FY2023 Project for Ministry of the Environment Japan

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

Promotion of Zero-Carbon Technology to Improve the Environment in Hanoi City

Report

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Nippon Koei Co., Ltd.
Fukuoka Prefecture

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

Promotion of Zero-Carbon Technology to Improve the Environment in Hanoi City

Report

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Abbreviations

AR6	The Sixth Assessment Report
BAU	Business-As-Usual
BESS	Battery Energy Storage System
CCAP	Climate Change Action Plan
COP	United Nations Climate Change conference
C2P2	The Clean City Partnership Program
DOIT	Department of Industry and Trade
DONRE	Department of Natural Resources and Environment
EMS	Eco-drive Management System
EPC	Engineering Procurement Construction
EV	Electric Vehicle
EVN	VIETNAM ELECTRICITY.
FIT	Feed-in Tariff
GGS	Green Growth Strategy
GHG	Greenhouse Gas
IFC	International Finance Corporation
INDC	Intended Nationally Determined Contribution
IPCC	The Intergovernmental Panel on Climate Change
JCM	Joint Crediting Mechanism
JETP	The Just Energy Transition Partnership
JICA	Japan International Cooperation Agency
LNG	Liquefied Natural Gas
MARD	Ministry of Agriculture and Rural Development
MOEJ	Ministry of the Environment, Japan
MOIT	Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOU	Minutes of Understanding
MRV	Measurement, Reporting and Verification
NDC	Nationally Determined Contribution
NKV	Nippon Koei Vietnam
PDP	Power Development Plan
SDGs	Sustainable Development Goals
VCCI	Vietnam Chamber of Commerce and Industry
VGBC	Vietnam Green Building Council
VNUA	Vietnam National University of Agriculture
WtE	Waste to Energy

CHAPTER 1 BACKGROUND AND OBJECTIVE

1.1 Background of the Programme

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

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

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

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

The City-to-City Collaboration Programme between Fukuoka Prefecture and Hanoi City, Viet Nam started in FY2021 and this year is the third year of Phase 1. In addition to the human resource development and technology transfer in the environmental field (water, air, waste, etc.) that Fukuoka Prefecture has independently implemented, the Project aims to support institutional development to address climate change and improve the environment in Hanoi, and to contribute to the reduction of Green House Gases (GHG) emissions in the fields of renewable energy, energy-savings, waste management, and hydrogen technology utilizing the Joint Crediting Mechanisms (JCM).

1.2 Cities of the Project

1.2.1 Fukuoka Prefecture Government

Fukuoka Prefecture, a representative prefecture of Kyusyu region and with approx. 5.1 million population, is located in the northern area, so they have trade with Asian countries mainly on the Chinese continent and the Korean Peninsula. Making use of its geographical advantage, Fukuoka Prefecture has been actively working on international support for Asian countries (Figure 1-1).

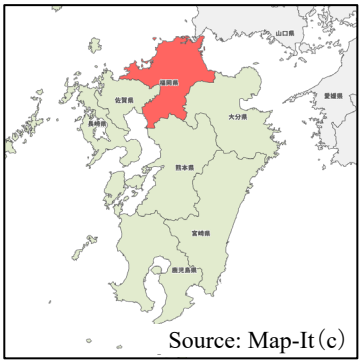


Figure 1-1 Location of Fukuoka Prefecture

Furthermore, Fukuoka Prefecture has promoted international environmental cooperation with the "Fukuoka Prefecture Comprehensive Plan" and "Fukuoka Prefecture Environmental Comprehensive Vision" and has concluded friendship alliances with multiple local governments overseas to conduct various environmental cooperation projects.

As for Hanoi City, the friendship alliance has been concluded with Fukuoka City in 2008 and a workshop in Japan for Hanoi City's environmental administrators and a seminar on environmental education have been implemented between the cities. In addition, with Fukuoka Prefecture's technical support, a waste treatment plant using "Fukuoka method" (quasi-aerobic landfill method), which has become the standard for waste disposal sites in Japan, has been completed in 2015. After that, the same type of waste treatment plant plans to be constructed in Thua Thien Hue in central Vietnam. In this way, Fukuoka Prefecture has made a big impact for improving environmental problems in Vietnam.

Statistical overview of Fukuoka Prefecture is shown in Table 1-1.

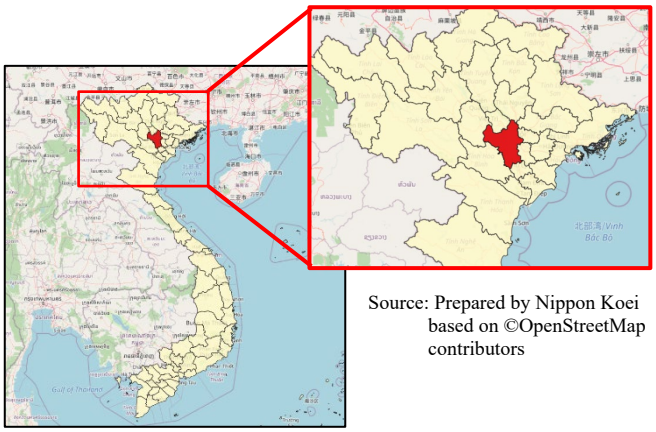
Table 1-1 The Overview of Fukuoka Prefecture

#	Item	Statistics
1	Area	4,987 [km^2] (as of 2019)
2	Population	5,114,881 [population] (as of 1 January 2023)
3	Population density	1,026 [population /km^2] (as of 1 January 2023)
4	Num. of household	2,372 [thousand households] (as of 1 January 2023)
5	Num. of private enterprise offices	205,965 [offices] (as of 1 June 2021)
6	GDP (nominal)	19.9 [trillion JPY] (as of 2019)

Source: Prepared by Nippon Koei base on "FY2022 the overview of Fukuoka Prefecture's policy" and the prefecture's official website

1.2.2 Hanoi City

Hanoi City (approx. 8.2 million population), the capital city of Vietnam, has the second largest economy following Ho Chi Minh City and is a central city of politics and culture in the country (Figure 1-3). The city is under the direct control of the central government, and has governmental organizations of other countries and international organizations, as well as local subsidiaries and representative offices of many foreign-affiliated companies.



Source: Prepared by Nippon Koei based on ©OpenStreetMap contributors

Figure 1-2 Location of Hanoi City

Currently Hanoi City has many environmental problems such as air pollution and river pollution due to open burning and use of briquette stoves. In addition, environmental issues related to agriculture, urban development, and climate change have become very serious because of recent rapid economic growth. So, the city is now considering the policies for solving these problems.

Statistical overview of Hanoi City is shown in Table 1-2 and the city views are shown in Figure 1-3.

Table 1-2 Overview of Hanoi City

#	Items	Statistics
1	Area	3,358.60 [km^2] (as of 31 December 2018)
2	Population	8,246.6 [thousands population] (as of 2020)
3	Population density	2,455 [population/ km^2] (as of 2020)
4	Num. of household	2,224,107 [households] (as of 1 April 2019)
5	Num. of private enterprise offices	165,875 [offices] (as of 31 December 2020)
6	GDP (nominal)	5.13 [trillion JPY] (as of 2020)

Source: Prepared by Nippon Koei based on"STATISTICAL YEARBOOK OF VIET NAM 2020"" COMPLETED RESULTS OF THE 2019 VIET NAM POPULATION AND HOUSING CENSUS" Hanoi Statistical Yearbook 2020" etc.

View of Hanoi City

Traffic jam during rush hour in Hanoi City

Ruins in the city (tourist facilities)

Garbage collection cart in Hanoi city

Source: Photos taken by Nippon Koei

Figure 1-3 Current cityscape of Hanoi City

1.3 Objective of the Project

Objectives of the project are: 1) institutional support on promotion of zero-carbon and Sustainable Development Goals (SDGs) for improvement of environment in Hanoi City, and 2) support on formulation of JCM project to contribute to GHG emission reduction by introducing high efficiency equipment/renewable energy technologies which are in high demand in Hanoi City.

1.4 Implementation procedure and structure

1.4.1 Institutional Support

In the Project between Hanoi City and Fukuoka Prefecture, Department of Natural Resources and Environment (DONRE) of Hanoi City and Environmental Policy Division of Environmental Affairs Department of Fukuoka Prefecture Government are in charge, and a support on promotion of decarbonization in Hanoi City as an institutional support. Through the following activities, human resources development and information sharing and also consideration for introduction of advanced technologies were implemented.

1) Consultation on promoting decarbonization in accordance with environmental policy in Hanoi City, SDGs, and other basic policies

2) Support for human resource development related to the environment (especially in the waste management sector) and climate change countermeasures

3) Business matching support for private companies

1.4.2 Promotion of Renewable Energy technology

In the renewable energy sector, the following items were considered.

1) Support for JCM model project feasibility study by introducing solar sharing

2) Support for JCM model project feasibility study by introducing small wind power generation and exhaust wind power generation

3) Support for consideration of the use of meteorological observation data for the introduction of renewable energy technologies

4) Business matching support for formulation of renewable energy project

1.4.3 Promotion of Energy Saving equipment

In the energy saving sector, the following items were considered.

1) Support for field surveys and stakeholder consultations to introduce energy saving technologies in factories, commercial facilities, etc.

2) Business matching support for formulation project to introduce energy saving technologies

1.4.4 Support in the Waste Management

In the waste management sector, an important topic for Hanoi City, the following things were considered.

1) Gathering information on the waste sector in Hanoi City

2) Support for the development of a waste management master plan in Hanoi City

3) Support for JCM model project feasibility study to promote introduction of environmental infrastructure in the waste management sector

1.4.5 Introduction of Hydrogen Technology

Regarding the hydrogen technology that could contribute to the decarbonization of Hanoi City, the following things were considered.

1) Gathering information to consider the introduction of hydrogen technology in Vietnam
2) Support for business matching to discover the projects introducing hydrogen technology

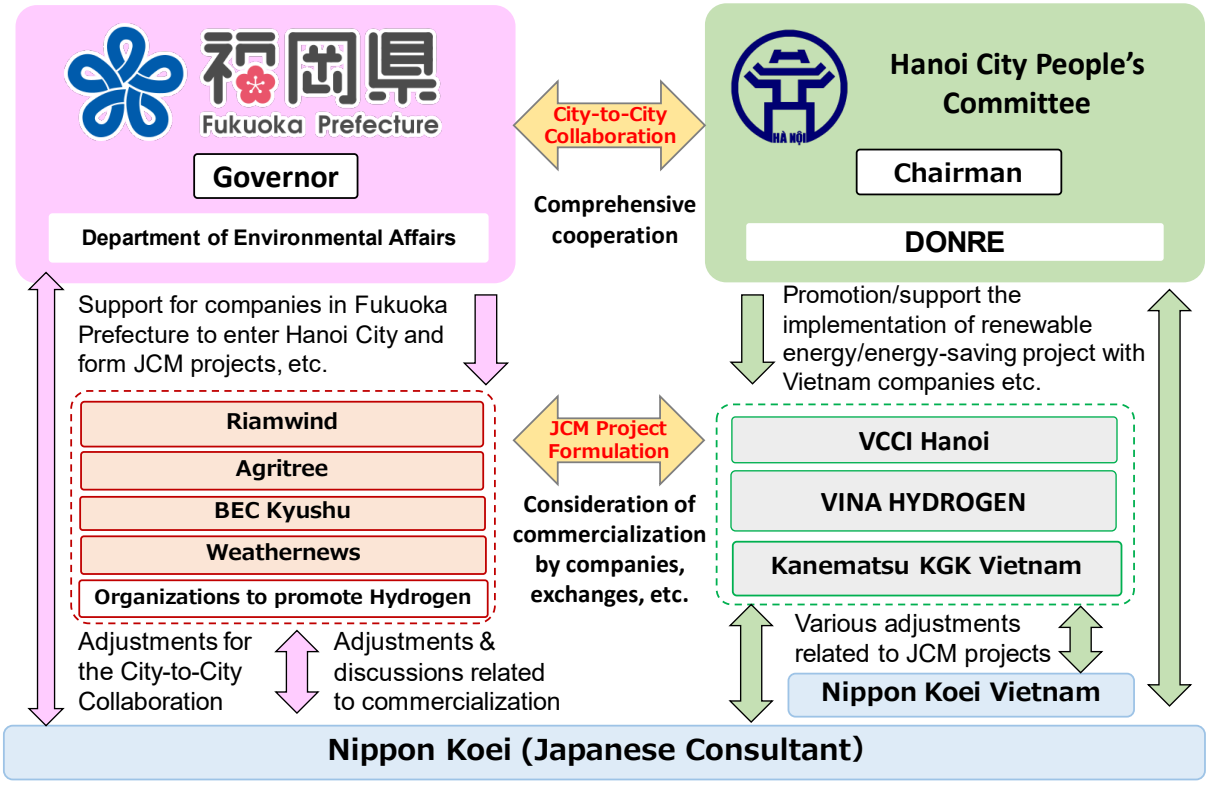
1.4.6 Implementation Structure

Study for formulation of JCM model project was implemented by cooperating mainly with Seibu Giken Co., Ltd that has their own energy saving technologies like high-efficiency total heat exchangers for commercial building or factories, RIAMWIND Co., Ltd. that has small wind turbine systems using “Wind-Lens Technologies” which can generate electric power even from breeze, Agritree Co., Ltd. that has many experiences of introducing solar sharing in Japan,

and Kanematsu KGK Vietnam Co., Ltd. where their mother company has experienced a representative participants of JCM model project., Weathernews Inc., the world's largest private weather company, Vina Hydrogen, which provides hydrogen technology information and networks with local companies and the Vietnam Chamber of Commerce and Industry (VCCI).

