

# City to City Collaboration for Zero-Carbon Society in FY2022

(Project to support the achievement of green growth and the realization of a decarbonized society through city-to-city collaboration between Quang Ninh Province and Shiga Prefecture)

Report

March 2023

KANSO TECHNOS CO., LTD.

Shiga Prefecture



# Contents

|  |    |
|--|----|
| 1. Background, purpose and business structure of the business .....                                  | 1  |
| 1.1 Business Background.....   | 1  |
| 1.2 Purpose of the Work .....  | 1  |
| 1.3 Business Implementation Structure .....  | 2  |
| 1.4 Business Process.....  | 3  |
| 2. Overview of participating municipalities and measures for decarbonization .....                   | 5  |
| 2.1 Overview of Quang Ninh Province.....   | 5  |
| 2.1.1 Special Economic Zones and Industrial Parks .....  | 5  |
| 2.1.2 Geographic situation and land use .....  | 8  |
| 2.2 Quang Ninh Province and Shiga Prefecture Connections.....  | 9  |
| 2.3 Status of implementation and declaration of decarbonization in Quang Ninh Province.....          | 11 |
| 2.4 Outline of Shiga Prefecture .....  | 12 |
| 2.5 Status of Shiga Prefecture's decarbonization efforts and declarations .....                      | 14 |
| 3. Activities related to City to City Collaboration projects to realize a decarbonized society ..... | 16 |
| 4. Support for the establishment of institutions for decarbonization .....                           | 20 |
| 5. Efforts to decarbonize.....   | 21 |
| 5.1 Decarbonization in urban areas.....  | 21 |
| 5.1.1 Introduction of solar power generation.....  | 21 |
| 5.1.2 Installation of Centrifugal chiller and waste heat utilization chillers .....                  | 21 |
| 5.1.3 Boiler Installation .....  | 24 |
| 5.2 Decarbonization in remote islands and non-urban areas.....                                       | 26 |
| 5.2.1 Introduction of Jokaso .....   | 26 |
| 5.2.2 Introduction of sludge gas power generation .....  | 39 |
| 5.2.3 Carbonization of sludge and effective use of biochar, etc.....                                 | 40 |
| 6. Seminars and company matching .....   | 44 |
| 6.1 Background of the event .....  | 44 |
| 6.2 Implementation details.....  | 44 |
| 6.2 Implementation Results .....   | 44 |
| 6.2.1 Number of participants .....   | 44 |
| 7. Identification of Japanese companies with decarbonization technologies .....                      | 50 |
| 8. Future plans .....  | 51 |
| 8.1 Support for Institution Building in Quang Ninh Province .....                                    | 51 |
| 8.2 Introduction of solar power generation and turbo refrigeration.....                              | 51 |

|   |    |
|---|----|
| 8.3 Installation of waste heat recovery chiller/boiler.....   | 51 |
| 8.4 Introduction of Jokaso .....                              | 51 |
| 8.5 Introduction of sludge gasification power generation..... | 52 |
| 8.6 Carbonization of sludge and effective use of biochar..... | 52 |

## 1. Background, purpose and business structure of the business

### 1.1 Business Background

The Paris Agreement, adopted at the 21st Conference of the Parties (COP21) to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015, calls for efforts to keep the global average temperature increase well below 2 degree C above pre-industrial levels and to limit it to 1.5 degree C (COP26 in 2021 set the goal of limiting the increase to 1.5 degree C). ), to peak out global greenhouse gas emissions as soon as possible, and to achieve a balance between greenhouse gas emissions and absorption (by forests, etc.) in the second half of the 21st century.

The Paris Agreement also calls for the acceleration of climate change policies by non-governmental entities including local governments and cities in addition to the central government. In Japan, a "regional decarbonization roadmap" has been formulated to show the process and specific measures, focusing on initiatives and measures to be implemented by 2030, and various efforts have begun to be made to start a "decarbonization domino" in various regions, including local governments and cities .

Vietnam has declared at COP26 that it will reduce its greenhouse gas emissions to virtually zero (net zero) by 2050, and it is expected that the country will formulate plans to achieve this goal and make reductions. However, at this point, no concrete plan or timeline has been established, so it will be very important for Japanese local governments and cities to collaborate with Vietnamese cities and others to demonstrate the movement toward decarbonization and low carbon emissions.

### 1.2 Purpose of the Work

" City to City Collaboration for Zero-Carbon Society in FY2022" aims to support Japanese cities that have experience and expertise in the formation of a decarbonized and low-carbon society in cooperation with overseas local governments and other entities in their efforts to create a decarbonized and low-carbon society and to introduce facilities that will contribute to the formation of a decarbonized and low-carbon society.

The purpose of this project is to support Quang Ninh Province in establishing an institutional framework for the creation of a Zero Carbon City in Quang Ninh Province, Vietnam, to reduce greenhouse gas emissions in major centers of tourism and industry (urban areas and remote islands/non-urban areas) where needs are high, and to form JCM projects that will contribute to such reductions, by conducting the following activities.

#### Support for Institution Building

Contribute to the promotion of the study for the formation of a 2050 zero carbon city in Quang Ninh Province by sharing Shiga Prefecture's efforts and responding to the province's needs and consultations in the process of the study for decarbonization.

#### Decarbonization in urban areas

In the urban areas of Quang Ninh Province, we will support the development of JCM projects and business models by introducing the following renewable energy and energy-saving technologies owned by Japanese companies.

- (1) Solar power generation
- (2) Centrifugal chiller and waste heat utilization chiller
- (3) Boiler

#### Decarbonization in remote islands and non-urban areas

In the remote islands and non-urban areas of Quang Ninh Province, we will support the development of JCM projects and business models by introducing the following renewable energy and energy-saving technologies owned by Japanese companies.

- (1) Jokaso
- (2) Sludge gas power generation
- (3) Investigation of carbonization of sludge and effective use of biochar

### 1.3 Business Implementation Structure

In the case of inter-city cooperation between Quang Ninh Province and Shiga Prefecture, the Department of Planning and Investment (DPI) in Quang Ninh Province serves as the contact point and contacts the Department of Natural Resources and Environment (DONRE) and other relevant departments for cooperation.

Shiga Prefecture, with Commerce and Industry Policies Division of Department of Commerce, Industry, Tourism and Labor as the contact point, together with CO2 Net Zero Program Promotion Division of Department of General Policy Planning and the Sewerage Division of the Department of Lake Biwa and the Environment, worked with companies from Shiga Prefecture and other business groups to help Quang Ninh Province form a decarbonized society.

The implementation structure of the project is shown in Figure 1.

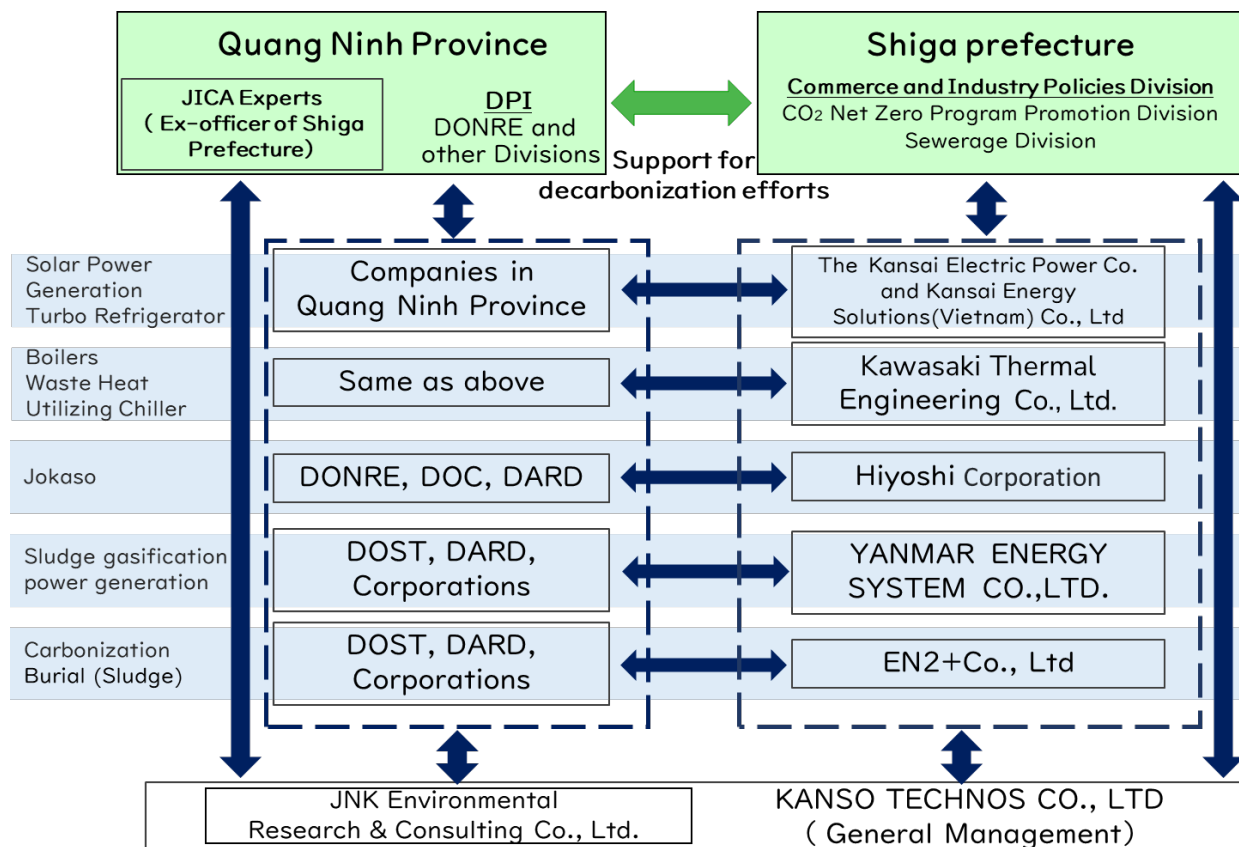


Figure 1 Implementation Structure of the Project

#### 1.4 Business Process

The period of this work is from July 8, 2022 to March 10, 2023, and the main process is shown in Table 1.

