collaboration activities, all original activities (mainly meetings and seminars between the cities) were carried out online. Indeed, there were several merits to conduct these activities by online. For example, the bureau/department of Kawasaki City other than the International Economic Affairs Office (main contact office of the Project) gave a presentation and also GIC companies introduced their own technologies to DKI-JKT, which were difficult to do if the seminar was conducted face-to-face. In addition, more participants from DKI-JKT than the past year joined the workshop and seminar. After the pandemic as well, continuously utilizing online tools will make good opportunities for both Kawasaki City and DKI-JKT, also private companies.

As for the online activities such as workshop, not a consecutive interpreter but a simultaneous interpreter was arranged to implement the activities smoothly and effectively because online activities are not suitable for long duration.

With the above ingenuity, almost all activities of the original plan could be completed although the steps of some activities were modified.

5.3 ISSUES OF IMPLEMENTING THE PROJECT UNDER COVID-19

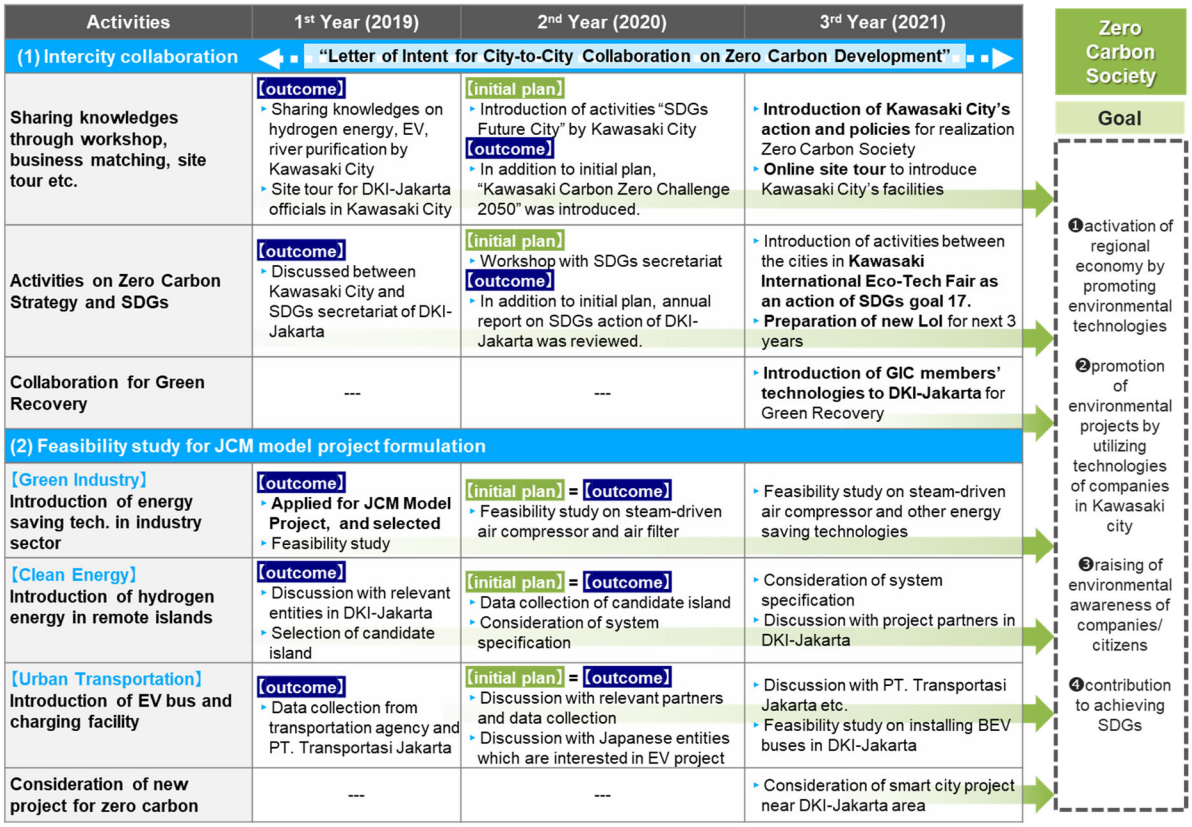
The implementation of the Project was not significantly affected by COVID-19 by collaborating with Nippon Koei's local subsidiary (PT. Indokoei International) and local consultants, and utilization of online tools.