BEC Kyushu Ltd. (BEC Kyushu), which owns energy-saving technologies such as induction lamps for factories, newly joined this project and provided technical information to the local factory owner companies and others.

Nippon Koei Co. Ltd. (hereafter "Nippon Koei") has supported these City-to-City Collaboration activities and carried out studies for introducing zero carbon technology and advanced environmental technologies. And Nippon Koei Vietnam (NKV, local subsidiary of Nippon Koei) collected the latest local information and discovered candidate companies for the target facilities of the project. The implementation structure of this project is shown in Figure 1-4.

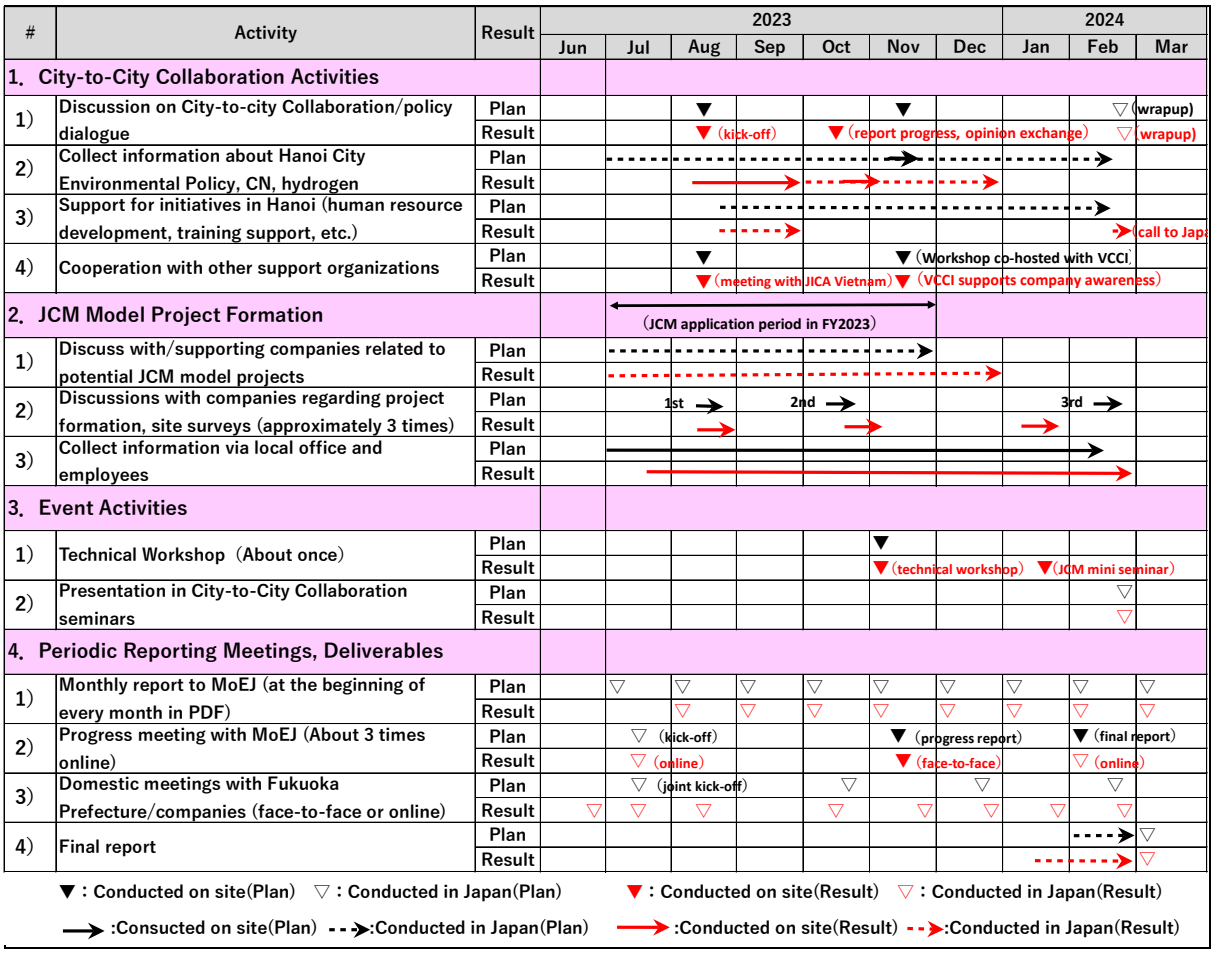


Source: Prepared by Nippon Koei

Figure 1-4 Implementation Structure

1.5 Project Schedule

The project period is from 21 June 2023 to 8 March 2024. The schedule is shown in Figure 1-5.



Source: Prepared by Nippon Koei

Figure 1-5 Project Schedule

CHAPTER 2 ACTIONS TO CLIMATE CHANGE BY FUKUOKA PREFECTURE AND HANOI CITY

2.1 Actions on Climate Change Countermeasures by Fukuoka Prefecture

2.1.1 Action Plan of Global Warming Countermeasures in Fukuoka Prefecture

Fukuoka Prefecture has established "Action Plan of Global Warming Countermeasures in Fukuoka Prefecture" to promote countermeasures to global warming, and support citizens, companies, and administrators to take their actions proactively. The action plan issued in March 2017. The plan includes "GHG emission reduction" and "measures for carbon sinks" for the promotion of energy saving and renewable energy, furthermore, "adaptation" to mitigate or avoid the impact of climate change. (Quoted from Fukuoka Prefecture homepage).

2.1.2 Main actions on Global Warming Countermeasures

Fukuoka Prefecture mainly implements or supports the following actions as global warming countermeasures (Table 2-1).

Table 2-1 Main countermeasures for Global Warming in Fukuoka Prefecture

#	Items	Activities
1	Actions for the citizen	1) Implementation of support project for eco-family 2) Enlightenment activities by Fukuoka Prefecture Global Warming Prevention Activity Promotion Center 3) Enlightenment activities by Staff of Fukuoka Prefecture Global Warming Prevention Activity Promotion 4) Distribution of Fukuoka Eco Life Support Book 5) Distribution of sub-material for Fukuoka environmental education
2	Actions for private entities	1) Implementation of eco-business support project 2) Implementation of Fukuoka Prefecture energy saving human resources development project 3) Implementation of Fukuoka Prefecture energy saving consultation project 4) Promotion of the spread of Eco Action 21 5) Establishment of Fukuoka Prefecture energy saving promotion council 6) Implementation of Fukuoka Prefecture information dissemination project
3	Actions related to automobile	1) Promotion of Eco-car (EV and its charging station, FCV and its hydrogen station) 2) Promotion of eco-driving 3) Promotion of green management certification system 4) Promotion of installing eco drive management system (EMS)
4	Public relations/ public hearing	1) Operation of Fukuoka Eco Life Support Portal Site 2) Operation of Ecoton's eco-diary (public relations blog) 3) Dispatch of a staff of Fukuoka Prefecture for on-site lessons

Source: Fukuoka Prefecture official website (**https://www.pref.fukuoka.lg.jp/contents/ondanka.html**)

2.1.3 Guidebook on technologies of Environment-related corporations in Fukuoka Prefecture

Fukuoka Prefecture has accumulated achievements and know-how on overcoming environmental problems over many years and is now taking advantage of this strength to promote exchanges in the environmental fields with Asian region. Due to the high level of interest from various regions in the environmental technologies cultivated in its prefecture through exchanges in the past, this "Guidebook on Technologies of Environment-Related Corporations in Fukuoka Prefecture (2020 edition)" has been published as a public relation material for investigating and organizing the environmental technologies of companies in Fukuoka Prefecture, introducing them in Japan and overseas to further promote exchanges on environmental technologies and industries based on the network of the prefecture and partner-local governments. The guidebook in Japanese has been translated into English, Chinese, Thai, and Vietnamese (Figure 2-1).

This guidebook not only presents the latest technologies for solving environmental problems in the areas of waste, water, and atmospheric environments, but has also been enhanced with technologies on energy saving and renewable energy based on the global trend of decarbonization (Table 2-2). This year, this guidebook was used and distributed to the Hanoi municipal government and local companies during technical workshop and field survey to introduce the technologies of Fukuoka Prefecture companies in concrete terms.

Source: Fukuoka Prefecture homepage (https://www.pref.fukuoka.lg.jp/contents/env-tech-guide.html)

Figure 2-1 Cover of Guidebook on technologies of Environment-related corporations in Fukuoka Prefecture (each language)

Table 2-2 Summary of Number of companies on Guidebook on technologies of Environment-related corporations in Fukuoka Prefecture (2020 edition)

Sector	Num. of companies	Companies related to the project
Waste	24	―
Water	17	―
Air	4	―
Energy	12	Agritree Co., Ltd., RIAMWIND Co., Ltd., Bec Kyushu Ltd.
Others	8	―
Total	65	―

Source: Prepared by Nippon Koei base on "Guidebook on Technologies of Environment-Related Corporations in Fukuoka Prefecture (FY2020)"

2.2 National Policies and Energy Plan of Viet Nam

Vietnam Prime Minister Pham Minh Chinh has announced the country's aim to achieve carbon neutrality by 2050 at UN Climate Change Conference (COP26) held in November 2021. Compared to the NDC target of reducing GHG emissions by 9% from Business-As-Usual (BAU) unconditionally and 27% with international cooperation by 2030, it is an ambitious target. The national policies and energy plans related to this project are summarized below.

2.2.1 Nationally Determined Contribution (NDC)

Vietnamese Government firstly submitted Nationally Determined Contribution (NDC) in November 2016 and then revised it in September 2020 and November 2022. To achieve the long-term targets of Viet Nam's National Climate Change Strategy to 2050, the latest version of the NDC (2022) significantly increases the GHG reduction targets from the previous update

(2020). The GHG reduction targets in the latest NDC (2022) have been updated from 9% to 15.8% unconditional and from 27% to 43.5% conditional by 2030 compared with BaU scenario. The target GHG reduction reductions by 2030 for each sector are shown in the table below.