Table 1 Main process of the project

| 項 目  |   | FY2022 |      |      |      |      |      |      |       |     |
|--|---|--------|------|------|------|------|------|------|-------|-----|
|  |   | July   | Aug. | Sep. | Oct. | Nov. | Dec. | Jan. | Feb.  | Mar |
| Quang Ninh Province Support                        | Kick-off meeting  | ■      |      |      |      |      |      |      |       |     |
|  | Needs and local understanding   | ■      |      | ■    |      |      | ■    |      | ■     |     |
|  | Support for decarbonization efforts, etc.                                   |        |      |      |      |      |      |      | ■     |     |
|  | Workshops, etc.   |        |      |      |      |      |      |      | ■     |     |
| Introduction of solar power generation equipment   | Needs Survey  | ■      |      | ■    |      |      |      |      |       |     |
|  | Understanding of specifications and desired conditions on the Japanese side |        | ■    |      |      |      |      |      |       |     |
|  | Candidate Selection   |        |      |      | ■    | ■    | ■    | ■    |       |     |
|  | Matching  |        |      |      |      |      |      |      | ■     |     |
| Introduction of turbo refrigeration                | Needs Survey  | ■      |      | ■    |      |      |      |      |       |     |
| Waste heat recovery chiller                        | Needs Survey  | ■      |      | ■    |      |      |      |      |       |     |
|  | Understanding of specifications and desired conditions on the Japanese side |        | ■    |      |      |      |      |      |       |     |
|  | Candidate Selection   |        |      |      | ■    | ■    | ■    | ■    |       |     |
|  | Matching  |        |      |      |      |      |      |      | ■     |     |
| Boiler   | Needs Survey  | ■      |      | ■    |      |      |      |      |       |     |
|  | Understanding of specifications and desired conditions on the Japanese side |        | ■    |      |      |      |      |      |       |     |
|  | Candidate Selection   |        |      |      | ■    | ■    | ■    | ■    |       |     |
|  | Matching  |        |      |      |      |      |      |      | ■     |     |
| Jokaso   | Needs Survey  | ■      |      |      |      |      |      |      |       |     |
|  | Apply for Grant Assistance for Grass-Roots Human Security Projects          | ■      |      |      |      |      |      |      |       |     |
|  | Consideration of application for Non-Project Grant Aid                      | ■      | ■    | ■    | ■    | ■    | ■    | ■    | ■     |     |
|  | Consultation with Embassy, Ministry of Foreign Affairs, etc.                | ■      |      | ■    |      |      | ■    |      |       |     |
| Sludge gasification equipment                      | Needs Survey  |        | ■    | ■    | ■    |      |      |      |       |     |
|  | Understanding of specifications and desired conditions on the Japanese side |        |      |      |      | ■    |      |      |       |     |
|  | Consult with counterparts   |        |      | ■    |      | ■    |      |      | ■     |     |
|  | Search for local engineering companies                                      |        |      |      |      | ■    |      |      |       |     |
| Carbonization and burial of sludge                 | Needs Survey  |        |      | ■    |      |      | ■    |      |       |     |
|  | Consult with counterparts   |        |      |      |      |      | ■    |      | ■     |     |
| Reporting, etc. to the Ministry of the Environment | Monthly Report  | ■      | ■    | ■    | ■    | ■    | ■    | ■    | ■     |     |
|  | Report writing  |        |      |      |      |      | ■    | ■    | ■     | ■   |
|  | Report meetings, etc.   | ■      |      |      |      | ■    |      |      | Final |     |



## 2. Overview of participating municipalities and measures for decarbonization

### 2.1 Overview of Quang Ninh Province

Quang Ninh Province is located in the northern part of Vietnam and is part of an economic zone integrated with the capital Hanoi and the important trade port Haiphong City. Since it borders China, it is also expanding its strategic importance as an important transit city in the ASEAN-China Free Trade Area. It is one of the top 10 provinces and municipalities in Vietnam in terms of economic scale, and is expected to continue to develop remarkably in the future.

It is also an international tourist destination with Halong Bay, registered as a UNESCO World Natural Heritage, and is also rich in mineral resources, boasting the largest amount of calculated coal in Vietnam, which contributes greatly to the Vietnamese economy.

A summary of Quang Ninh Province is shown in Table 2.

Table 2 Overview of Quang Ninh Province

|   | Item                     | Numerical value                          |
|---|--------------------------|--|
| 1 | Area                     | 6,178.2 km <sup>2</sup>                  |
| 2 | Population               | 1,320,324 (FY2019)                       |
|   | Labor force              | 693,900 (FY2019)                         |
| 3 | Regional GDP             | USD 63,392 million (FY 2019)             |
|   | Regional GDP Growth Rate | 10.71% (annual average for FY 2015-2020) |

Source: Quang Ninh Province HP and others

Supplementary explanations are added below for other matters closely related to this work.

#### 2.1.1 Special Economic Zones and Industrial Parks

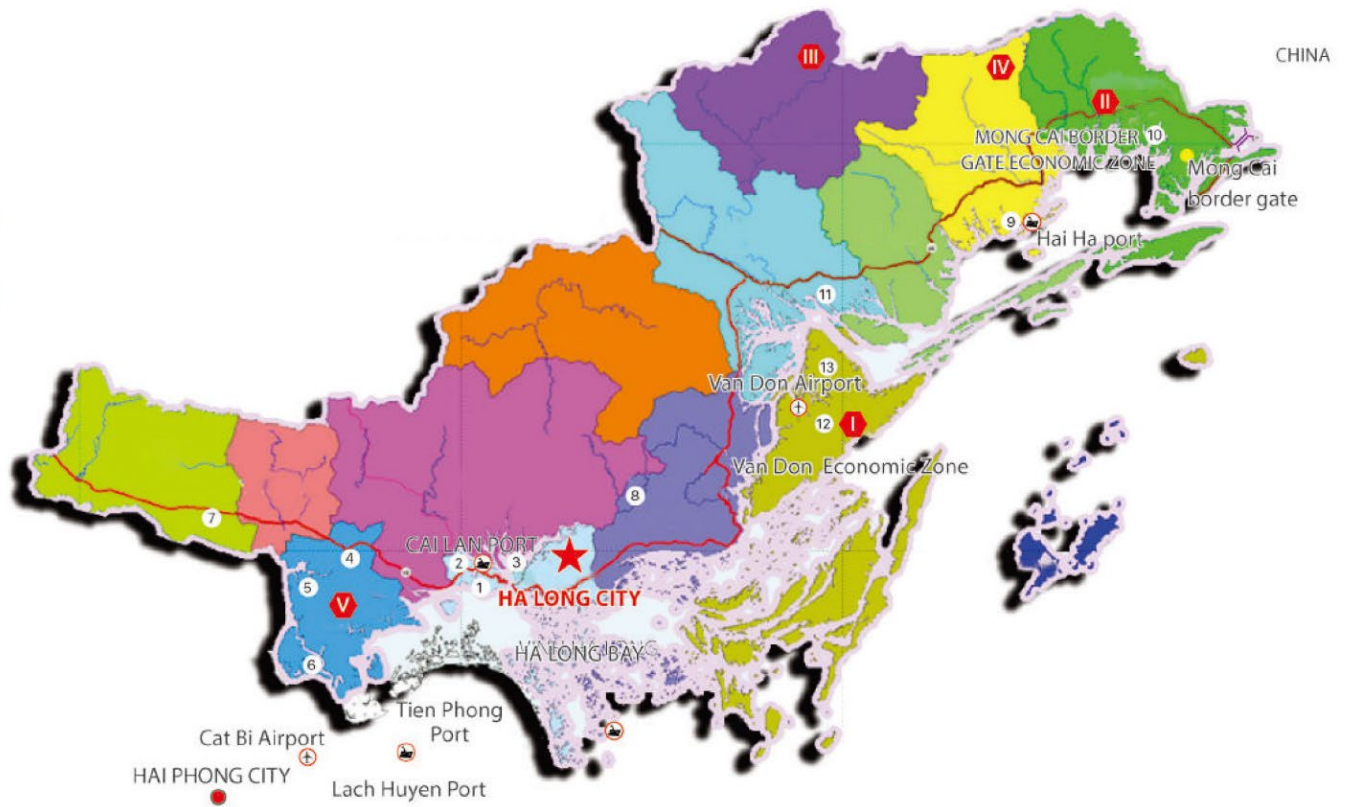
In Quang Ninh Province, there are five SEZs (three near the border with China and two on the coast) and 16 industrial parks. The SEZs and industrial parks are outlined in Tables 3 and 4, and their locations are shown in Figure 2.

Table 3 Special Economic Zones in Quang Ninh Province

| number | Name                                     | Area (Ha) |
|--------|--|-----------|
| I      | Van Don Coastal Economic Zone            | 217,133   |
| II     | Mong Cai Border Economic Zone            | 121,197   |
| III.   | Hoanh Mo - Dong Van Border Economic Zone | 14,236    |
| IV     | Bac Phong Sinh Border Economic Zone      | 9,405     |
| V      | Quang Yen Coastal Economic Zone          | 13,303    |

Table 4 Industrial Parks in Quang Ninh Province

| number | Name   | Area (Ha) |
|--------|--|-----------|
| 1      | Cai Lan Industrial Park                        | 69        |
| 2      | Viet Hung Industrial Park                      | 301       |
| 3      | Hoanh Bo Industrial Park                       | 681       |
| 4      | Dong Mai Industrial Park                       | 168       |
| 5      | Song Khoai Industrial Park                     | 714       |
| 6      | Dam Nha Mac Service Industrial Park            | 3,710     |
| 7      | Dong Trieu Industrial Park                     | 150       |
| 8      | Coal Supporting Industrial Park                | 400       |
| 9      | Tien Yen Industrial Park                       | 150       |
| 10     | Industrial Park - Hai Ha Seaport               | 4,988     |
| 11     | Hai Yen Industrial Park                        | 182       |
| 12     | Van Ninh Logistics Industrial and Service Park | 1,500     |
| 13     | Hai Ha Industrial Park 1                       | 731       |
| 14     | Hai Ha Industrial Park 2                       | 727       |
| 15     | Hi-tech Pharmaceutical Industrial Park         | 1,000     |
| 16     | High-tech industrial park                      | 400       |



Note: The numbers in the figures refer to the numbers in Tables 3 and 4.