On the other hand, regarding the feasibility studies for JCM Model Project formulation, it was more difficult to carry out smoothly because it took longer than usual to select candidate companies that could introduce the technologies and also to discover new needs of DKI-JKT. According to the information from an expatriate staff of Japanese companies in Indonesia, it is still difficult for local companies to hold business negotiations face-to-face, and when conducting face-to-face, it may be necessary to present the PCR test results. So it has been done basically online even among companies in Indonesia. It is more difficult to proceed project formulation support through face-to-face communication in the situation. It is necessary to be consider how to overcome the issue continuously in FY2022 and later.

In FY2022 and later, it will be essential to discuss closely with relevant entities for formulating JCM Model Project among Japanese companies and local entities. It means that more ingenuity or other ways to find candidate partner companies and communicate with them will be needed if the COVID-19 spreading continues.

CHAPTER 6 PROGRESS OF 3-YEAR PLAN

Kawasaki City and DKI-JKT started the city-to-city collaboration project in September 2017 and have been carrying out activities for promotion of green innovation in DKI-JKT.
Also, when starting FY2019 project, 3-year plan until the end of FY2021 project and 4 goals for realization of zero-carbon city was set (Figure6.1).



Source: Nippon Koei

Figure6.1 3-year plan (As of proposal submission for FY2021 project)

FY2021 is the last year of the 3-year plan. Progress of the 3-year plan was summarized in the table below.

Table6.1 Progress outcomes of 3-year plan

Sector	Progress and outcomes
(1) City-to-City Collaboration Activities	
Sharing knowledge through workshop, business matching, site tour etc.	In the first year, knowledge sharing about hydrogen energy, river purification and utilization of EVs through a workshop in DKI-JKT and site visit to facilities in Kawasaki through Japan visit by DKI-JKT, were carried out. Due to COVID-19 pandemic, all activities have been conducted by online since the second year. However, zero-carbon policies and SDGs activities of the two cities were shared through online workshop and online site tour of facilities in Kawasaki was implemented, which contributed to four goals of the 3-year plan.
Activities on zero-carbon policy and SDGs	Discussion of collaboration activities for SDGs started in the first year and concrete activities have been implemented since the second year. Online workshop regarding SDGs, review of SDGs annual report of DKI-JKT, etc. were carried out. With regard to zero-carbon policy, Kawasaki City has presented overview and progress of "Kawasaki Carbon Zero Challenge 2050" since the second year. As DKI-JKT published RPRKD in the third year, contents and background of it were shared with Kawasaki City and support approach through city-to-city collaboration was considered. Those activities and information were exhibited in Kawasaki Eco-Tech Fair to transmit them to other cities.
Collaboration for green recovery	In the second and third year, business matching among GIC companies and DKI-JKT and GIC companies introduced their technologies to contribute to green recovery.
(2) JCM Project Formulation Studies	
Green Industry Introduction of energy saving technology in industry sector	In the first year, "Introduction of High Efficiency Boiler System to Carton Box Factory" was selected as JCM model project. In project formulation studies from the second year, new technologies, which has not been introduced by JCM model projects, have been study targets and introduction of steam-driven air compressor, high-efficient air filter, etc. has been considered. As it was identified that air filter is not applicable for JCM model project through discussion with MOE, study on air filter was terminated unfortunately. However, the study on steam-driven air compressor has been carried out continuously as written in Section 4.4.
Clean Energy Introduction of hydrogen energy in remote islands	In the first year, through discussions with local stakeholders, Sebira Island was decided to be target site of introduction of hydrogen energy. Information collection and consideration of system structure of hydrogen production facility has been implemented since the second year. Study in Pramuka Island, in which electricity demand is more than that in Sebira Island, additionally started in the third year.

Sector	Progress and outcomes
Urban Transportation Introduction of EV bus and charging facility	Since the first year, discussion with Department of Transportation of DKI-JKT and TransJakarta has been carried out continuously and introduction plan of EV buses and its progress have been confirmed. As shown in Section 4.3, Hino Mortors Asia is currently considering implementation of trial and utilization of JCM model project. However, as there are many steps to business development, it is aimed at applying for JCM model project in FY2023.

Source: Nippon Koei

Activities in FY2021 were limited in comparison with previous years due to COVID-19 pandemic situation. However, Kawasaki City and DKI-JKT actively implemented collaboration activities and information sharing, which was a large outcome.

Also, although activities of private companies were limited, JCM project formulation studies were supported by utilizing local network of Nippon Koei. Projects such as introduction of hydrogen energy need further study but implementation of support on EV bus project, being expected to reach application for JCM Model Project was one of the outcomes.

CHAPTER 7 FUTURE PLANS

Considering the results of JCM project formulation studies and city-to-city collaboration activities which carried out in FY2021, the plan for next fiscal year's activities is presented below.