Table 2-3 Reduction targets by sector in revised NDC（2022）

Sector	GHG emission reduction Unconditional Contribution		GHG emission reduction with international support		GHG emission reduction Conditional Contribution	
	Compared to BAU scenario (%)	Reduction amount (Mil. tonnes of CO2eq)	Compared to BAU scenario (%)	Reduction amount (Mil. tonnes of CO2eq)	Compared to BAU scenario (%)	Reduction amount (Mil. tonnes of CO2eq)
Energy	7.0	64.8	17.5	162.2	24.4	227.0
Agriculture	1.3	12.4	4.1	38.5	5.5	50.9
LULUCF*	3.5	32.5	1.5	14.1	5.0	46.6
Waste	1.0	8.7	2.2	20.7	3.2	29.4
IP	3.0	27.9	2.4	21.9	5.4	49.8
Total	**15.8**	**146.3**	**27.7**	**257.4**	**43.5**	**403.7**

*LULUCF: Land Use, Land Use Change and Forestry
Source: Updated Nationally Determined Contribution (NDC), The Socialist public of Viet Nam

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

Table 2-4 National policies for climate change and energy use in Viet Nam

Name of regulation (Date of enforcement)	Objectives
★National Electricity Development Plan VIII for the period of 2021-2030, with a vision to 2050 (PDP8) (Decision500/QD-TTg) 15 May 2023	Overall objectives - Supplying enough electricity demand in the country, meeting socio-economic development goals with an average GDP growth of about 7%/year in the period 2021-2030. Specific objectives - Total capacity of power plants serving domestic demand is 150,489 MW by 2030 and 490,529-573,129 MW by 2050. - Raise the ratio of renewable energy in the power source composition in 2050 to more than 60%.
★National Climate Change Strategy to 2050 (Decision 896/QD-TTg of the Prime Minister) 07 March, 2022	Overall objectives - Reduce GHG emissions by 43.5% by 2030 compared to BAU, peaking in 2035 and achieving net zero emissions by 2050. Specific objectives - Adaptation to climate change: To reduce vulnerability and risks to the impacts of climate change through improved resilience and the adaptability of natural, economic and social systems, minimizing losses harm caused by natural disasters and climate extremes increased due to climate change. - Reduce greenhouse gas emissions: To meet emissions targets net zero by 2050, actively contributing responsibly to the national community

Name of regulation (Date of enforcement)	Objectives
	protecting the Earth's climate system; improve the quality of growth and competitiveness picture of the economy
★**Nationally Determined Contribution (NDC)** Updated November 2022	Specific objectives - Reduce GHG emissions by 15.8% unconditional and 43.5% conditional GHG reductions relative to BAU by 2030.
★**National Strategies on Green Growth 2011-2030 with a vision by 2050** (Decision 1658/QĐ-TTg) 1 October, 2021	Overall objectives Accomplish green growth, thereby promoting the economic restructuring associated with innovation of growth model, in order to achieve economic prosperity, environmental sustainability and social equality; strive towards green and carbon-neutral economy and contribute to achievement of the goal to reduce global warming.
National Program on Economical and Efficient Use of Energy for the period 2019 – 2030 (Decision 280/QD-TTg of the Prime Minister) 13 March, 2019	Overall objectives "National program on economical and efficient use of energy in the period of 2019 - 2030" is the implementation step to concretize the energy development strategy, an important element in the National Sustainable Development Strategy, with the aim to turn Viet Nam into a country using energy saving and efficiency. Specific objectives − To mobilize all the national and international resources for stimulating economical and efficient use of energy through the synchronous implementation of assignments and solutions of State management, technical assistance, science and technology research and product development, market transition, human resource training and development, and also utilization of support from the international community in the field of economical and efficient use of energy. − To formulate the habit of using energy economically and effectively in all social activities; to reduce intensive use of energy in a variety of economic sectors and industries; energy efficiency becomes a regular activity in key energy users and key economic sectors that consume a lot of energy, with an aim at green growth and sustainable development.
Action Plan for Implementation of Paris Agreement on Climate Change (Decision 2053/QD-TTg of the Prime Minister) 28 October, 2016	Overall objectives To identify and implement appropriate activities and solutions until 2020 and 2030 to gradually carry out all the provisions in the Paris Agreement applicable to Viet Nam. Specific objectives - To fulfil commitments in the Intended Nationally Determined Contribution (INDC) to mitigate GHG emissions. - To fulfil commitments in the Intended Nationally Determined Contribution to adapt to climate change. - To prepare human, technical and financial resources to fulfil commitments in the Intended Nationally Determined Contribution and contribute to the transition to a low-carbon, highly resilient economy. - To establish and operate the transparency system (MRV system) to monitor and assess the implementation of adaptation, mitigation, and resource preparation. - To revise institutions and policies to establish a favorable environment and focus national efforts to respond to climate change

Name of regulation (Date of enforcement)	Objectives
National Target Program to Respond to Climate Change period 2012-2015 (Decision 1183/QD-TTg of the Prime Minister) 30 August, 2012	Specific objectives - To gradually realize the National Strategy on climate change. - To increase awareness and capacity to adapt to climate change. - To orient to reduce greenhouse gas emissions. - To develop low-carbon economy. - To actively cooperate with international communities to protect the global climate system.

Source: Prepared by Nippon Koei based on each policy.
★ is detailed in after 2.2.2.

2.2.2 National Climate Change Strategy toward 2050

In March 2022, the Vietnamese government formulated the "National Climate Change Strategy for 2050". The strategy set targets that a 43.5% reduction in GHG emissions relative to BAU by 2030, peaking in 2035, and achieving net zero by 2050. The GHG reduction targets for each sector are shown in Table 2-5.

Table 2-5 Targets by 2023 and 2050 in National Climate Change Strategy toward 2050

Sector	Target by 2030		Target by 2050	
	Reduction ratio compared to BAU scenario (%)	Emissions (Mil. tonnes of CO2eq)	Reduction ratio compared to BAU scenario (%)	Emissions (Mil. tonnes of CO2eq)
Energy	32.6	457	91.6	101
Agriculture	43.0	64	63.1	56
LULUCF	70.0	-95*	90.0	-185*
Waste	60.7	18	90.7	8
IP	38.3	86	84.8	20
Total	**43.5**	**530**	**100**	**0**

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

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

The PDP8 for the period of 2021-2030, with a vision to 2050, was finalized in Prime Minister Decision500/QD-TTg in May 2023, two and a half years later than originally planned, and took effect immediately. The Vietnamese government has projected an average annual GDP growth rate of 7% between 2021 and 2030, and has set a plan for the same period to ensure that the country can supply enough electricity demand for socio-economic growth. The PDP8 plans for an increase in power generation capacity to 150,489 MW by 2030, which considering that the installed capacity at the end of 2022 was 80,704 MW, means that nearly 9,000 MW of installed capacity will need to be added each year. In addition, the long-term vision is to achieve net zero GHG emissions by 2050. The targets by 2030 and 2050 in PDP8 are shown in Table 2-6.

Table 2-6 Targets by 2023 and 2050 in PDP8

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

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

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

2.2.4 Green Building Regulation in Viet Nam

Green building regulations in Viet Nam aim to promote sustainable building practices and reduce the environmental impact of buildings. As of 2020, Viet Nam has nearly 150 certification cases that have been recognized as Green Building[1] according to different technical standards: LEED (USA), EDGE (IFC), LOTUS (VGBC), and Green Mark (Singapore). In Hanoi and Ho Chi Minh City, specific regulations are in place to support green building practices.

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

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

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

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

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

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

2.2.5 Regulations for Solar Power Generation Plans

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

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

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

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

1) Enacting the National Climate Change Strategy, Green Growth Strategy, PDP8 and planning for renewable energy development, etc.

2) Announcement of the plan to introduce funds on the Just Energy Transition Partnership (JETP)

3) Establishing legal framework for oil and gas, land, and electricity

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

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

2.2.7 Trends in the Domestic Carbon Market in Viet Nam

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

2.2.8 Updates Vietnamese Circular regarding JCM

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

2.3 Policies in Hanoi City

2.3.1 Green Growth Strategy（GGS）

In July 2020, Hanoi City People's Committee (PC) issued Action No. 149/KH-UBND on "Green growth action of Hanoi City to 2025, orientation to 2030". The overall object of this strategy is to develop the economy rapidly and sustainably, improve the efficiency of the use of resources, and reduce GHG emissions. Specifically, the targets include reducing GHG emission, green production, greening lifestyles, and sustainable consumption. To achieve these targets, necessary projects and task are listed below.

Reducing GHG emissions:

1) By 2025, GHG emission will be reduced by 12.14% compared to emission of 2025 without measures to reduce GHG emissions (approx. 6.68 million tons of CO_2)
2) By 2030, GHG emissions will be reduced by 18.71% compared to the 2030 level in the absence of measures to reduce GHG emissions (approx. 13.76 million tons of CO_2)

Green production: The rate of increase of products labeled green and eco is 15%/year. Newly built buildings meet the standards of the National Technical Regulation on "Buildings using energy efficiently" - QCVN 09:2017/BXD (offices, hotels, hospitals, schools, commercial and service zones, apartment buildings, industrial parks, export processing zones, industrial clusters) by 2025 is 100%.

Green lifestyle: Increase the average green tree area per capita, reaching 7.8m^2 to 8.1m^2 by 2025 and 13m^2 to 15m^2 by 2030. The rate of public procurement for green/ ecological products reaches 100%, the rate of public passenger transport will reach 30-35 % by 2025 and 40-45% by 2030, the rate of domestic wastewater treatment in urban areas will reach 45-50% by 2025 and 60% by 2030.

Sustainable consumption: level of reduction in consumption of non-biodegradable packaging in supermarkets, trade centers and by 2025 from 70 to 75%; 85% by 2030 and 65 to 70% in markets by 2025, 80% by 2030. Public procurement rate of green and ecological products, for goods on the market with labeled products Green/ Eco is 100%.

In addition, in July 2021, Hanoi City issued Plan No. 172/KH-UBND on measuring emissions of motorcycles and motorbikes in the city, because the exhaust gas from motorcycles and motorbikes are one of the major sources of GHG emissions. From September 2021 to June 2022, the emission tests of major motorcycles such as Honda and Yamaha will be implemented to analyze the impact for social economy when the city regulates exhaust gas. Based on the result of analysis, the city will propose solutions to improve air quality, including a subsidy for a replacement purchase from old motorbikes.

2.3.2 Climate Change Action Plan (CCAP)

DONRE in Hanoi City are currently drafting "Action Plan to respond to Climate Change for the period 2021-2030 for Hanoi City".
So, Hanoi City still follows "Plan for Implementation of the Paris Agreement on Climate Change in Hanoi City" issued in November 2017. The plan describes concrete issues on mitigation and adaptation to climate change, and divided approaches to solve them into two phases: 2018-2020 and 2021-2030.

1) To carry out the task of mitigating greenhouse gas emissions, Hanoi City will develop and implement proposals to reduce greenhouse gas emissions and green growth in accordance with national conditions for the country for the sectors of industry, transportation, construction, agriculture, and rural development.
2) For the task of climate change adaptation, Hanoi City will update its contribution on climate change adaptation; develop a national adaptation plan under the guidance of the Ministry of Natural Resources and Environment, Viet Nam (MONRE); review existing information and data on climate change adaptation, loss and damage; Proposing information, additional research and methods of data management and sharing to facilitate the development and updating of national contribution reports on climate change adaptation

2.3.3 SDGs

In December 2017, Hanoi City PC issued Plan No. 242/KH-UBND on Action Plan of Hanoi City to implement the 2030 Agenda for Sustainable Development. The action plan, which takes SDGs into consideration, sets goals for sustainable development by 2030, and these attachment documents show concrete action plan for achieving the goals and the responsible agencies for implementing actions (Table 2-7).

Table 2-7 Goals for Sustainable Development in Hanoi City

#	Goals
1	End all forms of poverty in the area.
2	Ensure food security, improve nutrition and promote sustainable agricultural development.
3	Ensure healthy lives and promote well-being for people of all ages.
4	Ensure quality, equitable, and inclusive education and promote lifelong learning opportunities for all.
5	Achieve gender equality; empowering and creating opportunities for women and girls.
6	Ensure adequate and sustainable management of water resources and sanitation for all.
7	Ensure access to affordable, reliable and sustainable energy for all.
8	Ensuring sustainable, comprehensive and continuous economic growth; full employment, productivity and decent work for all.
9	Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.
10	Reduce inequality in society.
11	Sustainable and resilient urban and rural development; ensure a safe living and working environment; reasonable distribution of population and labor by region.
12	Ensure sustainable production and consumption.
13	Timely and effective response to climate change and natural disasters.
14	Protect and develop forests sustainably, conserve biodiversity, develop ecosystem services, combat desertification, prevent degradation and restore land resources.
15	Promoting a peaceful, democratic, fair, equal and civilized society for sustainable development, creating access to justice for all; building effective, accountable and participatory institutions at all levels.
16	Strengthening implementation and promoting a global partnership for sustainable development.

Source: Creared Nippon Koei based on Plan No. 242/KH-UBND on Action Plan of Hanoi City to implement the 2030 Agenda for Sustainable Development.

2.3.4 Hanoi City Plan Waste Separation Plan

A quick review was conducted to understand a draft Urban Waste Separation Plan (2022) prepared by Hanoi DONRE. Following the enactment of the revised Law on Environmental Protection (revised LEP) in 2020 which includes the mandatory sorting of general waste and the promotion of recycling measures, Hanoi City is going to promote source separation throughout their administration boundary in which details are described in Table 2-8.