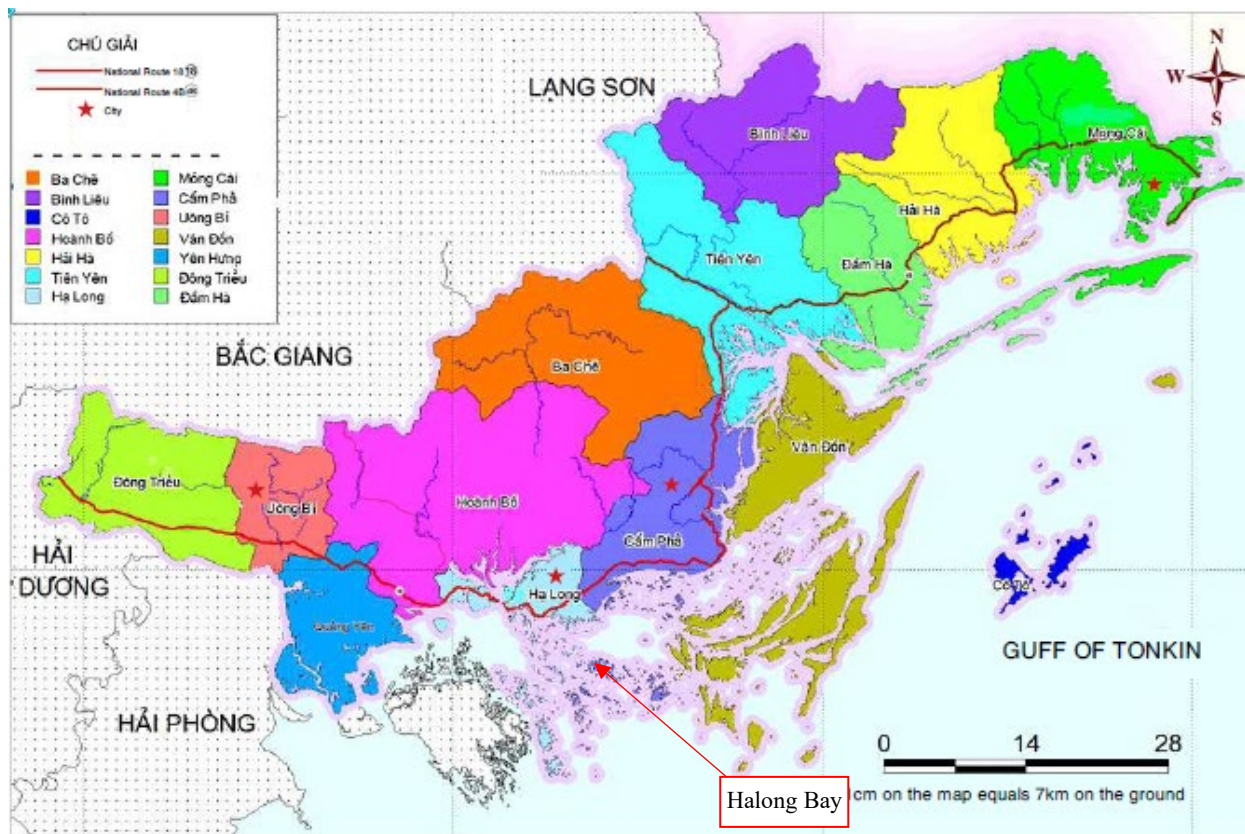
Source: Quang Ninh Economic Zone Authority data

Figure 2 Location of Special Economic Zones and Industrial Parks in Quang Ninh Province

## 2.1.2 Geographic situation and land use

The waters of Quang Ninh Province are home to more than 2,000 islands, both large and small, accounting for 2/3 of all islands in Vietnam.

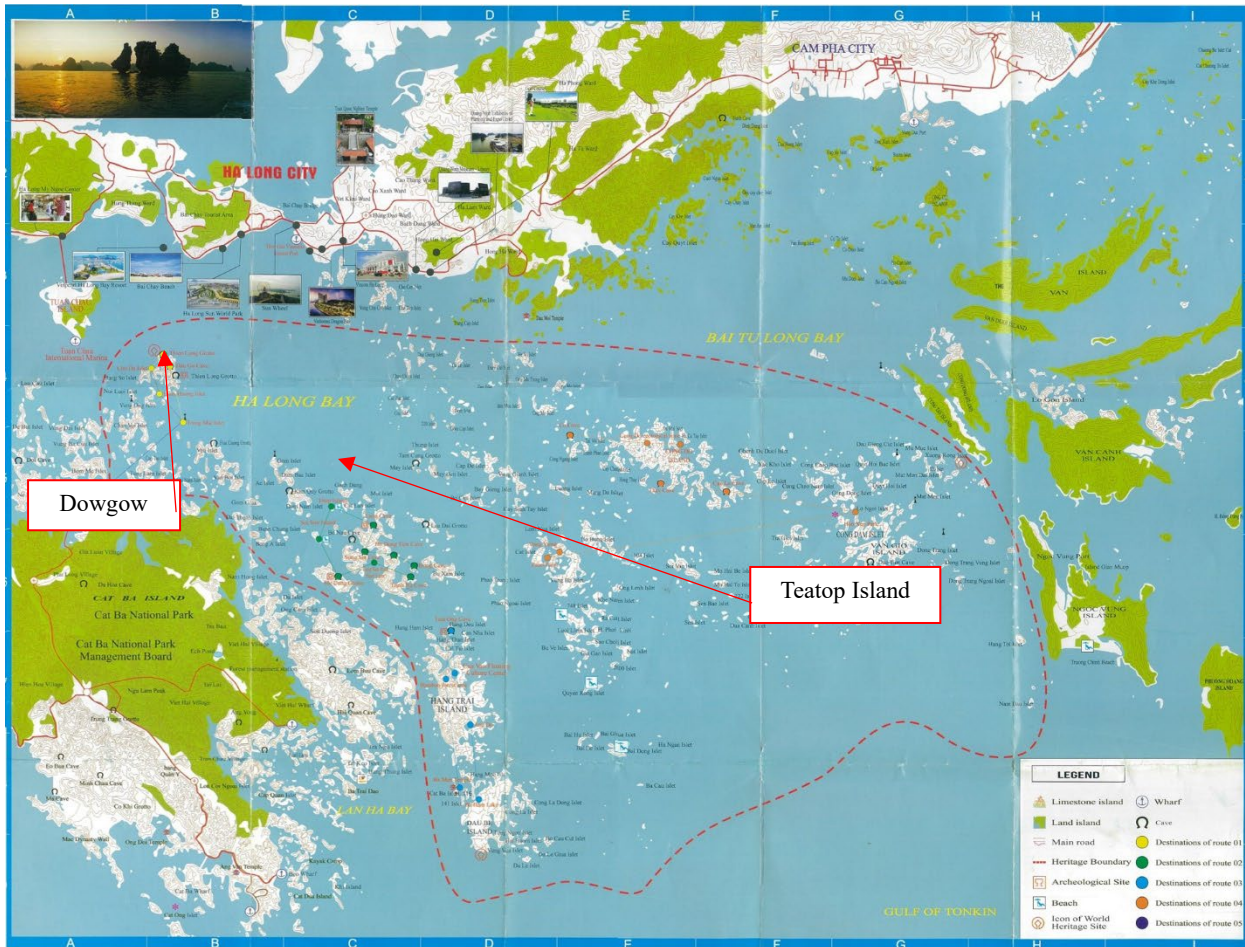
Halong Bay and Bai Tu Long Bay, both designated as World Natural Heritage, extend over the waters to the south and east of Halong City, the capital of Quang Ninh Province. The locations of Quang Ninh Province and Halong Bay are shown in Figure 3, and the World Heritage-designated area of Halong Bay is shown in Figure 4.



Source: Based on data provided by Quang Ninh Province Department of Economic and Regional Management

Figure 3 Location of Quang Ninh Province and Halong Bay, etc.





Note: World Heritage designated areas are surrounded by red dotted lines.

Figure 4 World Heritage-designated areas in Halong Bay

Of the 6,178 km<sup>2</sup> of land area in Quang Ninh Province, 608 km<sup>2</sup> (9.8%) is agricultural land, 3,737 km<sup>2</sup> (60.5%) is mountain forest, and 455 km<sup>2</sup> (7.4%) is non-residential land (land used for purposes other than agriculture, forestry and residence).

## 2.2 Quang Ninh Province and Shiga Prefecture Connections

Quang Ninh Province has been facing various environmental issues such as water pollution despite its economic development. Since the 1990s, JICA has been providing cooperation on environmental management, focusing on water pollution from the perspective of protecting the environment of the World Heritage of Halong Bay. Seeking to improve the water environment around Halong Bay, which has become an urgent issue in this context, Quang Ninh Province requested a technical cooperation project from JICA, and the "Project for Green Growth Promotion in Halong Bay Area, Quang Ninh Province" was launched in October 2015.

Shiga Prefecture was requested by JICA to cooperate in this project because of its experience in environmental conservation in Lake Biwa (Lake Biwa Model) and its potential to contribute to environmental improvement in Halong Bay, a closed water body. Since then, Shiga Prefecture have dispatched its staff to the site to introduce Shiga Prefecture's efforts and provide guidance and advice on the management of the project based on our experience.

In the process, a Memorandum of Understanding on Environmental and Economic Cooperation (see Table 5) was signed in October 2017, which has developed the cooperative relationship into a mutually beneficial one, contributing to both environmental conservation and economic development in Quang Ninh Province. Specific results to date are shown in Table 6.

Table 5 Summary of " Memorandum of Understanding on Environmental and Economic Cooperation

|                         |  |
|-------------------------|--|
| Objective.              | To contribute to both environmental conservation and economic development in Quang Ninh Province, and to further promote water environment business in the province through industry-academia-government-private sector collaboration.   |
| Period                  | October 20, 2017 - October 30, 2019<br>However, if there is no indication of intent to terminate the contract, it will be renewed continuously.  |
| matters for cooperation | <ol style="list-style-type: none"> <li>1. Pursuing both environmental conservation and economic development</li> <li>2. Establishing financial mechanism for environmental conservation</li> <li>3. Cooperating with citizens for environmental conservation</li> <li>4. Establishing a research institute belonging to Halong University in Quang Ninh modeled after the Lake Biwa Environmental Research institute</li> <li>5. Strengthening the cooperation between universities and research institutes in Quang Ninh and Shiga</li> <li>6. Applying advanced environmental technologies, owned by Shiga-based companies, to improve the environment in Quang Ninh</li> <li>7. Developing tourism through the use and conservation of regional resources</li> <li>8. Promoting environmentally friendly agriculture</li> <li>9. Reducing the pollution load flowing into public water bodies by introducing wastewater treatment facilities</li> </ol> |

Source: Prepared based on materials published by Shiga Prefecture.