7.1 CONCEPT OF CITY-TO-CITY COLLABORATION PROJECT IN NEXT FISCAL YEARS

City-to-City collaboration for realization of zero-carbon society, between DKI-JKT and Kawasaki City is planned to continue in the next three years (next phase).
As described in this report, update of LoI between DKI-JKT and Kawasaki City, which was signed by both cities in March 2019, has been carried out. Also, themes of future collaboration was discussed between the cities in wrap-up meeting held in February 2022. Therefore, despite COVID-19 pandemic situation, some GIC companies are planning to newly participate in the project by support from Kawasaki City.
Thus, it is planned that promotion of collaboration activities among DKI-JKT, Kawasaki City and related organizations and JCM project formulation studies will continue in the next years. In addition, new themes will be included in city-to-city collaboration activities to contribute to realization of zero-carbon society by the two cities.
DKI-JKT published RPRKD in 2021 to realize net zero by 2050. It could be recognized as a challenging plan for DKI-JKT since RPRKD is the first plan for zero carbon in Indonesia and includes countermeasures for climate change adaptation as well, as written in Section 2.1.2.
To realize the plan, external support is necessary. In concrete, it is expected that knowledge of Kawasaki Climate Change Center can be useful for DKI-JKT. In addition, Kawasaki City can expand their know-how especially of "Kawasaki Carbon Zero Challenge 2050" and "SDGs Future City" from the framework of city-to-city collaboration. Through these supports, Japanese local government (Kawasaki City) can contribute to realization of RPRKD in the flamework of city-to-city collaboration.
Concepts of city-to-city collaboration project in the next three years are described below.

Collaboration to build a future city toward Net-Zero (tentative)
To promote collaboration not only to aim at net zero but to develop future city considering SDGs etc. by taking advantages and characteristics of DKI-JKT and Kawasaki City to meet needs of climate change of DKI-JKT such as RPRKD in the three years.

1) Knowledge sharing regarding climate change countermeasures based on Kawasaki Carbon Zero Challenge 2050
2) Support by Kawasaki City and GIC companies for climate change adaptation
3) Knowledge sharing regarding development based on SDGs by taking advantage of Kawasaki City as SDGs Future City
4) Support on implementation of JCM projects regarding low-carbon urban transportation system
5) Support on implementation of JCM projects regarding clean energy
6) Support on implementation of JCM projects regarding green industry

7.2 DRAFT OF FY2022 CITY-TO-CITY COLLABORATION PROJECT

Under the concept in Section. 7.1, themes in the next phase and overview of city-to-city collaboration activities and JCM project formulation studies in FY2022, are shown below.

Table7.1 Draft activities in FY2022

Approach	Themes in the next phase	Draft activities in FY2022
City-to-city collaboration activities	**Knowledge sharing regarding climate change countermeasures based on Kawasaki Carbon Zero Challenge 2050**	**To support for identification and implementation of concrete initiatives to contribute to zero-carbon goal of DKI-JKT.** Kawasaki City is one of the most advanced cities about zero-carbon initiatives in Japan. To date, various information and opinion sharing have been done by the cities through online events.
	Knowledge sharing regarding development based on SDGs by taking advantage of Kawasaki City as SDGs Future City	To share knowledge of Kawasaki City regarding SDGs Future City by the method along with RPRKD developed by DKI-JKT. By doing this, **from the perspective of SDGs, various support for DKI-JKT** can be carried out.
	Support for decarbonization and climate change adaptation by GIC companies	**To consider supports on adaptation measures, one of needs of DKI-JKT** since only mitigation measures are not enough to be zero-carbon society. In concrete, (1) Improvement of air and water environment, (2) Public participation in waste management, (3) Decarbonization of water infrastructure (reiver, ponds, etc.)
JCM project formulation studies	**Support on implementation of JCM projects regarding low-carbon urban transportation system**	**To continue study on EV bus project** which has been implemented until FY2021. Supports such as **information collection for proposal to JCM model project and explanation to stakeholders** will be done for smooth implementation of the project. Also, discussion with private bus operation companies, who meets conditions for installation of EV buses, will be started.
	Support on implementation of JCM projects regarding clean energy	To continue study on introduction of **hydrogen energy supply system** to a remote island in DKI-JKT which has been implemented until FY2021.
	Support on implementation of JCM projects regarding green industry	To aim at promotion of energy-saving technologies to factories in DKI-JKT and suburb. by **taking contribution to goals of RPRKD into account** and to **support on implementation of JCM model project by prioritizing highly feasible projects.**

Source: Nippon Koei