Table 2-8 Structure and Outline of Hanoi City Waste Separation Plan

Structure	Summary
CHP1 : Perspectives, Objectives and Scopes	▪ Establishing an effective mechanism to enable the revised LEP including separation plan, organizational settings, monitoring, evaluation and reporting. ▪ Minimization of domestic waste and establish reasonable fee services. ▪ Environmental awareness to citizens. ▪ Setting target years and numerous targets. (2025、2030)
CHP2 : Status of SWM and Projections	▪ The status of household waste generation is organized by urban category, and the estimated amount of collection in 2021 is 6128 tons/day, with a basic unit of 0.74 kg/person. On the other hand, insufficient data on generation and composition were noted. ▪ The percentage of treatable organic waste is 60-80% at the source (households, commercial facilities) and 38% at disposal sites. However, the plan pointed out that the organic waste has a high moisture content, which makes it difficult to treat when mixed with other types of waste. (Existing intermediate treatment are composting and WtE). ▪ The current situation is problematic because there is no systematic separation of waste, and valuable materials are mainly collected by the informal sector (e.g., craft villages, etc.).Lack of infrastructure and implementation capacity for collection/transportation and intermediate treatment identified as an issue. ▪ Existing collection service prices are too low to motivate source reduction.
CHP3 : Waste Separation Category and Source Separation	▪ Presenting existing household waste classification principles (valuables, food waste, hazardous waste, bulky waste, other household waste) and service fees. ▪ Presentation of tasks and solutions to advance the classification principles. ▪ Project implementation roadmap and calculation of project implementation costs.
CHP4 : Organizational and Implementing Structure	▪ A "top-down" implementation system in which the Hanoi People's Committee is positioned on the top and the plan is carried out in cooperation with the municipal government, local level People's Committees, waste collection companies, etc. Waste generators (individuals and households) to receive instructions, etc., from the local People's Committee branch office to which they belong.
CHP5 : Monitoring, Evaluation and Reporting Mechanisms	▪ Indicators are set for waste generation by category, recycling rate, energy recovery rate, final disposal amount, composting rate, various indicators related to service charges, willingness to pay/residents, and waste management capacity.

Source: Hanoi DONRE（Translation from Vietnamese to English by Nippon Koei）

Although the plan puts emphasis on waste segregation at source, it can be considered a general municipal waste management plan considering its contents. The plan consists of five chapters and sets numerical targets for the reduction and treatment rate of household waste in urban and rural areas for 2030 and 2050, respectively. The plan is guided by the policies of "implementation in compliance with higher-level laws and regulations," "reduction of the total amount of waste to be disposed of," "establishment of an appropriate service fee mechanism," and "raising and educating citizens about environmental awareness". The activities to achieve these goals are described in each chapter.

Table 2-9 shows the five types of waste separation categories and their management methods stated in the plan. To facilitate disposal after collection, the plan stipulates management methods at source of generation and shows collection and disposal methods for each type of waste, but there is no detailed description of specific disposal methods.
As stated in details in chapter 3 of the plan, overall, the plan sets the direction to promote source waste separation and appropriate treatment depending on each waste category thereby minimizing the amount of final disposal materials.

Table 2-9 Wate Separation Categories, Proposed by Hanoi City

Type of waste	Before sorting	Classify	Collection, Transportation	Handling
(1) Reusable, recyclable waste	- Encourage reduction in use and reuse. - Keep dry, clean and put in available packaging	Bring to centralized collection locations (by population group, school, commercial center, supermarket ..)	Scheduled collection units	Recycling facilities
		Transfer to the collection unit by fixed date		
		Sale for bottle ticks		
2) Food and organic waste	- Drain. - Compact branches, large-sized garden waste	Do-it-yourself treatment as compost or animal feed at home		
		If the locality has applied concentrated compost treatment technology: Store and store separately in blue packaging/bags	Scheduled collection units	Concentrated organic waste treatment
		If the locality does not process concentrated organic fertilizers: Store and store together in the remaining waste bag		Processing according to existing technology
(3) Hazardous waste	Not to be mixed with other types of waste	Bring to the prescribed gathering point (prescribed by the People's Committee at all levels; implemented by manufacturers).	Collection and transportation units have the function	Regulatory processing
		Transfer to a collection unit with a fixed date function		
(4) Bulky waste	Compact, reduce the size to be able to further classify	Self-transport or hire functional units to the gathering point or to the processing facility (prescribed by the People's Committee at all levels).	Unit with appropriate functions	Processing according to existing technology
(5) Residual waste		Contained, stored separately in packaging	Scheduled collection units	Processing according to existing technology

Source: Hanoi DONRE（Translation from Vietnamese to English by Nippon Koei）

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

3.1 Background and Objective

Fukuoka Prefecture mentions the promotion of international environmental cooperation in Asian regions widely in "Fukuoka Prefecture Comprehensive Plan" and "Fukuoka Prefecture Environmental Comprehensive Vision." Fukuoka Prefecture has made a lot of good relationship with several overseas cities inclusive of Hanoi City and implemented activities by cooperating with them for the environment.

Especially in Hanoi City, Fukuoka Prefecture has supported on waste management and countermeasure to air pollution etc. by organizing workshops or providing technical support. Because of these previous collaborations, the both cities have started the City-to-City Collaboration financed by Ministry of the Environment, Japan (MOEJ) on “climate change and decarbonization” as new cooperation fields, therefore, the City-to-City Collaboration Project started from FY2021.

The previous achievements of the collaboration between the cities are shown in Table 3-1.

Table 3-1 Major achievements of support from Fukuoka Prefecture

#	Fiscal year	Outline
1	FY2006 - Ongoing	International Environment HR development Training Invited Hanoi trainees to Fukuoka, 31 participants in total
2	FY2011 - FY2020	Support on introduction of Fukuoka method landfill Field study, Design, construction, O&M
3	FY2010 - FY2012	Environmental Education Environmental Seminar, Training for invited stakeholders
4	FY2014 - FY2016	Water environment improvement Pilot project stage was completed.
5	FY2020(R2)	Start discussion for improvement of environment and decarbonization in Hanoi City
5	FY2021(R3)	City-to-City Collaboration Project started as the 1st year
6	FY2022(R4)	City-to-City Collaboration Project was conducted as the 2nd year
7	FY2023(R5)	City-to-City Collaboration Project was conducted as the 3rd year

Source: Prepared by Nippon Koei based on infomation of Fukuoka Prefecture

3.2 Approach of the City-to-City Collaboration

The Project implemented several activities focusing on 4 goals out of 17 SDGs between Hanoi City and Fukuoka Prefecture. (Table 3-2).

Table 3-2 Achievement and Activity plan of the City-to-City Collaboration

SDGs	Field of collaboration	Activity achievement in previous years	Activity plan for this fiscal year
	Introduction of "energy-saving" & "renewable energy" technologies	Through the technical workshop, solar sharing, small wind power, and other technologies owned by companies in the prefecture were proposed.	・Collect and organize information on related policies Conduct on-site surveys by participating companies, coordinate and support discussions with local governments, and formulate projects.
	Proposal of multiple technologies as "decarbonization" & "air pollution" countermeasures	・Examples of technologies for combating wildland fires and factory-derived emissions were presented. ・ Shared information on utilization and technology of rice straw, rice husks, and other biomass.	・Introduce participating companies' renewable energy, energy saving, and other environmental technologies through the technical workshops. ・Formulate projects for decarbonization projects by making technical proposals that meet the needs of Hanoi City and local companies.
	Information sharing and human resource (HR) development by technical training on hydrogen	New technologies were introduced at the technical workshops to disseminate knowledge (continued)	・Shared information to promote understanding of hydrogen technology through the technical workshops. ・ Investigate trends in hydrogen in Vietnam.
	Information sharing and continuous support in the waste management sector	Shared information on waste sorting and collection systems, proper disposal, etc. in the discussions with Hanoi City (ongoing).	・ To review the current plans and requirements in Hanoi City. Aim to identify companies that can conduct technical studies on waste management.

Source: Prepared by Nippon Koei

3.3 Achievements of the City-to-City Collaboration

3.3.1 Overview of each activity

In FY2023, meetings of the City-to-City Collaboration activities with MOE were conducted three times during the project period as shown in Table 3-3.

Table 3-3 Activities of the City-to-City Collaboration in FY2023

Content	Date	Description
MOE kick-off meeting (online)	July 12, 2023	The activity plan, implementation structure and plans for field surveys in this fiscal year were reported.
MOE progress report meeting (hybrid)	November 13, 2023	The results of the first (August) and second (October-November) field surveys and the progress of project formulation were explained. In particular, the future activity plans based on the results of the technical workshops and discussion on the City-to-City Collaboration were reported.

Content	Date	Description
MOE final report meeting(Online)	February 9, 2024	The results of this year's activities, including the activities of the third field survey (January) was reported. In addition, the future activity policy in response to the request of Hano City was reported.

Source: Prepared by Nippon Koei

3.3.2 Activities related to Institutional support

The main contents of the face-to-face meetings between Hanoi City and Fukuoka Pref. are as follows (Table 3-4 and Figure 3-1).

Table 3-4 Discussion under the City-to-City Collaboration Project in FY2023

Content	Date	Description
Kick-off meeting between Fukuoka Prefecture and Hanoi City	15 Aug. 2023	・City-to-City Collaboration activities and JCM model projects over the past two years were explained. ・The dates of the technical workshops were confirmed.
Meeting with Hanoi DOIT	16 Aug. 2023	・Overview of City-to-City Collaboration and JCM and its benefits were explained. ・Requested the presentation at a technical workshop. ・Information was exchanged on the role of DOIT and the scope of its jurisdiction.
Progress meeting between Fukuoka Prefecture and Hanoi City	1 Nov. 2023	・Fukuoka Prefecture's past cooperation and support were explained, and information was exchanged on the current needs related to waste and climate change in Hanoi City. ・DONRE has evaluated the results of City-to-City Collaboration activities previously and confirmed that it wishes to continue the City-to-City Collaboration.
Meeting with DONRE staff in Fukuoka	28 Feb. 2023	・One staff from Hanoi DONRE was invited to City-to-City Collaboration Seminar and she visited to Fukuoka Prefecture to discuss the further activities. ・It was confirmed that Hanoi DONRE expects to continue this project with Fukuoka Pref. to consider the countermeasure of city environment issues with deep discussion.

Source: Prepared by Nippon Koei

Discussion with Hanoi DONRE,Aug. 2023

Discussion with Hanoi DOIT,Aug. 2023

Discussion with Hanoi DONRE
Nov. 2024

Discussion with Hanoi DONRE staff in
Fukuoka, Feb. 2024

Source: Photos taken by Nippon Koei

Figure 3-1 Photos of discussion under the City-to-City Collaboration

3.3.3 Field Survey

Field surveys (three times) were conducted during this year's City-to-City Collaboration Project. A summary is provided below (Table 3-5).

Table 3-5 Summary of each field work

Content and date	Description
1st field work	- Meeting with DONRE, Hanoi City about City-to-City Collaboration - Meeting with DOIT - Meeting with JICA Vietnam office - Meeting with JETRO Hanoi office - Visit to the Soc Son Waste Power Generation and Nam Son Landfill (see details below) - Visit to Xuan Son Landfill and Craft Village (see details below) - Technology introduction and factory tour in an industrial park in the suburbs of Hanoi City - Technology introduction and factory tour at an industrial park in Hai Phong City
2nd field work	- Conducting technical workshop - Meeting with MARD - Meeting with VNUA - Meeting with DONRE, Hanoi City about City-to-City Collaboration - Courtesy visit to the Embassy of Japan in Vietnam - Participation in an industrial park seminar sponsored by the Ministry of Foreign Affairs
3rd field work	- Conducting JCM mini seminar - Wrap-up meeting with DONRE, Hanoi City

Source: Prepared by Nippon Koei

3.3.4 Field Visit to Waste Management Facilities in Hanoi

The team conducted field visits to waste management facilities in Hanoi city with the purpose to observe and have basic understanding on the status of waste management in the city. Table 3-6 and Figure 3-3shows the outline of each visit.