Table 6 Contribution of Shiga Prefecture to Quang Ninh Province

| Shiga Prefecture Contributions                       | concrete details   |
|--|--|
| Establishment of Halong Bay Research Center          | Contributed to the establishment and enhancement of the Halong Bay Research Center by introducing the role and functions of Lake Biwa Environmental Research Institute, along with the importance of policy formation based on scientific findings |
| Publication of Green Growth White Paper              | Support for publication of the Green Growth White Paper, which communicates the efforts and contents of Shiga Prefecture's environmental white paper and serves as a communication tool with diverse actors.                                       |
| Technical exchange in the field of water environment | Introducing environmental technologies accumulated by companies in Shiga Prefecture through technical seminars, etc.   |
| Human Resource Development                           | Introduced the concept of the Lake Biwa Model in Shiga Prefecture through workshops, etc., and contributed to human resource development on the Quang Ninh Province side.  |
| Dispatch of Shiga Prefecture alumni                  | Dispatch of Shiga Prefecture alumni to Quang Ninh Province as JICA experts from April 2021 to support the promotion of green growth.   |

Source: Prepared based on materials published by Shiga Prefecture

### 2.3 Status of implementation and declaration of decarbonization in Quang Ninh Province

At COP21 in 2015, the Paris Agreement was adopted as a new international framework for reducing greenhouse gas emissions and other emissions after 2020. The Paris Agreement stipulates that efforts should be made to keep the global average temperature increase well below 2 degree C above pre-industrial levels and limit it to 1.5 degree C, that greenhouse gas emissions should peak out as soon as possible and reach net zero in the second half of the 21st century. The Paris Agreement also calls for accelerated climate change policies not only by the central government but also by local governments and other entities.

In response to the Paris Agreement, Quang Ninh Province developed in 2018 the "Implementation Plan of the Paris Agreement on Climate Change in Quang Ninh Province" (No. 75/KH-UBND, May 2, 2018) (see Appendix 1 in the Appendixes), which, with regard to adaptation, calls for improving the level of disaster prediction and warning, infrastructure and irrigation works to adaptability, and to take climate change into account in plans and strategies related to socioeconomic development and regions, while for mitigation, it called for an 8-25% reduction in province-wide greenhouse gas emissions from the BAU. At the same time, to ensure the implementation of those measures, it required the implementation of measures to be reported to the DONRE at the provincial level and to

the People's Committee at the departmental, branch, and district levels by the end of October each year.

At the end of the following year, the "Decision on Approval of the Action Plan for Climate Change Response in Quang Ninh Province for the Period 2021-2030 and Vision to 2050" (No. 5535/QD-UBND, December 30, 2019) was issued (see the Appendix 1 in the Appendixes). It sets out priority measures with respect to climate change adaptation and mitigation and a roadmap targeting the years 2025 and 2030, declaring an 8% reduction of greenhouse gas emissions relative to BAU by 2030 and a 25% reduction relative to BAU by 2050. At the same time, it clarified the roles of organizations related to climate change in the province (DONRE, DPI, etc.) and municipalities such as cities and districts under its umbrella.

Following the Vietnamese government's declaration of net zero greenhouse gas emissions by 2050 at COP26, Quang Ninh Province issued a document entitled "Report on the Implementation of Post-COP26 Climate Change Issues" (No. 3174/TNMT-NKB, June 14, 2022) in June 2022 (see Appendix 1 in the Appendixes). Here, it refers to the challenges to achieve the declarations made at COP26, reviews past activities on climate change, and describes the work that is currently being carried out.

According to the document, Quang Ninh Province will prepare a "Quang Ninh Province Planning Report" for the period 2021-2030 and 2050, and update its climate change response plan in line with the goals set at COP26. Along with the implementation of adaptation measures, including specific sectoral plans, emission reduction measures are planned to include the efficient use of energy, the development and use of renewable energy, and a shift from coal-fired to gas-fired power generation. One specific proposal is to consider suspending plans for the 320 MW Quang Ninh III coal-fired power plant and the 600 MW Mao Khe II thermal power plant, and instead develop gas-fired power plants in Cam Pha City, Quang Yen Town, and Hai Ha Province.

As described above, since the conclusion of the Paris Agreement, various climate change-related plans have been formulated and measures are being taken, but no decarbonization plan has yet been formulated in response to the Net Zero declaration at COP26. At the hearing held in February 2023, the government plans to develop a decarbonization plan after preparing an inventory and examining measures to be taken. The decarbonization plan will go from DONRE to the People's Committee and then to the Communist Party, and if approved, will be published as a document. Once the document is published, an action plan will be developed.

## 2.4 Outline of Shiga Prefecture

Shiga Prefecture is an inland prefecture surrounded by mountains, and Lake Biwa, which occupies 1/6 of the prefecture's total area, is located in the center of the prefecture. Shiga is close to major cities such as Kyoto, Osaka, and Nagoya, and has developed as a bedroom community and satellite city of these large cities due to its convenient transportation system. The prefecture also has a thriving manufacturing industry, with the secondary industry accounting for 48% of the prefecture's gross domestic product (as of FY2019).



Water pollution in Lake Biwa became a problem during the period of rapid economic growth, and in the late 1970s, the occurrence of a freshwater red tide in Lake Biwa triggered the so-called "soap movement" throughout the prefecture, a campaign by housewives to stop using synthetic detergents and to use soap powder. The prefecture is also home to a concentration of environment-related companies and human resources. In order to promote industrial development utilizing the concentration of water environment-related industries and research institutes, as well as past water environment conservation efforts in Lake Biwa (which we call the "Lake Biwa Model"), Shiga Prefecture has established Shiga Water Environment Business Promotion Forum, a platform for industry-academia-government-private sector collaboration, to promote the development of water environment businesses.

A summary of Shiga Prefecture is shown in Table 7 and a conceptual diagram of the Lake Biwa model is shown in Figure 5.

Compared to Quang Ninh Province, Shiga Province is about 2/3 the size, but has about the same population.

Table 7 Overview of Shiga Prefecture

|   | Item                                     | Numerical value                          |
|---|--|--|
| 1 | Area                                     | 4,017.38 km <sup>2</sup>                 |
| 2 | Population                               | 1,409,388 (as of October 1, 2022)        |
|   | Labor force                              | 784,000 (FY2019)                         |
| 3 | Regional GDP (Gross Prefectural Product) | 6,922.6 billion yen (FY2019)             |
|   | Regional GDP Growth Rate                 | 2.952% (annual average for FY 2014-2019) |

Source: Shiga Prefecture HP, etc.

## Contribution to solving problems with the water environment around the world



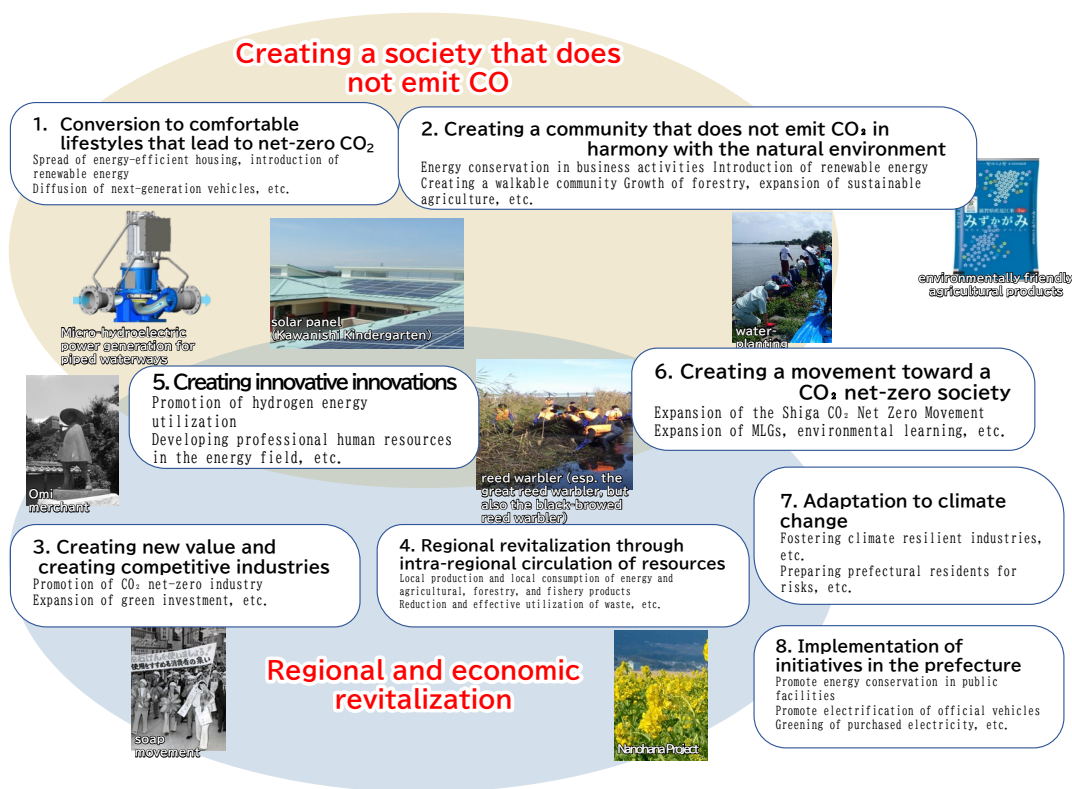
Figure 5 Conceptual diagram of Lake Biwa model

### 2.5 Status of Shiga Prefecture's decarbonization efforts and declarations

Shiga Prefecture has a long history of public and private sector efforts to balance economic growth and environmental preservation, and to improve the local community through its own efforts. Since the First Regional Plan for the Prevention of Global Warming, which was enacted in 1999, the prefecture has revised the plan, enacted ordinances, and made other efforts in cooperation with various entities, including residents and businesses.

In January 2020, the Shiga CO<sub>2</sub> Net Zero Movement Kickoff Declaration was made with the aim of reducing CO<sub>2</sub> emissions to virtually zero by 2050, and in March 2022, the Shiga Prefecture CO<sub>2</sub> Net Zero Society Promotion Ordinance and the Shiga Prefecture CO<sub>2</sub> Net Zero Society Promotion Plan were formulated.

The "Shiga Prefecture CO<sub>2</sub> Net Zero Society Creation Promotion Plan" aims not only to reduce greenhouse gas emissions but also to achieve regional and economic revitalization. As shown in Figure 6, the plan has eight pillars, including a "shift to comfortable lifestyles" and "creation of competitive industries."



Source: Shiga Prefecture presentation (February 27, 2023)

Figure 6 CO<sub>2</sub> Challenges to Achieve a Net Zero Society

Specifically, in addition to supporting energy conservation and the introduction of renewable energy in homes and offices, Shiga has launched the website "Zero Navi Shiga" and created the "Net Zero Forum Shiga" to promote the efforts of all entities, including prefectural residents, businesses, and organizations, as well as the government. As of the end of January 2023, 286 business establishments (64,330 people) and 34,274 individuals had endorsed the "Shiga CO<sub>2</sub> Net Zero Movement.

### 3. Activities related to City to City Collaboration projects to realize a decarbonized society

The table below shows the meetings, surveys, seminars, etc. related to City to City Collaboration projects conducted this fiscal year.

| No | Item  | Implementation period | summary  |
|----|---|-----------------------|--|
| 1  | First survey  |                       |  |
|    | Meeting with Halong Bay Management Department                                 | July 20               | A meeting was held to discuss the details of an application to install a Jokaso using the Grassroots Grant Assistance Scheme.  |
|    | Inspection of planned Jokaso installation sites in Halong Bay                 | July 21               | The participants visited Dau Go Island, which is within the designated World Natural Heritage Area of Halong Bay. Through the visit, all the members realized that it would be better to insist on the benefit to local residents engaged in tourism on the island as a benefit to local residents under the Grassroots Grant Assistance Scheme, and decided to proceed with the proposal in this direction. |
|    | Meeting with Department of Planning and Investment (DPI), Quang Ninh Province | July 21               | Had a meeting with DPI, which will be the contact point for the City to City Collaboration Project, and informed them of the contents of the explanations and requests to the relevant departments scheduled for September, and requested them to make preparations.   |
| 2  | Second survey   |                       |  |
|    | Meeting with Department of Industry and Trade (DOIT), Quang Ninh Province     | September 19          | DOIT manages small industrial parks and shopping malls ranging from 20 to 70 hectares.<br>We obtained a list of shopping malls managed by DOIT (see Appendix 2 in the Appendixes) and a list of companies using boilers (see Appendix 3 in the Appendixes).  |
|    | Meeting with Quang Ninh Province Department of Tourism (DOT)                  | September 19          | We had a meeting with the Tourism Department, which has jurisdiction over large hotels, one of the targets for decarbonization in urban areas.<br><u>Obtain a list of hotels (with hotel names, number of rooms, etc., see Appendix 4 in the Appendixes).</u>  |
|    | Meeting with Quang Ninh   | September 20          | Meetings were held with large hospitals (3 hospitals), one of the targets for decarbonization in urban areas.  |

|   |               |  |
|---|---------------|--|
| Province Medical Department   |               | Equipment renewal must be implemented with the hospital's budget, and although the budget was small and seemed to be struggling, there is a possibility of installing equipment if it is time for equipment renewal.   |
| Meeting with Quang Ninh Province Department of Economic and Regional Management           | September 20  | A meeting was held with Department of Economic and Regional Management, which has jurisdiction over SEZs and large industrial parks.<br>There are 5 SEZs and 16 industrial parks in Quang Ninh Province.<br><u>We obtained a list of companies that are currently conducting business in the industrial park (see Appendix 5 in the Appendixes).</u>   |
| Meeting with Department of Natural Resources and Environment (DONRE), Quang Ninh Province | September 22. | We had a meeting with the Department of Natural Resources and Environment, which we believe will be the focal point for decarbonization and the environment in general in Quang Ninh Province.<br>They asked for Shiga Prefecture's cooperation regarding specific actions once Quang Ninh Province's plan on decarbonization is approved.<br>They also expected Japanese support for the introduction of Jokaso.  |
| Meeting with Department of Construction (DOC), Quang Ninh Province                        | September 22. | Meetings were held with Department of Construction, which has jurisdiction over Jokaso and other wastewater treatment facilities and sludge management.<br>The master plan for wastewater and sludge treatment in Quang Ninh Province has been prepared by the DOC.<br>However, a twist in the revised Environmental Protection Law has made the roles of DONRE and DOC unclear.   |
| Meeting with Department of Agriculture and Rural Development (DARD), Quang Ninh Province  | September 23. | A meeting was held with DARD, which appears to have jurisdiction over the introduction of Jokaso and gasification and carbonization of sludge in non-urban areas.<br>The department was in charge of wastewater treatment in rural areas and had expressed interest in Jokaso.<br>He said that charcoal is not applied to farmland as a soil conditioner and that there is no technology for carbonizing sludge, but if it were to be implemented, the counterpart would be DARD.<br>They also needed to create one project for environmental improvement and wastewater treatment by 2025 and expected support and cooperation. |

|   |   |               |  |
|---|---|---------------|--|
|   | Meeting with Halong City Public Service Management Office (JURENCO)                               | September 23. | JURENCO is responsible for waste disposal, wastewater treatment, and management of street trees and street lights in Halong City. The company does not transport waste materials and is only responsible for the management of landfill sites.   |
|   | Inspection of sites in Halong Bay where Jokaso have been installed or are planned to be installed | September 24. | Visits were made to Ti Top Island, where two Jokaso have been installed, and to Dau Go Island, which has applied to install Jokasos under a grassroots grant scheme.   |
|   | Meeting with Halong Bay Management Department   | September 24. | We explained the difference between the Grassroots Grant Scheme and the Non-Project Grant Scheme. They expressed their willingness to support the introduction of Jokasos through the Non-Project Free Scheme and said that they would be the main actor in the activity. They said that they have already made a proposal to DPI, which will be the proposing entity. |
|   | Meeting with Mr. Hiroi, Secretary of the Embassy of Japan in Vietnam                              | September 30  | The Non-Project Grant Aid scheme was found to kick off with the submission of a request (letter of demand) to the Embassy by the Vietnamese government.  |
| 3 | Kick-off meeting  |               |  |
|   | Kick-off meeting with Ministry of Environment   | November 15   | A kick-off meeting with the Ministry of Environment, Japan was held, which had been delayed due to the timing of the surveys in Vietnam.   |
| 4 | Third survey  |               |  |
|   | Meeting with DPI (Department of Planning and Investment)  | December 1    | Discussed the details and methods of the event (seminar and company matching) to be held in February 2023.   |
|   | Meeting with Halong Bay Management Department   | December 2    | Conducted a detailed hearing on on the Halong Bay Management Department's proposal (business plan) for the Non-Project Grant Aid scheme.   |
|   | Meeting with  | December 5    | The Japanese side proposed wastewater and sludge   |

|   |   |              |  |
|---|---|--------------|--|
|   | DARD<br>(Department of Agriculture and Rural Development)               |              | treatment in non-urban (rural) areas.<br>DARD would be the counterpart and could be responsible for the preparation, implementation, and evaluation of a pilot project for wastewater and sludge treatment using DOST's development funds.   |
|   | Meeting with DOST<br>(Department of Science and Technology)             | December 6   | Since Quang Ninh Province has a key mission of technological initiatives for decarbonization and waste and wastewater treatment, and the Department of Science and Technology supports the development and research of science and technology and the introduction of new technologies from abroad to companies in the province, we were asked to propose a more organized approach to wastewater treatment and sludge disposal. |
|   | Meetings with Company A   | December 7   | <i>Details are not disclosed as they are currently under investigation and negotiation.</i>  |
| 5 | Fourth survey   |              |  |
|   | Meeting with DOST<br>(Department of Science and Technology)             | February 20  | As a response to the request made at the December 6 meeting, we made a proposal including a case study on wastewater and sludge treatment (effective utilization) in rural areas. DOST asked us to organize the necessary conditions for the realization of both a large-scale project and a small-scale project for its implementation.   |
|   | Meeting with DPI<br>(Department of Planning and Investment)             | February 20  | Details were confirmed for the Seminar and Social Event on Decarbonization and Water Conservation for Environmental Protection in Quang Ninh Province to be held on February 27 (hereinafter referred to as " Seminars and Company Matching ").  |
|   | Meeting with DONRE<br>(Department of Natural Resources and Environment) | February 21  | The meeting reviewed the progress of Quang Ninh Province's climate change action plan and the progress in developing a decarbonization plan in response to the Net Zero declaration at COP26.  |
|   | Meeting with DARD<br>(Department of Agriculture and Rural Development)  | February 28  | Presented our proposal including a case study on wastewater and sludge treatment (effective utilization) in rural areas. DARD's response was more about economic benefits than decarbonization benefits.   |
| 6 | Seminars and Company  | February 27. | The seminar and company matching was held at a hotel in Halong City.   |

|  |          |  |  |
|--|----------|--|--|
|  | Matching |  |  |
|--|----------|--|--|

#### 4. Support for the establishment of institutions for decarbonization

As noted in Section 2.3, Status of Quang Ninh Province's Decarbonization Implementation and Declaration, Quang Ninh Province has developed various plans and is taking steps to address climate change, but has not yet developed a decarbonization plan based on Vietnam's declaration at COP26 to achieve net zero.

Since we started the discussion without clearly distinguishing between the climate action plan and the decarbonization plan, we were not able to catch up on our understanding, and we finally got the whole picture during the survey conducted in February.

DONRE, which has jurisdiction over all aspects of decarbonization, expected the following support from Shiga Prefecture.

- Would like to get feedback on measures that should be taken from the inventory data.
- Once a decarbonization plan has been developed, an action plan will be created, and we would like assistance with the goals (criteria), specific projects, and specific activities to achieve the goals.

In a presentation at the event (seminar and company matching) held on February 27 (see "6. Seminar and Company Matching"), Shiga Prefecture introduced the details of its ordinance and plan to realize the "creation of a CO<sub>2</sub> net-zero society" as well as various activities to expand and promote the initiative.

The presentation coincides with Quang Ninh Province's expectations for support, and we would like to take this opportunity to support Quang Ninh Province's efforts to realize a decarbonized society by exchanging information and opinions online between Quang Ninh Province and Shiga Prefecture.



## 5. Efforts to decarbonize

### 5.1 Decarbonization in urban areas

#### 5.1.1 Introduction of solar power generation

##### (1) Understanding the product specifications (strengths) of Japanese companies

The photovoltaic equipment and products themselves to be installed will not be manufactured by THE KANSAI ELECTRIC POWER COMPANY, INCORPORATED or K-ESV, but will be set up using a combination of products from other companies. It is not known at this time which company's products will be used, but it is assumed that quality-assured products will be used.