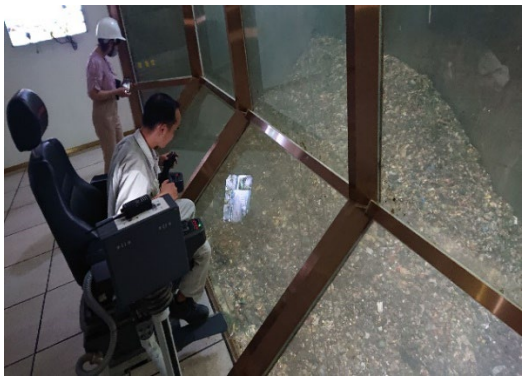
Table 3-6 Outline of Field Visit to Waste Management Facilities

Date	Place	Summary of Visit
15th Augst	Xuan Son Landfill	・ The site receives 530t/day of waste form the city. ・ Partially applied Fukuoka-method in 2015 which is currently under stabilization. ・ Currently operating a different cell to dispose of incoming waste.
	Xa Cau Village (Craft Village)	・ Numerous informal waste recyclers operating their workshops in the west side of Hanoi City. ・ Mainly dealing with waste plastics (purchase, processing, and reselling) for domestic use. ・ Low grade waste plastics are not recycled but abandoned in the backyards leading to pollution in public water channels.
17th August	Nam Son Landfill/ Soc Son Waste to Energy (WtE) Plant	・ Nam Son Landfill（157ha）commenced operation in 1990 and accepts 500t/day. The site is almost reaching the maximum capacity and is in the need of relocation/expansion. ・ At the time of visit, the access road was muddy and offensive odor and vectors were observed despite spraying pesticides. ・ Demonstrations against the site operation frequently occurred several times in the past demanding the suspension of landfill operation and waste transportation. ・ Soc Son WtE commenced its operation in 2021 and is operated by a Chinese company in contract with Hanoi Authority with the capacity of 4,000t/day.（800t/incinerator*5 incinerators in total） ・ The rest of 2 incinerators are under the process of EIA and once completed, the WtE is expected to process 4000/t of waste/day which is more than a half of waste produced in Hanoi City (7000t/day).
31st October	Dong Xuan Market	・ Observed waste collection at one of the largest markets in Hanoi City. ・ Waste collection is performed twice a week (morning and evening) by 4t compactor trucks. ・ Majority of waste was organic and few carton boxes , plastics, and textiles were observed with less mixture of waste.

Source:Prepared by Nippon Koei

Xuan Son Landfill（Operating Cell）

Xa Cau Village（Craft Village）



Waste Pit, Soc Son WtE Plant

Collection at Dong Xuan Market

Source: Photos taken by Nippon Koei

Figure 3-2 Photos of site visit related to waste management

3.3.5 Technical Workshop in Hanoi City (Hybrid)

Technical Workshop towards a decarbonized society was held on October 31, 2023. The event was held at a hotel in Hanoi city and was attended by approximately 41 people, including Hanoi city government officials, Fukuoka Prefecture, and private companies.

In this workshop, Fukuoka Prefecture Environment Bureau and Nippon Koei introduced the progress of this City-to-City Collaboration Project and an overview of the JCM subsidy scheme, Hanoi DOIT introduced the implementation status of energy saving measures in the industrial sector in Hanoi City, and Kanematsu KGK Vietnam. introduced JCM projects (renewable energy project), Riamwind Co., Ltd. introduced small wind power generation technology, Bec Kyushu. introduced energy-saving technology and dust prevention systems in factories, Agritree. introduced agricultural solar power generation and VINA HYDROGEN. reported on information collection related to hydrogen and renewable energy. Participants also exchanged information on each other at the business matching session.

In the opening speech, DONRE of Hanoi City stated that they hope to achieve results in the city's climate change countermeasures by utilizing JCM to achieve net zero CO2 emissions by 2050. The workshop agenda is shown in Table 3-7 , and the pictures in Figure 3-2. The presentation materials are in the attachments of this report.

Table 3-7 Agenda of the Technical Workshop

#	Agenda	Speaker
1.	Opening remarks	Hanoi DONRE
2.	City-to-City Collaboration activities in Environment sector	Environment Bureau, Fukuoka Prefecture
3.	Project formulation for zero-carbon society in Viet Nam	Nippon Koei
4.	Promotion of renewable energy technology and energy saving equipment in Vietnam	Hanoi DOIT
5.	Technological introduction by Japanese companies 1) Introduction of JCM project (renewable energy) 2) Micro wind power turbine	 1) Kanematsu KGK Vietnam 2) Riamwind 3) Bec Kyushu

#	Agenda	Speaker
	3) Energy-saving technology and dust prevention system 4) Solar sharing system in agricultural land 5) Outline of JCM scheme 6) Report of data collection survey related to hydrogen	4) Agritree 5) Nippon Koei 6) VINA HYDROGEN
6.	Q&A	Nippon Koei
7.	Closing remark	Environment Bureau, Fukuoka Prefecture
8.	Business matching	—

Source: Prepared by Nippon Koei

Presentation of Fukuoka Prefecture

Presentation of Hanoi DOIT

Participants of the workshop

Photo session

Source: Photos taken by Nippon Koei

Figure 3-3 Photos of the Technical Workshop in Hanoi City

3.3.6 Seminar on City-to-City Collaboration for Zero Carbon Society

MOEJ hosted the seminar on City-to-City Collaboration for Zero Carbon Society on February 26 and 27, 2024, inviting partner cities to Japan. The seminar was held on the occasion of the 10th anniversary of the City-to-City Collaboration Project and aimed to promote zero carbon society through three sessions: 1) high-level session, 2) mutual learning session, and 3) site visit to a decarbonization leading area. Hanoi City DONRE and Fukuoka Prefecture participated in the seminar. The Project supported for the invitation procedures to Japan, and Figure 3-4 was prepared as seminar materials.

FY2023 C3P Project Overview

Japanese City	Partner City	Implementation Body
Fukuoka Prefecture	Hanoi City	Nippon Koei Co., Ltd.

Project title
FY2023 Promotion of Zero-Carbon Technology to Improve the Environment in Hanoi City
Project objectives
This project aims to solve the environmental issues in Hanoi City by supporting on Human Resources Development related to promotion of "Zero-carbon" and introduction of advances decarbonization technology.
Planned activities in FY2023
-Sharing the knowledge between Fukuoka and Hanoi -Introducing decarbonization and advanced technology to Hanoi
Major achievements in FY2023 & previous years
-Support on MOU between Local company in Fukuoka and National University in Viet Nam for project formulation. -One JCM model project was adopted by MOEJ -Technical Workshop for business matching in Hanoi City

Discussion on the project activities at Hanoi DONRE office

Technical Workshop for business matching in Hanoi City

Source: Prepared by Fukuoka Prefecture and Nippon Koei

Figure 3-4 City-to-City Collaboration Seminar material (Project Overview)

CHAPTER 4 JCM MODEL PROJECT FORMULATION

4.1 Information Collection Survey

Conducted information gathering surveys with local staffs and participating companies to support decarbonization and environmental measures in Hanoi City (Table 4-1).

Table 4-1 Target fields of this survey and overview of work

Target field	Overview of work
1) Support for institution building (described in Chapter 3)	To support the formulation of JCM model projects, the Project collected information on policies, institutions, and plans of the Vietnamese government and Hanoi City in the field of environment and climate change and summarized the main points and issues. This year, the latest information has been added and updated, including survey results from previous years.
2) Renewable energy	To support the business development of the participating companies (Agritree and Riamwind), the Project collected local information, met with potential partner companies, and inspected the target facilities. This chapter summarizes the results of these surveys and studies for each technology.
3) Energy saving	To support the business development of participating companies (BEC Kyushu), local information was collected, interviews were held with potential partner companies, and visits were made to target facilities. This chapter summarizes the results of the survey.
4) Waste Management	Hanoi City's draft Waste Master Plan was analyzed and a field survey on waste disposal and the introduction of separate collection in the city were conducted (Chapter 3). Although no studies or technical studies for project formulation were conducted this year, discussions were held with Japanese companies that have waste power and biogas power generation technologies, and basic information was collected. If the activities continue in the next fiscal year, to conduct a full-scale project formulation study was agreed upon.
5) Hydrogen technology	A participating company (Vina Hydrogen) conducted a study on the diffusion of hydrogen technology in Vietnam and presented the results at a technical workshop. Since Vietnam is still in the early stages of institutional development and technical studies on how to produce, supply, and utilize hydrogen, it is necessary to conduct ongoing surveys and gather information from relevant organizations to formulate the project.

Source: Prepared by Nippon KoeiY

4.2 Consideration of JCM Model Project Formulation by Installing Renewable Energy in Farmlands near the City: Solar Sharing system (Agritree)

4.2.1 Overview of the Study

In the study, as a renewable energy for farmlands near the city, installing solar sharing technology which was developed by Agritree Co., Ltd. (hereinafter called "Agritree) located in Fukuoka Prefecture was considered for JCM model project formulation.
Agritree has been trying to develop and promote solar sharing technology since 2018 and has over 10 cases of installing this technology in Japan. Furthermore, through the Project, the company is considering to expand their business to overseas targeting on farmlands near Hanoi City in Vietnam.
Solar sharing is an efficient system that realizes agriculture and power generation using solar power by setting narrow solar panels at intervals on a high frame installed in farmlands. The services provided by Agritree have the following merits (Figure 4-1).

- Reducing GHG emission by using solar power generation
- Getting power generation income while continuing farming (in the case of selling electricity)
- Reducing significantly the electricity charges that have been purchased so far (in the case of electricity self-generation)
- Getting technical supports on agricultural management and solar sharing
- Contribution to restraint in new land development and environmental conservation because solar sharing utilizes existing farmlands. etc.

Source: Agritree (Guidebook on Technologies of Environment-Related Corporations in Fukuoka Prefecture)

Figure 4-1 Image of installing Solar Sharing (the example in Japan)

In Vietnam, Feed-in Tariff (FIT) to large scale solar power generation projects was completed in 2021. Therefore, solar sharing of small scale less than 1MW for self-generation was

considered, not selling power to an electric power company via a grid. Specifically, collecting information on Vietnamese agricultural situation, farmer's technical or budgetary issues, and the needs about solar sharing were conducted through interview survey with Hanoi City government, local companies, and university as follows (Table 4-2).

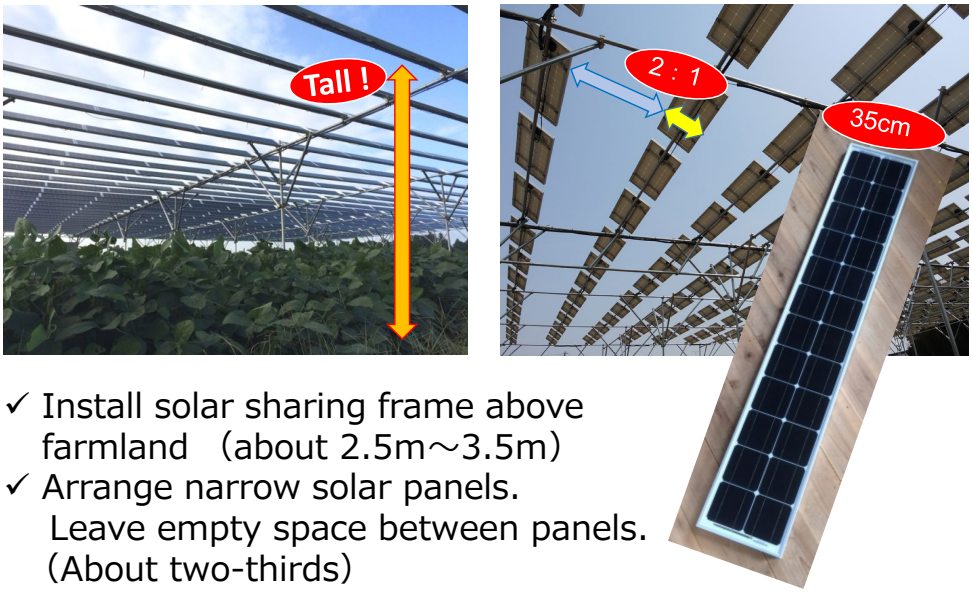
Table 4-2 Survey items and its Overview for installing Solar Sharing

Interviewee	Overview
Agricultural companies	Status of greenhouse installation in Vietnam, market trends of value-added crops such as fruits, exchange opinions of installing solar sharing.
Agricultural university	Possibility of installing solar sharing in Vietnam, candidate crops, possibility of implementing demonstration project in the university

Source: Provided by Nippon Koei

4.2.2 Specification of the technology expected to be installed

Solar sharing uses narrow panels to avoid them from interfering with growing crops and working on the farms, which is different from general solar power generation system, and the panels are installed at a height of 2.5 to 3.5m. As the photos(Figure 4-2) below shows, the amount of solar power generation per area is lower than the usual one since the panels are installed at 2:1 interval.
However, by using a double-sided type of panel, the light reflected on the ground can also be efficiently utilized for power generation.



Source: Agritree's presentation material

Figure 4-2 Technology to be installed (Solar Panel)

The electricity generated by solar sharing should be utilized effectively for self-consumption at farmers with the aim to realize a grid alternative/ fuel conversion. To improve the quality of agricultural management and increase added value of crops, it is essential to connect to a facility that can consume the generated electricity without waste. Table 4-3 shows an ancillary

equipment expected to be installed which will be investigated and considered continuously in the next fiscal year.