The strength of the PV installation projects in this work lies in the companies that install the products rather than in the products themselves. The biggest selling point for THE KANSAI ELECTRIC POWER COMPANY, INCORPORATED and K-ESV is that, as experts in dealing with energy, they can provide total support for customers' efforts to decarbonize their businesses. For example, when a trading house is responsible for introducing equipment, or when an equipment manufacturer introduces equipment on its own, it tends to make proposals to customers that focus on the decarbonization of that product in isolation. THE KANSAI ELECTRIC POWER COMPANY, INCORPORATED and K-ESV have experience and knowledge from their own power generation projects and efficient operations, and can provide guidance and support to customers in a consultative manner. This is the biggest advantage of partnering with THE KANSAI ELECTRIC POWER COMPANY, INCORPORATED and K-ESV in the development of solar power projects in Quang Ninh Province.

##### (2) Identification of necessary and desired conditions for the target of introduction

*Details are not disclosed as they relate to the business expertise.*

##### (3) Gather information on candidate companies

*Details are not disclosed as they are currently under investigation and negotiation.*

##### (4) Provision of information to candidate companies

*Details are not disclosed as they are currently under investigation and negotiation.*

#### 5.1.2 Installation of Centrifugal chiller and waste heat utilization chillers

##### (1) Understanding the product specifications (strengths) of Japanese companies

###### 1) Centrifugal chiller

Similar to the description of the same item in "5.1.1 Introduction of Photovoltaic Power Generation" for Centrifugal chiller, the products themselves are not manufactured by THE KANSAI ELECTRIC POWER COMPANY, INCORPORATED or K-ESV, and the selling point is that THE KANSAI ELECTRIC POWER COMPANY, INCORPORATED and K-ESV,

as experts in handling energy, can provide total support for decarbonization on the consumer side.

## 2) Waste heat utilization chiller (absorption chiller)

Kawasaki Thermal Engineering Co., Ltd. product lineup includes a wide variety of absorption chillers alone, depending on the heat source and other factors.

Here, we will briefly summarize the differences between the centrifugal chiller described in the previous section and absorption chillers that include waste heat utilization chiller.

Vapor compression chillers, as typified by centrifugal chiller, use electricity to drive the compressor and raise the pressure and temperature of the refrigerant gas (chlorofluorocarbons) to produce a cooling effect using heat of vaporization. On the other hand, absorption chillers do not use an electric compressor, but cool refrigerant (water) by evaporating it in a vacuum.

The differences between absorption chillers and centrifugal chiller are shown in Table 8.

Table 8 Comparison of Absorption chillers and Centrifugal chiller

| Item            | Absorption chillers   | Centrifugal chillers  |
|-----------------|---|---|
| Refrigerant     | Water   | Chlorofluorocarbons   |
| Source of power | Fuel (gas, oil), waste heat, etc.   | Electric power  |
| Efficiency      | Lower than centrifugal chiller  | More expensive than absorption chillers                                     |
| Advantages      | <ul style="list-style-type: none"> <li>✓ Various energy sources can be used in addition to fuels, such as waste heat, etc.</li> <li>✓ Low electricity demand (allows for peak power use reduction)</li> </ul> | <ul style="list-style-type: none"> <li>✓ Highly energy-efficient</li> </ul> |
| Demerit         | Slow start up   | Electricity demand is high  |
| Equipment costs | Generally cheaper than centrifugal chiller  | Generally higher than absorption chillers                                   |

Source: Prepared based on manufacturers' materials, etc.

Since electricity costs are lower in Vietnam than in Japan, there are great advantages to using centrifugal chiller as air conditioning equipment for large-scale facilities, and absorption chillers are unlikely to be included. However, if waste hot water and waste heat are used, there is great merit in using absorption chillers, and if a factory or other facility is likely to have waste hot water and waste heat, there is a high possibility that one of the absorption chillers will be used as a waste heat utilization chiller.

(2) Identification of necessary and desired conditions for the target of introduction

1) Centrifugal chiller

*Details are not disclosed as they relate to the business expertise.*

2) Waste heat utilization chiller

Kawasaki Thermal Engineering Co., Ltd. is basically in the business of selling facilities and equipment, and although they will of course conduct a corporate credit check, local companies will be widely targeted.

Large-scale facilities such as shopping centers have central air conditioning, but as described in the previous section "(1) Understanding the Specifications (Strengths) of Japanese Companies' Products," the introduction of absorption chillers is generally not easy in Vietnam due to the low cost of electricity and the fact that absorption chillers require a heat source. Therefore, we decided to look for absorption chillers to be introduced mainly in factories that have waste heat.

(3) Gather information on candidate companies

1) Centrifugal chiller

*Details are not disclosed as they are currently under investigation and negotiation.*

## 2) Waste heat utilization chiller

The following list was obtained from the Department of Economic and Regional Management and DOIT as information on factories, etc. that are likely to have waste heat, as well as a list of companies that emit large amounts of greenhouse gases for reference. In addition, a list of large hotels was also obtained, although it is considered unlikely.

- ✓ List of factories in large industrial parks (obtained from Department of Economic and Regional Management)
- ✓ List of factories using boilers, etc. (obtained from DOIT)
- ✓ List of Large Greenhouse Gas Emitters
- ✓ Large Hotel List

## (4) Provision of information to candidate companies

### 1) Centrifugal chiller

*Details are not disclosed as they are currently under investigation and negotiation.*

### 2) Waste heat utilization chiller

At the seminar and company matching on February 27, 2023, technology introduction and company matching were conducted for companies selected by Kawasaki Thermal Engineering Co., Ltd. and companies recommended by the DPI and relevant bureaus in Quang Ninh Province.

## 5.1.3 Boiler Installation

### (1) Understanding the product specifications (strengths) of Japanese companies

Kawasaki Thermal Engineering Co., Ltd.'s boilers are extremely efficient, about 10% better than those of other local companies in Vietnam, so there are significant advantages for customers to install the equipment. When a large amount of steam is used, a 10% reduction in fuel costs is a very significant cost savings.

When bringing Japanese products to Southeast Asia and other regions, we often hear that even if they are recognized for their good performance, the cost of the product ultimately prevents them from installing. In this respect, JCM's equipment subsidy is considered to be a major advantage. In the case of Kawasaki Thermal Engineering Co., Ltd. products, of course, JCM's equipment subsidy will further facilitate the introduction of the product, but even without JCM's equipment subsidy, the product is competitive against locally made inexpensive boilers when large volumes of steam are used. The service life of once-through boilers is generally said to be 10 years, but Kawasaki Thermal Engineering Co., Ltd. boilers have a service life of about 15 years, which may also contribute to price competitiveness.

(2) Identification of necessary and desired conditions for the target of introduction

As in Section 5.1.2, "5.1.2 Installation of Centrifugal chiller and waste heat utilization chillers (2) Understanding of necessary and desired conditions for installation target (2) Waste heat utilization chillers," there is no problem even if the target of introduction is a local company.

On the other hand, the strength of Kawasaki Thermal Engineering Co., Ltd. products is its high-efficiency once-through boilers, so factories and companies that require huge boilers are unlikely to be targeted.

The easiest target for introduction would be factories that are about to replace their boilers.

(3) Gather information on candidate companies

As described in section 5.1.2, "Introduction of Centrifugal chiller and Waste Heat Utilization Chillers (3) Information Collection on Candidate Companies for Introduction (2) Waste Heat Utilization Chillers," the approximate amount of waste heat and steam was estimated based on the list of factories using boilers and other factors, such as industry type and factory size, to narrow down the target companies and factories.

(4) Provision of information to candidate companies

As described in "5.1.2 Introduction of Centrifugal chiller and Waste Heat Chillers (4) Information Provision to Candidate Companies (2) Waste Heat Chillers," technology introduction and company matching were conducted at the seminar and company matching on February 27, targeting companies selected at the request of Kawasaki Thermal Engineering Co., Ltd. and companies recommended by the DPI and relevant authorities in Quang Ninh Province.

## 5.2 Decarbonization in remote islands and non-urban areas

### 5.2.1 Introduction of Jokaso

#### (1) Assessing the needs of Quang Ninh Province

##### 1) UNESCO's remarks on the conservation status of Halong Bay, etc.

Halong Bay, a major tourist attraction in Quang Ninh Province, is dotted with more than 2,000 islands of various shapes and sizes. The limestone rocks have been eroded over the years to form oddly shaped rocks, preserving a magnificent and fantastic landscape that is also known as the "Guilin of the Sea. Since its inscription as a World Natural Heritage site in 1994, the Vietnamese government, in cooperation with UNESCO and other organizations, has taken measures to preserve the World Heritage site. However, due to an increase in waste and wastewater resulting from an increase in tourism and development in the surrounding areas, the site has not become a heritage in danger, but its value as a heritage is under threat.

In 2013, UNESCO listed the following as ongoing risks to Halong Bay's value as a World Heritage, along with continued pressures from population growth and tourism, and called for action.

- ✓ Excessive and unregulated tourism activity
- ✓ Water pollution due to nutrient and waste inputs from the coast
- ✓ Water pollution from wastes from water settlements and aquaculture activities in the region

In 2018, at the request of the Vietnamese government, the IUCN (International Union for Conservation of Nature, which conducts World Natural Heritage assessments and recommendations) conducted a field survey and made recommendations and demands regarding waste management and environmental protection, along with various recommendations for sustainable tourism activities. Specifically, they call for no further development of Halong Bay until an environmentally safe collection and disposal system for waste is established, and for the development of landfills that are properly managed. Regarding wastewater treatment, they call for cruise ships to be equipped to separate and treat wastewater, and recommend the installation of Jokasos with a treatment capacity of 8 to 10 m<sup>3</sup>.

Based on the IUCN field survey and recommendations/requests, the Vietnamese government is submitting a report on the conservation status of Halong Bay in 2019, in which the following conservation measures are listed.

- ✓ Strengthening Management and Policies Related to World Heritage
  - Adoption of the National Decree on the Protection of the World Heritage
  - Implementation of the World Heritage Management Plan (2017-2021)
  - Establishment of Halong Bay Management Unit in close cooperation with provincial and local authorities, etc.
- ✓ Reduction of solid waste
  - Reduction of plastic waste

- Priority collection along the coast and at discharge points
- Improve general recycling efforts
- ✓ Strengthen management of wastewater discharges from mining and tourism
  - Installation of Jokaso systems
  - Conduct quarterly water quality monitoring at 41 sites in Halong Bay

2) Status of wastewater treatment on the islands in the bay and plans and concepts of the Halong Bay Management Department.

While the islands in the World Heritage of Halong Bay are generally off-limits to visitors, there are some islands that are open to visitors. Some of the islands that are open to visitors have toilets (there are nine toilets on six islands). These toilets are of the septic tank type, but septic tank have structural and maintenance problems and are not able to treat wastewater sufficiently to maintain and preserve the environment.

The Halong Bay Management Department, which manages Halong Bay, after considering several methods, claims that Jokaso is the only option for sewage control on the islands in Halong Bay, not only because of their high wastewater treatment capacity, but also because they are easy to maintain and space-saving. In fact, Quang Ninh Province has already installed two small Jokasos on Ti Top Island, which is the most visited island in Halong Bay and has a beach, as a pilot project funded by Quang Ninh Province. The Jokasos was manufactured by Japanese company FujiClean Co., Ltd, and Petrolimex, a major oil and gas producer in Vietnam (which also operates a large number of gas stations), is maintaining and managing them under the guidance of FujiClean Co., Ltd., and they have been operating smoothly for three years since their installation.

Based on the experience on Ti Top Island, Halong Bay Management Department hopes to promote the introduction of Jokasos on islands within Halong Bay.



Ti-Top Island



Toilets with Jokaso installed



Jokaso top lid



Halong Bay Management Department's plan to install Jokasos on islands in Halong Bay is shown in Table 9, and a total of 31 Jokasos are being considered for installation on 16 islands and other locations.

Table 9 Halong Bay Management Department's plan to introduce Jokaso

| No | Tourist Attractions              | Number of visitor per day ( 2019) | Number of JOKASO planed to install |            |
|----|----------------------------------|-----------------------------------|------------------------------------|------------|
|    |                                  |                                   | Quantity                           | Efficiency |
| 1  | Thien Cung Grotto                | 14,827                            | 3                                  | 5 m3/ day  |
| 2  | Dau Go Cave                      | 2,983                             | 3                                  | 5 m3/ day  |
| 3  | Sung Sot cave                    | 8,679                             | 2                                  | 5 m3/ day  |
| 4  | Me Cung cave                     | 1,424                             | 1                                  | 5 m3/ day  |
| 5  | Tien Ong cave                    | 480                               | 1                                  | 5 m3/ day  |
| 6  | Cua Van Floating Cultural Centre | 694                               | 2                                  | 5 m3/ day  |
| 7  | Trinh Nu - Ho Dong Tien Cave     | 500                               | 1                                  | 1 m3/ngày  |
| 8  | Thay cave                        | 900                               | 1                                  | 5 m3/ day  |
| 9  | Co Cave                          | 910                               | 2                                  | 5 m3/ day  |
| 10 | Ba Hang cave                     | 876                               | 2                                  | 1 m3/day   |
| 11 | Bai Dong                         | Planned to open in 2 years        | 1                                  | 5 m3/ day  |
| 12 | Cong Do                          | 1,083                             | 1                                  | 1m3/day    |
| 13 | Vong Vieng                       | 913                               | 1                                  | 1m3/day    |
| 14 | Luon Cave                        | 9,530                             | 2                                  | 1 m3/day   |
| 15 | 05 sites for overnight cruises   | 132 overnight boats per day       | 5                                  | 1 m3/day   |
| 16 | 03 sites for yachts              | Planned to open in 2 years        | 3                                  | 1m3/day    |

Source: Materials provided by Halong Bay Management Department

## (2) Consideration of a funding scheme for the introduction of actual equipment

Since wastewater treatment facilities, including Jokaso, is not fundamentally profitable, we felt that it would be difficult to introduce such facilities on a business basis between private companies and felt the need to look for public funding schemes, so it began considering them from an early stage.

One of the projects that JICA is trying to promote is "Clean City Initiative" . It aims to contribute to the creation of a sustainable society that realizes a healthy environment and preserves the health and living environment of people in developing countries through the promotion of environmental measures such as waste management and prevention of water and air pollution. At the "Clean City Initiative" briefing (September 30, 2021), JICA stated that the following six programs are possible support schemes for the Clean City Initiative.

- a. Grant Aid
- b. Technical Cooperation Support
- c. Program loans
- d. Non-Project Grant Aid (Grant Assistance (Economic and Social Development Program))
- e. Grassroots Grants (Grassroots Grant Aid)
- f. Other Schemes

In discussions with the JICA Vietnam Office and the Embassy of Japan in Vietnam, it was suggested to us that the "Grassroots Grant Aid" scheme and "Non-Project Grant Aid" scheme would be effective, considering the purpose of introducing Jokasos and the time required for their adoption and construction.

We approached the DPI (Department of Planning and Investment) and the Halong Bay Management Office in Quang Ninh Province, and they are in favor of using the Grassroots Grant Scheme and the Non-Project Grant Aid Scheme, and are willing to make proposals to both schemes for implementation as soon as possible.

Based on the information obtained from interviews with related parties and related documents, the policy and utilization financing scheme for the introduction of Jokasos were organized as shown in Attachment 7, and the introduction of Jokasos is planned.

Specifically, it was decided to first consider the use of grassroots grants, which, although the amount of grant is small, can be introduced in a short period of time, as it does not take much time from proposal to adoption and grant. Subsequently, it was decided to consider the use of Non-Project Grant Aids, which take more time but have a larger grant amount.

| Project   |                                | Period               | Short-term<br>(1-2 years)   | Middle term<br>(3 years to 5 years)   | Long-term<br>(after 5 years)  |
|---|--------------------------------|----------------------|---|---|---|
| Solar Power Generation<br>Chillers<br>Boilers                         | Private initiative             |                      | Private-Private Base Promotion<br>(factories in industrial parks, large hotels, etc.)   |   |   |
| Sludge gasification power generation<br>Carbonization Burial (Sludge) | Need to introduce public funds |                      | City-to-City Collaboration Collaboration to study ways to promote the project.  |   |   |
| Jokaso  | Need to introduce public funds | Concretization ahead | Islands within the Ha Long Bay World Heritage Area (several locations)  |   |   |
|   |                                |                      | Multiple tourist destinations that contribute to the preservation of the Halong Bay World Heritage Site environment   | Inland areas, etc.  |   |
|   |                                |                      | Grant Assistance for Grass-Roots Human Security Projects (Japanese government funds)<br>·Up to 10 million yen<br>·VAT portion is not tax exempt<br>·Need to raise funds for maintenance and management<br>·Requested by Vietnamese side | Grant Aid (The Economic and Social Development Programme) (Japanese government funds)<br>·Several hundred million yen<br>·Time-consuming to execute<br>·Need to raise funds for maintenance and management costs<br>·Requested by Vietnamese side | Utilization of PPP systems, etc.<br>·Plans to consider possible methods for City-to-City Collaboration. |

Figure 7: Promotion policy for each project envisaged in the City to City Collaboration project (focusing on the introduction of Jokaso)

## 1) Grassroots grant scheme

### A. Outline of the Grassroots Grants Scheme Outline of Grassroots Grants Scheme

The Grassroots Grant Assistance Scheme, officially called the "Grant Assistance Grass-Roots Human Security Project," provides the necessary funds for relatively small-scale projects that directly benefit local residents for the purpose of economic and social development in developing countries.

A summary of the Grassroots Grants Scheme is as follows

#### Outline of the Scheme

- ✓ The target organizations are NGOs, local governments, educational institutions, medical institutions, and other non-profit organizations operating in developing countries.
- ✓ Although it is described as "fast aid that allows for flexible response" (Ministry of Foreign Affairs website), it still takes about five to six months from the time the application is received by the embassy to the time it is approved by the Ministry of Foreign Affairs headquarters.

- ✓ Basically, the maximum amount of grant is 10 million yen.
- ✓ The Grant Contract (G/C) is concluded between the Embassy and the local government (in this case, Quang Ninh Province), and the signatories are the Ambassador and a representative of the local government; it is not an international contract like ODA.
- ✓ In principle, construction work must be completed and the project implemented within one year after the G/C is signed.
- ✓ In principle, funds are provided after a procurement contract (P/C: Procurement Contract) is concluded and a gift contract (G/C) is signed, but since this is often not in time, funds are provided as a matter of fact if a P/C can be concluded.
- ✓ The beneficial effect on local residents is an important factor that determines whether or not the project will be adopted.

In the case of applying to the Grassroots Grant Scheme for this project, the procedures to be followed in Vietnam are those approved by DPI in accordance with Decree No. 80 of the Government of Vietnam. The grantee organization will be the Halong Bay Management Department, which will effectively manage and operate the project.

## B. Proposal for a grassroots free scheme to introduce Jokaso

### (a) Halong Bay Management Department's Plan

The following plans are being considered for introduction by the Halong Bay Management Department under the Grassroots Grant Scheme. It corresponds to No. 2 of the plan to introduce Jokasos to the whole Halong Bay shown in Table 9.

Introduction: Two restrooms in close proximity to Dau Go Cave on Dau Go Island  
 Toilets for tourists (5m<sup>3</sup> / day models x 2 units)  
 Toilets for staff (1m<sup>3</sup> /day model x 1 unit)

Dau Go Island has three caves (Tien Cung Cave, Dau Go Cave, and others) and is a popular tourist destination visited by half of the visitors to Halong Bay. However, tourists do not often use the toilets at Tien Cung Cave, which is located near the landing site, but use the toilets at Dau Go Cave, which is located at the end of the cave. As a result, there is a large amount of wastewater from the toilets, so Halong Bay Management Department wanted to give priority to installing toilets in the vicinity of Dau Go Cave.



Daw Go Island



Planned Jokaso installation sites  
(Toilets near the Daw Go Caves. Two units will be installed behind the store in the yellow box. Red box is location of existing tourist toilets.)



Staff toilets at Dau Go Cave





Planned Jokaso installation point for staff toilets at Dau Go Cave (1 unit)



Boats to cross over to a cave that can only be entered from the sea

## (b) Contents of Proposal

Initially, we were told by the Embassy that the deadline for proposals for the Grassroots Grants Scheme was the end of May for the first half of this fiscal year and the end of August for the second half, but only in July did we hear that the deadline for the second half was the end of July.

Although the Halong Bay Management Department would prepare most of the proposal documents, including the background and needs of the proposal, it was necessary for the Japanese side to submit ideas on the benefits to the local residents to increase the probability of adoption of the proposal. However, since Dau Go Island is uninhabited, it was difficult to identify the people who would directly benefit from the installation of the Jokaso on the island and the number of beneficiaries. Under such circumstances, the draft proposal completed by the Halong Bay Management Department described benefits to the Vietnamese government and Quang Ninh Province, such as effective measures to respond to UNESCO's recommendation on the World Heritage, rather than benefits to local residents.