Table 4-3 Survey items of an ancillary equipment to Solar Sharing

Target	Survey item
Agricultural machinery	Local standards, general specifications, power consumption (electric agricultural machines), fuel consumption (normal agricultural machines), international standards, selling prices, manufacturers, frequency of use, etc.
Storage battery	Local standards, specifications, manufacturers
Water distribution and irrigation system	Current equipment specifications, power consumption
Houses, factories and equipment adjacent to farmland	Electricity consumption, fuel consumption, presence or absence of air conditioning/drying equipment, etc.

Source: Provided by Nippon Koei

4.2.3 Result of the Study

The feasibility of introducing Solar Sharing has been confirmed through on-site surveys and discussions with related parties. Agritree and VNUA signed the Minutes of Understanding (MOU) for collaboration regarding an Solar Sharing demonstration project using VNUA's test firm, and significant progress was made. In addition, since there was no case of Solar Sharing introduced in Viet Nam before, so opinions were exchanged with VNUA regarding institutional constraints and similar example, and the following was agreed between Agritree and VNUA.

1) Consideration of candidate crop for Solar sharing:

It was suggested that more than one type of crop be grown to assess the environmental conditions. Possible candidates included ginger, chrysanthemums (an ingredient in tea), and soybeans.

2) Dispatch of staff for management and monitoring of Solar Sharing Facilities:

VNUA agreed to secure personnel to manage and analyse Solar Sharing system, such as a permanent staff to manage the equipment, a full-time researcher to collect and analyse monitoring data, and write reports, and an adviser to provide technical support.

3) Provision of basic soil data:

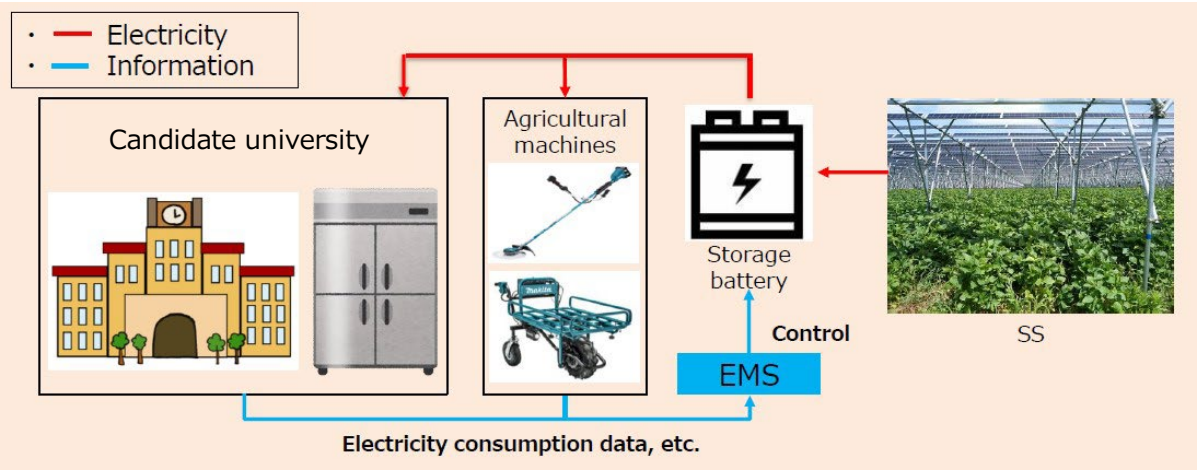
It was agreed that A would provide basic data such as soil physical characteristics of the candidate test site of VNUA.

Meeting with MARD　　Meeting with VNUA

Source: Photos taken by Nippon Koei

Figure 4-3 Photos of discussion (Agritree)

As the pilot project, it is considered a multifunctional image in which the electricity generated by Solar Sharing can be used for self-consumption of VNUA, agricultural machinery, Energy Management System (EMS), and rechargeable batteries (including E-bikes) which shown in Figure 4-4.

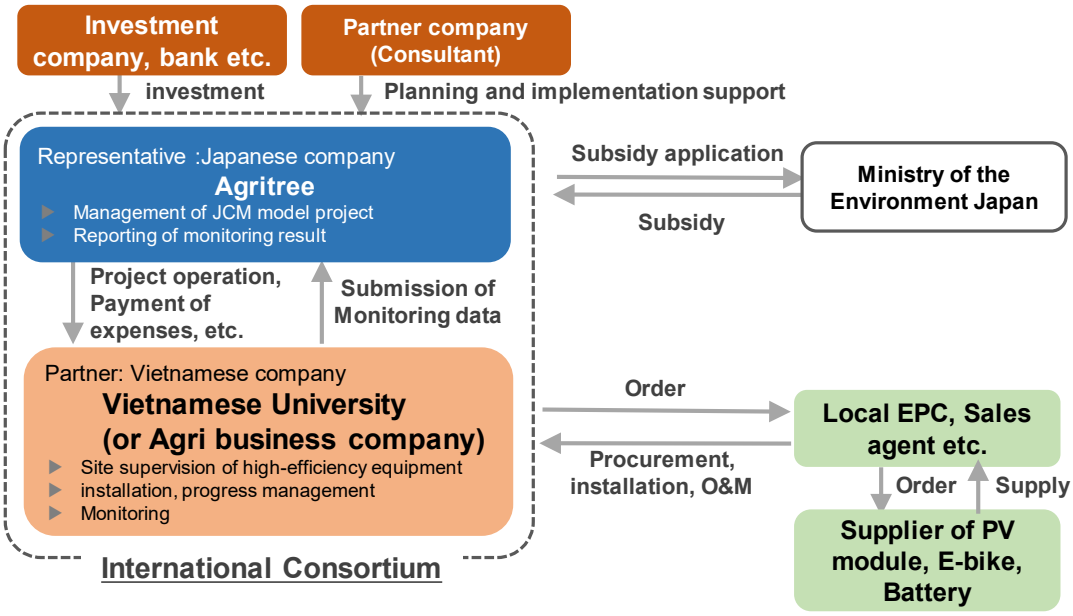


Source: Provided by Agritree (Partially edited by Nippon Koei)

Figure 4-4 Image of Business Plan (Agritree)

4.2.4 Draft Project Plan and Feasibility Evaluation

The pilot project will be implemented based on the MOU with VNUA, but the implementation structure for JCM model project with expansion of area is shown in Figure 4-5. It will be necessary to find partners such as joint ventures, investment companies, and local EPCs.



Source: Prepared by Nippon Koei

Figure 4-5 Image of International Consortium (Agritree)

4.2.5 MRV plan

With reference to the existing methodology for a project in Vietnam (VN_AM007), it is assumed that the monitoring of electricity generation by panels and solar radiation is necessary for solar power generation project by solar sharing system. At present, it is not decided the type of equipment utilizes generated power, however, it is needed to install a system can synchronize the electricity usage in each equipment in real time. In order to prevent power loss, it is also necessary to develop a new methodology including more complicated mechanisms such as the introduction of storage batteries.

4.2.6 Further Plan

If the project would continue to support the introduction of Soler Sharing in the next year, the pilot project should be started early and it needs to formulate a business plan into JCM model project (with subsidy) or private JCM project (without subsidy) to cooperate with a major local agricultural company as a joint venture.

4.3 Consideration of JCM Model Project Formulation by installing Renewable Energy in Hanoi City: Small Wind Turbine Systems (RIAMWIND)

4.3.1 Overview of the study

In the Project, installing of small wind turbine systems using "Wind-Lens Technologies" developed by RIAMWIND Co., Ltd. (hereinafter called "RIAMWIND") located in Fukuoka Prefecture was considered for JCM model project formulation in Hanoi City and neighboring areas. Collecting information and consideration of project formulation were conducted targeting the whole area of Vietnam, not only consideration of using this technology as self-consumption in commercial buildings/ factories or an emergency power source in public facilities but also expanding it to the coast areas and southern Mekong Delta where the wind conditions are good other than northern area of Vietnam inclusive of Hanoi City.
In the study of this fiscal year, comparison of the amount of power generation at northern, central and southern Vietnam locations by using wind simulation was implemented, and information of the amount of power generation and its cost in the country was collected.

4.3.2 Specification of the technology expected to be installed

"Wind-Lens Technologies" is a windmill with a ring (wind-lens) around its blades, and has the following features (quoted from RIAMWIND's website, Figure 4-6).

High efficiency: Two-threefold increase in output power compared to conventional wind turbines due to the concentration of wind energy ("wind-lens" technology)

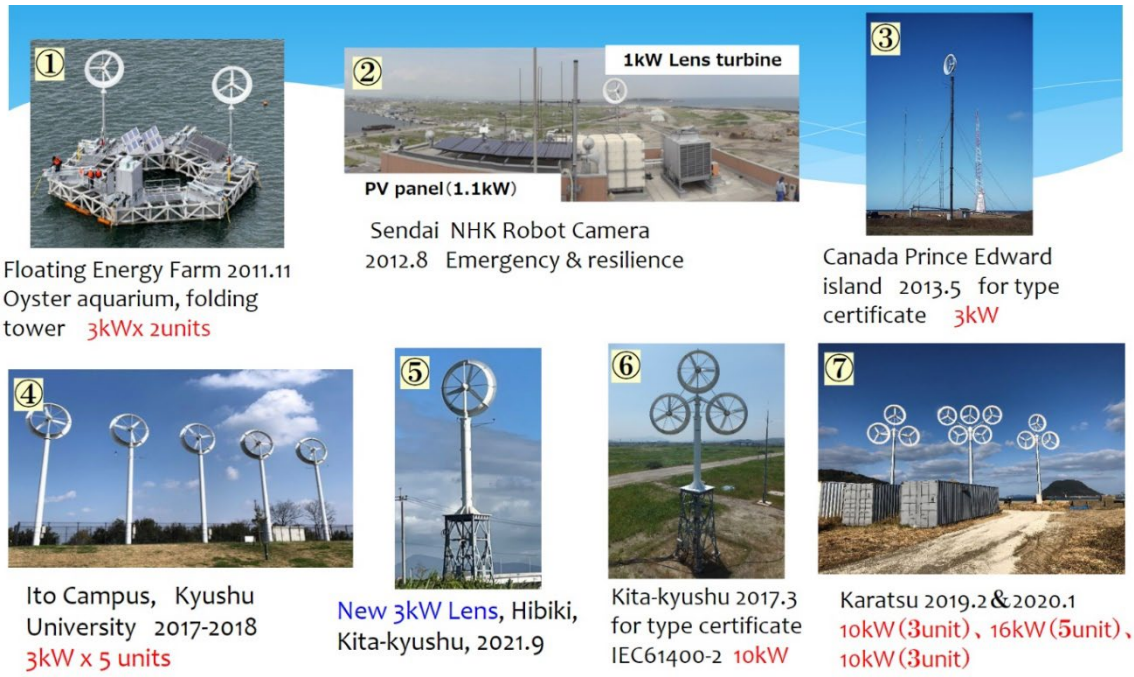
Very quiet: Since the vortices generated from the blade tips are considerably suppressed through the interference with the boundary layer within the diffuser shroud, the aerodynamic noise is reduced substantially

Adaptable to surrounding: Wind-lens is safe and has a beauty that blends into the surrounding landscape.

Source: Extracts form RIAMWIND's documents

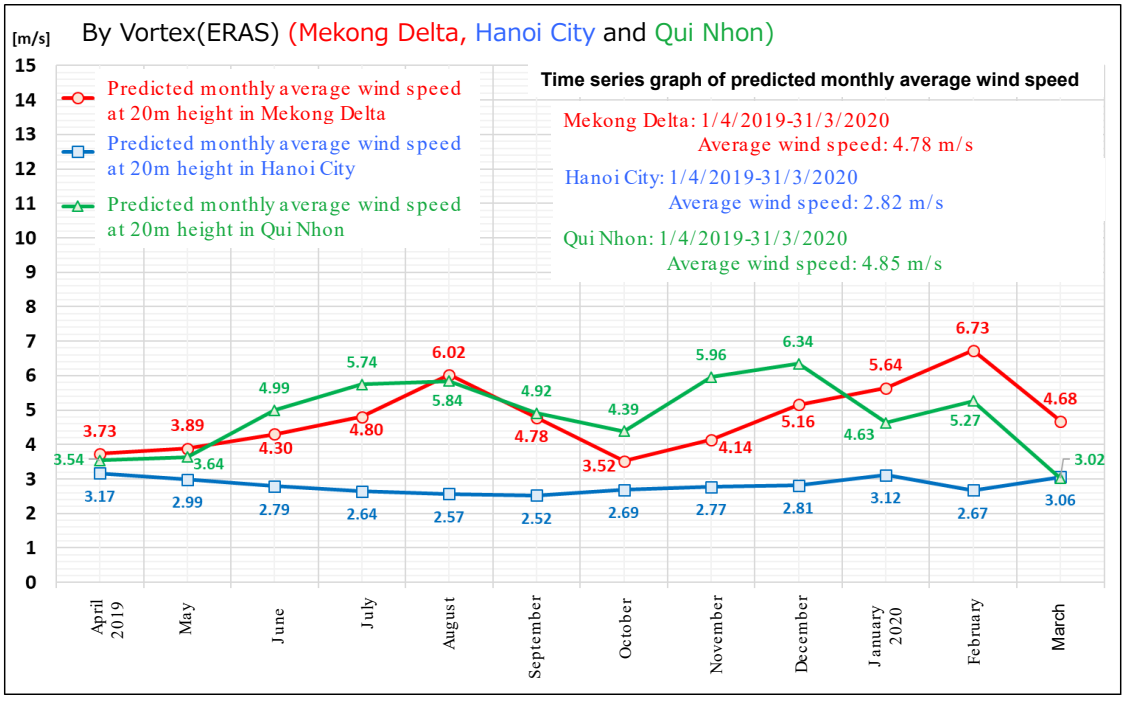
Figure 4-6 Image Lens-Wind（Left：Single, Right:Multi Lens）

In Japan, RIANWIND has around 30 installations of this technology as of February 2022(Figure 4-7), inclusive of demonstration projects. Another advantage of RIAMWIND's technology is that it is possible to design appropriately the size, number, and height of pillars of wind-lens turbine according to the location condition with the aim of maximizing the amount of power generation (Figure 4-8, Table 4-4).



Source: Extracts form RIAMWIND's documents

Figure 4-7 On-going project of Wind-Lens Technology in Japan



Source: RIAMWIND

Figure 4-8 Result of wind simulation based on data of VORTEX

Table 4-4 Estimated annual power generation at three locations in Viet nam

1. Estimated annual wind power generation 9kW（independent type) x2unit

Location	Average annual wind	Annual average power generation (9kW)	Unit	Total annual power generation
Mekong Delta	4.78 m/s	15.5 MWh/年	2台	31.0 MWh/年
Hanoi City	2.82 m/s	4.3 MWh/年未満※1	2台	8.6 MWh/年未満
Qui Nhon	4.85 m/s	16.0 MWh/年	2台	32.0 MWh/年

2. Estimated annual wind power generation 15kW（independent type) x1unit

Location	Average annual wind	Annual average power generation (15kW)	Unit	Total annual power generation
Mekong Delta	4.78 m/s	25.9 MWh/y	1台	25.9 MWh/y
Hanoi City	2.82 m/s	Less than 7.1 MWh/y※	1台	7.1 MWh/y
Qui Nhon	4.85 m/s	26.7 MWh/y	1台	26.7 MWh/y

※Estimation of power generation used 3.0m/s, because there is a lower limit of the wind strength in the simulation.
This estimation is based on the simulated data, it not guarantee the actual amount of power generation.

Source: RIAMWIND

4.3.3 The Result of Study

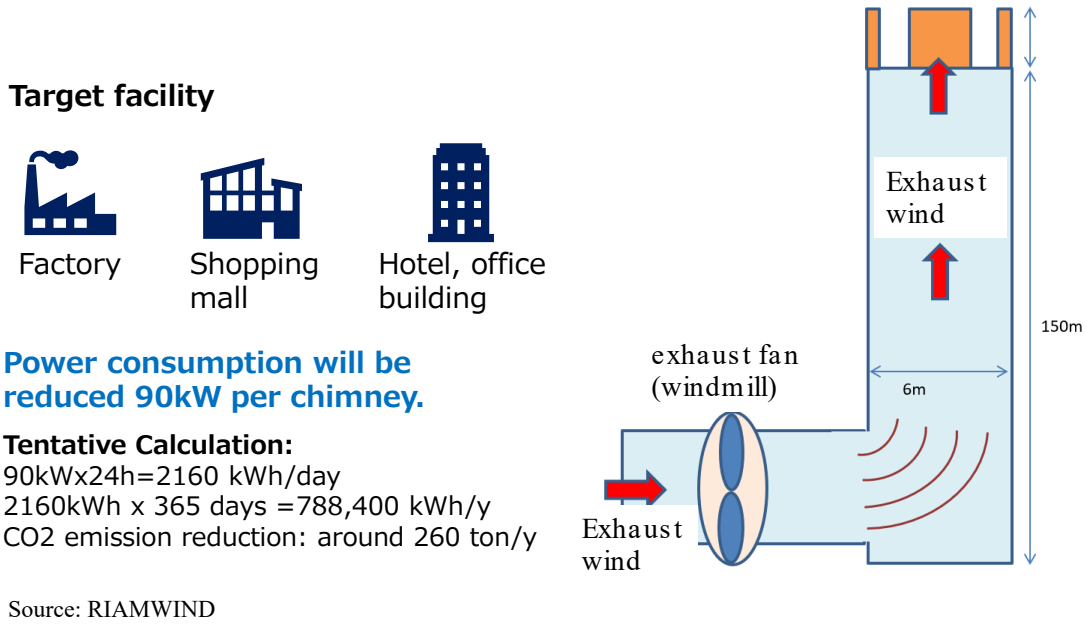
In response to a purchase request from a private company in this fiscal year, a field survey was conducted to confirm the current situation of the candidate site and the implementation procedure, and examined the possibility of introducing 3kW wind turbine. It was confirmed that the tower, storage battery, and electrical system equipment except wind turbine (core technology) can be produced and procured in partnership with a local construction company. However, the introduction cost of this technology is not very effective against the current electricity bill, and it was difficult to approach the price range where wind turbines can be sold in Viet Nam.

Source: Photo taken by Nippon Koei

Figure 4-9 Short Seminar for the industrial park in Hai Phong

4.3.4 Further Plan

According to the results of the study above, additional consideration of new business in Viet Nam regarding the power generation technology using exhaust wind was conducted. This technology can more generate power than the power used for exhaust, if it uses regeneration energy to install the wind turbine at the exhaust ports in the existing factory and commercial facilities as shown below (Figure 4-10). Although the power generation capacity of a single location is very small, there is the potential to introduce hundreds or even thousands of units in an industrial park because a typical factory has dozens of exhaust outlets. In addition, technically speaking, it can be installed as an addition to existing facilities, and since additional equipment other than blades and turbines is not required, it can be produced at low cost, which is highly likely to lead to new business. When the Vietnamese companies which the project team introduced the technology, has interests in it specifically, the project formulation will be conducted in the future.



Source: RIAMWIND

Figure 4-10 Renewable Energy technology using exhaust wind（RIAMWIND）

4.4 Consideration of JCM Model Project Formulation by installing Large-Scale Renewable Energy (Kanematsu KGK Vietnam)

4.4.1 Outline of the Study

In order to formulate renewable energy projects using JCM scheme, current trends in large-scale renewable energy projects and information of on-going and/or planned major projects were collected continuously in this fiscal year. Through the discussion with Hanoi City and information sharing with participating companies of the technical workshop, the large-scale renewable energy projects (solar power, small hydropower, waste to energy, etc.) for the purpose of selling electricity were considered.

4.4.2 Results of the Study

To confirm recent trend of renewable energy project, the related information for the past five years in Viet Nam as follows（Table 4-5 to Table 4-8）. Regarding planned project, it will be continued to collect details such as the project schedule and implementation system because it has some possibilities of considering formulation of JCM model project.

Table 4-5 List of large-scale Renewable Energy project in Viet Nam (Solar Power)

#	Project Site (category)	Capacity	Progress of the project
1	Ninh Thuan Province	150 MW	Operation start: January 2021
2	Binh Thuan Province	50 MW	Operation start: January 2021
3	Quang Binh Province	47.6 MW	Operation start: 2022
4	Thuan Thien-Hue Province	50 MW	Operation start: December 2020
5	Binh Dinh Province	50 MW	Operation start: 2020
6	Binh Dinh Province	50 MW	Operation start: 2020
7	Ninh Thuan Province	150 MW	Under construction
8	Long An Province	49 MW	Under construction
9	Gia Lai Province	14.8 MW	Planning
10	Gia Lai Province	49 MW	Planning
11	Gia Lai Province	500 MW	Planning
12	Tay Ninh Province	450 MW	Planning
13	Binh Phuoc Province	30 MW	Planning
14	Khanh Hoa Province	40 MW	Planning

Source: Prepared by Nippon Koei

Table 4-6 List of large-scale Renewable Energy project in Viet Nam (Hydropower)

#	Project Site (category)	Capacity	Progress of the project
1	Hoa Binh Province	480 MW	Under construction
2	Kon Tum Province	360 MW	Under construction
3	Nghe An Province	27 MW	Under construction
4	Thanh Hoa Province	102 MW	Under construction
5	Dong Nai Province	200 MW	Planning
6	Dong Nai Province	93 MW	Planning

Source: Prepared by Nippon Koei

Table 4-7 List of large-scale Renewable Energy project in Viet Nam (Wind Power)

#	Project Site (category)	Capacity	Progress of the project
1	Bac Lieu Province	80 MW	Operation start:2022
2	Gia Lai Province	50 MW	Operation start: 2021
3	Ninh Thuan Province	50 MW	Operation start: 2021
4	Quang Tri Province	48 MW	Operation start: 2021
5	Soc Trang Province	30 MW	Operation start: January 2021
6	Quang Binh Province	109 MW	Operation start: 2021
7	Dak Nong Province	49 MW	Operation start: 2021
8	Binh Thuan Province	50 MW	Operation start: October 2021
9	Tien Giang Province	100 MW	Under construction
10	Soc Trang Province	50 MW	Under construction
11	Ben Tre Province	30 MW	Under construction
12	Ben Tre Province	128 MW	Under construction
13	Ninh Thuan Province	88 MW	Planning
14	Tra Vinh Province	200 MW	Planning
15	Binh Thuan Province	3400 MW	Planning
16	Binh Thuan Province	3500 MW	Planning
17	Lam Dong Province	98 MW	Planning
18	Vung Tau Province 省	102.6 MW	Planning
19	Quang Tri Province 省	30 MW	Planning
20	Binh Dinh Province	2000 MW	Planning

Source: Prepared by Nippon Koei

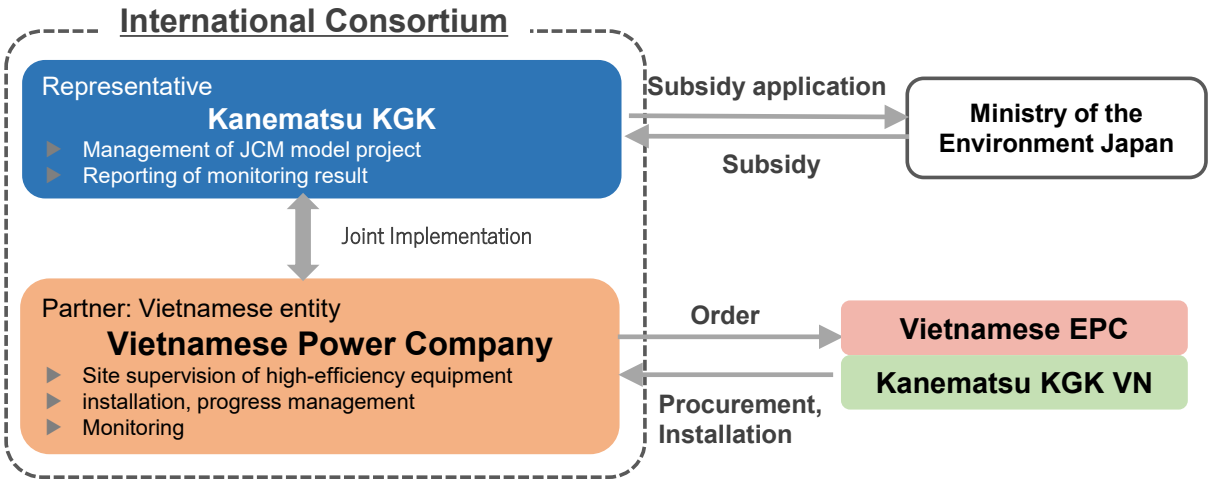
Table 4-8 List of large-scale Renewable Energy project in Viet Nam (Others)

#	Project Site (category)	Capacity	Progress of the project
1	Tuyen Quang Province(Biomass)	25 MW	Operation start: 2019
2	Gia Lai Province(Biomass)	95 MW	Operation start: 2018
3	Hau Giang Province(Biomass)	20 MW	Under construction
4	Tra Vinh Province(Biomass)	25 MW	Planning
5	Quang Binh Province(Biomass)	50 MW	Planning
6	Soc Son, Hanoi City(WtE)	15 MW	Operation start: July 2022
7	Son Tay, Hanoi City(WtE)	37 MW	Under construction
8	Bac Ninh Province(WtE)	11.6 MW	Under construction
9	Dong Nai Province(WtE)	30 MW	Planning
10	Thanh Hoa Province(WtE)	18 MW	Planning
11	HCMC City(WtE)	40 MW	Planning
12	HCMC City(WtE)	No info.	Planning
13	Quang Tri Province(Geothermal)	25 MW	Planning

Source: Prepared by Nippon Koei

4.4.3 Consideration of International Consortium for applying to JCM Model Project

The International consortium of large-scale renewable energy projects such as JCM model project is shown in Figure 4-11. It is assumed that Kanematsu KGK and local power company will form an international consortium. Kanematsu KGK Vietnam as a subsidiary company of Kanematsu KGK will support the operation of partner local company and MRV activities in order to achieve stable project operations and achieve GHG emission reduction plans,



Source: Prepared by Nippon Koei

Figure 4-11 Image of International Consortium (Kanematsu KGK Vietnam)

4.4.4 Future Plan

Kanematsu KGK Vietnam has been participating in the large-scale solar power project as JCM model project in Viet Nam. Through this scheme, the first micro hydropower project using JCM subsidy scheme in Viet Nam has also been pursued by MOEJ. It plans to continue for formulating JCM model project through the finding of Vietnamese company which has been considering investment and implementation of renewable energy.

4.5 Consideration of introducing energy-saving equipment in factories: Bec Kyushu

4.5.1 Overview of the Study

BEC Kyushu, a newly participating company based in Fukuoka Prefecture, conducted meetings and site visits to several factories in Hanoi City or surrounding areas in this year. The company's own environmental and energy-saving technologies are particularly conducive to improving factory environments, and in Vietnam, where there are many large-scale industrial parks, the potential for business development and the interest of local officials is high.

4.5.2 Specification of the technology expected to be installed

Three technologies owned by BEC Kyushu (induction lamps, natural green gas, and dust prevention systems) were examined this year. Details are provided in the attachment, but since induction lamps are an energy-saving technology that can be applied to JCM, their characteristics are described below.

Luminescence principle: Lighting without electrodes. By passing an electric current through a coil, ultraviolet rays are irradiated into the tube and converted into visible light by a phosphor coating applied to the inner wall of the tube.

Strengths of the product: Long life (about 100,000 hours) because there are no consumable parts. The light diffuses easily and does not cast shadows, providing a warm light that is easy on the eyes of factory workers.

4.5.3 Results of the Study and Future Plan

The Project team visited industrial parks and private sector factories in nearby Hanoi City (Figure 4-12). The current status of facilities related to lighting and air conditioning and the level of interest in introducing energy-saving equipment were confirmed. Since meetings with several companies are underway, it is expected that activities through City-to-City Collaboration will continue in the next fiscal year.

Meeting with facility owner

Inside the targeted factory

Source: Photo taken by Nippon Koei

Figure 4-12 Photos of meeting and factory survey

CHAPTER 5 FUTURE PLAN

5.1 Achievement of Activities and Analysis of the Issues in FY2023

Table 5-1 shows summary of the achievement in the technological fields (institutional establishment support, renewable energy, energy conservation, waste, and hydrogen technology) covered in Phase 1 (three years) of this City-to-City Collaboration project. All of the targeted activity items were implemented and most of the anticipated goals were achieved. Future support plans for activities that require continued support are described in the next section 5.2.

Table 5-1 Activity items and the results of City-to-City Collaboration project

#	Items	Achievement
1.	**Institutional Support**	
1)	Consultation on promoting decarbonization in accordance with environmental policy in Hanoi City, SDGs, and other basic policies.	Two to three meetings are held by the two cities each year, and the initial plan has been achieved. The Project collected and analyzed the current environmental policies in Hanoi City. In particular, the technical information was shared to provide support in the areas of energy conservation and waste management.
2)	Support for human resource development related to the environment (especially in the field of waste) and climate change countermeasures.	As technical information and examples from the Japanese waste sector were provided to Hanoi City, the initial plan was achieved in terms of support for planning, However, the specific measures in Hanoi City are just beginning to be implemented, so the need for human resource development is high.
3)	Business matching support for private companies.	Once a year, as initially planned, a technical workshop was held to support business matching between participating companies and participants in the City-to-City Collaboration. This year, with the cooperation of the VCCI, the Project also recruited participants.
2.	**Promotion of Renewable Energy technology**	
1)	Support for JCM model project feasibility study by introducing solar sharing.	A memorandum of cooperation (MOC) between the participating company (Agritree) and VNUA was signed to develop a draft plan for the demonstration project.
2)	Support for JCM model project feasibility study by introducing small wind power generation and exhaust wind power generation	Participating company (Riamwind) conducted several field surveys and individual meetings with local companies. Identified potential partner companies and provided support for drafting business plans and quotations.
3)	Support for consideration of the use of meteorological observation data for the introduction of renewable energy technologies	A participating company (Weathernews Inc.) has installed its own high performance observation radar in Hanoi City, together with the Meteorological Department, and has begun observations.

#	Items	Achievement
		The project supported the provision of technology to the parties concerned through technical workshops to study how to utilize renewable energy when it is introduced in industrial parks.
4)	Business matching support for finding renewable energy businesses	Once a year, as initially planned, a technical workshop was held to support business matching between participating companies and participants in the City-to-City Collaboration. In addition, to help participating companies develop their businesses, the Project conducted individual meetings with local companies and provided support for the preparation of materials for business negotiations.
3.	**Promotion of Energy Saving equipment**	
1)	Support for on-site surveys and stakeholder consultations for the introduction of energy saving technologies in factories, commercial facilities, etc.	To help participating companies develop their businesses, the Project arranged visits to local facilities and supported the preparation of explanatory materials for related parties.
2)	Business matching support for finding projects to introduce energy saving technologies	Once a year, as initially planned, a technical workshop was held to support business matching between participating companies and participants in the City-to-City Collaboration. In addition, to help participating companies develop their businesses, the Project conducted individual meetings with local companies and provided support for the preparation of materials for business negotiations.
4.	Support in the Waste Management	
1)	Gathering information on the waste sector in Hanoi City	The Project inspected waste related facilities in Hanoi City and collected information to analyze current measures and issues.
2)	Support for the development of a waste master plan in Hanoi City	The draft Waste Master Plan was analyzed and a menu of potential support was organized (described in Chapter 3).
3)	Support for JCM model project feasibility study to promote introduction of environmental infrastructure in the waste management sector	Technical information on waste power generation, biogas power generation, and other technologies was collected through field surveys.
5.	Introduction of Hydrogen Technology	
1)	Gathering information to consider the introduction of hydrogen technology in Vietnam	A participating company (Vina Hydrogen) presented the basics of hydrogen technology, international trends, and potential at a technical workshop.
2)	Support for business matching to discover the projects introducing hydrogen technology	It was confirmed that there are very few potential partner companies in Vietnam for hydrogen related business development, and that the first step is to disseminate information.

Source: Provided by Nippon Koei

5.2 Future Plan based on Achievements of Phase-1

5.2.1 Institutional Supports

The results of the three-year City-to-City Collaboration project have been well received by Hanoi City, and the City has requested that the project be continued. Continued support, including the sharing of know-how that can be used in the planning and implementation stages of specific measures, is expected to be necessary in the future. For example, the format of the technical workshops, which have so far focused on providing information, could be modified to incorporate mutual learning through discussions among participants, so that the information gained can be immediately applied to practical work.

5.2.2 Renewable Energy Sector

In Viet Nam, electricity prices derived from renewable energy will be announced based on the latest approved PDP8. Large-scale renewable energy projects will be planned and applied for in accordance with these prices, so it will be necessary to continue to monitor developments closely. Since the several local companies interested in the renewable energy business have been identified through our research to date, a support system is in place for future commercialization.

5.2.3 Energy Saving Sector

So far, the Project team has met with and inspected industrial parks and factory officials in Hanoi City and nearby cities. Since energy conservation is an area that the Hanoi DOIT is particularly focused on, the Project envisions continuing collaboration with them. Since there are participating companies that manufacture and sell multiple energy saving devices, a structure is in place to propose a set of optimal technologies and JCM scheme as requested by the local community.

5.2.4 Waste Management Sector

Possible supports were considered based on the draft master plan of waste management prepared by Hanoi City Gov. (Table 5-2). The implementation and commercialization of specific measures are expected to be supported through the use of other support schemes such as international organizations.

Table 5-2 Possible Supports from Fukuoka Prefecture in Waste Management Sector

Area	Possible Support	Activity
General	・ Technical training for environmental officers (Hanoi City)	・Sharing experience and knowledge of stakeholder consultation on waste separation and user-pay systems etc. ・Knowledge sharing on economic tools to minimize

		waste generation (charge to waste bags)
Source Separation	・ Waste separation promotion plan	・ Workshop on sharing the experience and challenges on recyclables collection in relation to the Japanese Act on the Promotion of Sorted Collection and Recycling of Containers and Packaging
Collection and Transportation	・Recycling station ・ Japanese garbage collection system	・Introduction of recycling station and promotion of collection in cooperation with private companies ・Technical advice to Hanoi DONRE/URENCO based on night time collection（route selection and collection monitoring）

Source: Prepared by Nippon Koei

5.2.5 Hydrogen technology Sector

The Vietnamese government is preparing a strategy for hydrogen energy development and is likely to promote research and development of hydrogen technology and demonstration projects to achieve the national goal of carbon neutrality by 2050. Since Hanoi City is not yet at the stage where technologies and knowledge in this field are widespread, future support is envisioned in the form of technological proposals in collaboration with Japanese and overseas demonstration cases and companies with hydrogen technologies.

5.3 Proposal of further City-to-City Collaboration

Based on the above results of Phase 1 and the future support policy, a draft support plan was prepared for the case where the Project could be continued (Phase 2) (Figure 5-1). Since decarbonization to improve the environment in Hanoi City will require technical and financial support for the local government and private companies that will be the main actors in the project, the Project envision the use of support schemes of international organizations as an option other than this City-to-City Collaboration project and JCM scheme.

1) City-to-City Collaboration activities

Phase 2 (3 years)

City-to-City Collaboration meetings: Conduct consultations to decarbonize Hanoi (2 to 3 times a year)

Support on institution building: Climate Change Action Plan (CCAP)/Waste Master Plan, etc.

Support for human resource development: Lectures and technical introduction of experts and others in the field of decarbonization to Hanoi

Planning and holding of technical workshop: Assumed to consist of two parts technical introduction and discussion (once a year)

2) Support for JCM project formulation

FY2024(1st year)	FY2025(2nd year)	FY2026(3rd year)
1. Solar Sharing Introduction Consideration of costs, quantities and specifications of various technologies such as storage batteries, e-bikes, etc. Development of project plan, preparation and partial start of demonstration project (Goal).	➡Determination of candidate sites for the JCM Model Project and development of a project plan. Feedback on the demonstration project	➡JCM Model Project Application (Goal)
2. Introduction of energy-saving equipment (induction lamps) Technical proposals to multiple factories in Hanoi, conducting on-site surveys, and drafting project plans	➡Consideration of introducing JCM Model Project or as a private business	➡Application for JCM Model Project with packaged technology with energy saving and renewable energy technology (Goal)
3. Large-scale renewable energy projects Research and project identification with local partner for second renewable energy project	➡JCM Model Project Application (Goal)	➡Consideration of horizontal development
4. Introduction of new energy-saving technologies Introduction of new participating companies' own technologies and business matching	➡Identification of candidate facilities (factories and large facilities), discussions with joint venture partners, and development of a draft project plan.	➡JCM Model Project Application (Goal)
5.Waste disposal: Consideration of introduction in combination with establishment of a sorted collection system	➡Securing candidate sites and funding sources, developing a simplified design and draft project plan.	➡JCM Model Project Application (Goal)
6.New Technologies (DX/Hydrogen, etc.):Introduction of technology in technical workshop	➡Consideration of new technology (DX/hydrogen, etc.) utilization, identification of local partners	➡Consideration of business development & collaboration with JCM Model Project (Goal)

Source: Prepared by Nippon Koei

Figure 5-1 Future plan for supporting Hanoi City