While we could not come up with a good idea, we visited Dau Go Island in late July guided by the Halong Bay Management Office and noticed that local residents were making a living by selling drinks and souvenirs at stores (20 stores) and renting canoes and boats for cave tourism (see the photos on the previous page and two previous pages). We advised the Halong Bay Management Office to claim the benefits to the people who make a living by engaging in tourism (improved water quality around Dau Go Island will increase their income and livelihoods due to the increase in tourists).

After the site visit was completed, the Halong Bay Management Department estimated the number of people earning a living on the island at 460, completed a proposal, and submitted it to the Japanese Embassy at the end of July.

The proposal submitted is attached as Appendix 7 (*not disclosed*) in the Appendixes.

## (C) Proposal Results

Due to the delay in the review by the Ministry of Foreign Affairs, we did not hear from them in January or February of the new year, which we were originally told was the schedule, and at this point (end of February), we have not received any notification as to whether the project has been adopted or not.

If a decision to adopt the project (review) is not made, according to the Embassy, the project will automatically be reviewed together with the next year's projects.

## 2) Non-project grant scheme

The official name of the Non-Project Grant Aid Scheme is "Grant Assistance (Economic and Social Development Program)". An overview of the Non-Project Grant Aid Scheme is provided below.

### A. Outline of Non-Project Grant Aid Scheme Outline of Non-Project Grant Aid Scheme

The following information was obtained through interviews with the Ministry of Foreign Affairs and the Embassy regarding the scheme.

#### Outline of the Scheme

- ✓ This is a grant aid that provides funds for purchasing materials and equipment from overseas to support developing countries that are implementing economic and social development projects such as poverty reduction.
- ✓ The Japanese government approves the application through the Embassy based on the request of the partner country's government.
- ✓ When equipment is to be installed, the government of the other country prepares a written request and plans, and consults with the embassy. Since the counterpart government naturally has a large number of projects, it will rank the projects in order and consult with the Embassy.
- ✓ The Embassy will also conduct the ranking.
- ✓ After the implementation of the project is almost finalized between the Embassy and the counterpart government, a Project Document is prepared and discussed in each ministry of the Japanese government.

#### Summary of Procedures

- ✓ The project is usually decided at the beginning of the year, at the end of January or February. If the project is on the embassy's list by that time, it will be brought to the Ministry of Foreign Affairs the following year for a Cabinet decision, and the implementation of the project will be officially confirmed.
- ✓ It usually takes one to two years until a Cabinet decision is made, about six months to conclude an Exchange of Notes (E/N) after the Cabinet decision, about six months to conclude a procurement contract, and about one year to implement the bidding process after that. It takes about three years to introduce the equipment.

#### Specific advice from the Ministry of Foreign Affairs, Embassies, etc.

- ✓ It will take some time before the expenditure becomes feasible, but the benefits to residents are not as demanding as grassroots grants.
- ✓ There is no upper limit, but 100 to 300/400 million yen is considered appropriate. Smaller amounts may be perceived as inefficient projects.
- ✓ There is no specific format, and the embassy should be consulted first with appropriate documentation.
- ✓ If the project is a development of a JICA project, it would be a good idea to consult with JICA.



## B. Proposal for Non-Project Grant Aid scheme to introduce Jokaso

### (a) Halong Bay Management Department's Plan

Halong Bay Management Department intends to utilize the Non-Project Grant Aid scheme to install Jokasos at all planned sites in Halong Bay (Table 9), including those that will be installed by grassroots grant, in case the project is not adopted.

In addition, although not directly related to decarbonization, Halong Bay Management Department would like to propose to the Non-Project Grant Aid a garbage collection vessel, a vessel for environmental monitoring and environmental education, onboard monitoring equipment, and a high-speed vessel for environmental protection patrols, together with a Jokasos, for environmental conservation in Halong Bay and to raise awareness and promote environmental conservation.

A summary of the Halong Bay Management Department's plan is shown in Table 10, and details of the plan are shown in Appendix 8 of the Appendixes.

Table 10 Summary of Halong Bay Management Department's plans for Non-Project Grant Aid schemes

|   | Contents  | Numbers   |
|---|---|-----------|
| 1 | Installation of Jokasos at 16 tourist sites in Halong Bay (see Table 9)   | 31 units  |
| 2 | Waste collection ship<br>Transshipment of garbage collected in shallow water areas<br>Land transportation of collected waste<br>Environmental accident response equipment (oil spill, etc.) | 4 ships   |
| 3 | Vessels for Environmental Monitoring and Environmental Education  | 1 ship    |
| 4 | Onboard monitoring equipment  | 1 formula |
| 5 | High-speed vessels for environmental protection patrols   | 1 ship    |

### (b) Content of requests, discussions with Embassy, etc.

On December 26, 2022, the above details were explained and discussions were initiated by an online meeting and a visit to the Embassy by relevant persons in Vietnam, with the submission of Attachment 8 of Appendixes.

The Embassy's remarks, advice, etc. are as follows

- ✓ This document is positioned as an internal document.
- ✓ The contents of the documents to be submitted in the future should be consistent

with those to be submitted to Japan by the Ministry of QN. There is no particular content or items that should be included.

- ✓ The shortest project would be in 2024.
- ✓ The Embassy will report the project to the Ministry of Foreign Affairs by next summer. At the same time, the Vietnamese government will submit a written request to the MOFA. Both requests will enter the Ministry of Foreign Affairs at the same time to start the review of the project.
- ✓ After the submission of the request, the MOFA will ask the Embassy about the specific details of the project, such as the target beneficiaries and the scale of the project.
- ✓ The scope of the beneficiaries is broader than that of the Grassroots Grants Scheme, so it is likely to be written in a broader and more vague way that there will be broader and more nebulous benefits.
- ✓ There was no indication from MOFA as to whether a single proposal could be accepted for the different purposes of introducing not only Jokasos but also various types of vessels and monitoring equipment.
- ✓ It is necessary to confirm whether it is possible to design the vessels in Japan and build it in Vietnam when the adoption of the project is decided. (From a person engaged in the work of a case in which a garbage collection vessel was introduced to Vietnam through grass-roots technical cooperation (Osaka Prefecture University (now Osaka Metropolitan University)), it was advised that "the design and construction should be carried out by the same entity on the Vietnamese side in order to meet the ship-related regulations of the Vietnamese country."

We plan to support the Halong Bay Management Department and work with the DPI to submit the project to the MOFA via the Embassy by next summer.

### (3) Maintenance system

The maintenance of Jokasos installed by Quang Ninh Province as a pilot project on Ti Top Island, a famous tourist island in Halong Bay, is being conducted by Petrolimex, a major oil and gas producer in Vietnam, under the guidance of Japanese Jokaso manufacturer FujiClean Co., Ltd. Although it was a time when there were not so many tourists, when maintenance experts and others visited Ti Top Island in September 2022, they checked the maintenance status and found that the Jokasos were currently being properly maintained and managed.

The reason why the introduction of Jokaso has not progressed as much as expected overseas is, of course, the initial cost, but the lack of proper maintenance and management is often mentioned as a factor. The sludge is not sufficiently drawn out, etc., and as a result, the performance of Jokaso is not fully demonstrated, and the benefits and advantages of Jokaso are not widely spread.

The Halong Bay Management Department has taken the budget and signed a contract with Petrolimex to continue to maintain and manage the Jokasos, and there are no major problems at

present, but the question will be whether the maintenance and management can be properly carried out if the area is expanded beyond Thi Top Island. We believe that the Halong Bay Management Department is well aware of the need for maintenance and management, but it will be necessary to appeal to Quang Ninh Province to understand the need for a budget for maintenance and management.

As for the maintenance contractor, Petrolimex is a major company, and if there is a need, it should be possible to increase the number of staff to handle the project, and since cooperation and guidance from FujiClean Co., Ltd. can be expected, there should be no particular problem for the time being. JICA Vietnam office is conducting a survey on the maintenance and management system and regulations of Jokaso in Vietnam, and we believe that it will be necessary to take action based on this information in the future.

#### 5.2.2 Introduction of sludge gas power generation

##### (1) Understanding the product specifications (strengths) of Japanese companies

*The company in question does not wish the name of the company to be mentioned, and therefore the information shall be undisclosed.*

##### (2) Identification of necessary and desired conditions for the target of introduction

*The company in question does not wish the name of the company to be mentioned, and therefore the information shall be undisclosed.*

##### (3) Understanding of the technical level and system required for maintenance

*The company in question does not wish the name of the company to be mentioned, and therefore the information shall be undisclosed.*

##### (4) Assess local conditions and needs

###### 1) Status of sludge treatment

It is estimated that about 300 tons of sludge is generated annually at wastewater treatment plants in Quang Ninh Province. Private hotels, condominiums, factories, etc. must take responsibility for their own wastewater treatment and contract with private companies to manage septic tanks and sludge treatment, which transport and treat the sludge. Therefore, the details of the amount of sludge generated are not known.

In Quang Ninh Province, sludge is currently disposed of in landfills.

###### 2) Needs for sludge gas power generation

While the demand for electricity is increasing with economic growth, the supply of electricity is becoming tight throughout Vietnam due to the difficulty in coal supply. However, we did not

identify much need for the use of sludge gas for power generation, partly because the grid is comprehensive in Quang Ninh Province and there is little need to introduce independent power sources, and partly because the price of electricity from the grid remains at a low level. When we interviewed DONRE in September, they were under the impression that power generation from solid waste would be advanced in the future and that power generation from sludge would be a project to be implemented in the next stage.

In December, we proposed to DARD (Department of Agriculture and Rural Development) the effective use of sludge, including wastewater treatment, using the materials shown in Appendix 9 of the Appendixes, but they did not feel that power generation from sludge is one of the effective ways to utilize sludge, and were not willing to actively introduce it.

#### (5) Identification and consultation with counterparties

Prior to the revision of the Environmental Protection Law in 2020, the Department of Construction (DOC) had jurisdiction over sludge treatment planning and operation and management, but with the revision, it is now under the jurisdiction of MONRE (or DONRE), creating a twist. Quang Ninh Province is planning to materialize a sludge treatment method by FY2024, but when the sludge is to be used effectively, the bureaus with jurisdiction will change depending on the purpose.

Since the needs for sludge gas power generation are not very clear and the treatment of sludge residues, including carbonization, should be handled as an integral part of the project, it is necessary to improve the accuracy of the project and reconfirm counterparts.

#### 5.2.3 Carbonization of sludge and effective use of biochar, etc.

##### (1) Assessing the needs of Quang Ninh Province

##### 1) Needs of Quang Ninh Province related bureaus

Interviews were conducted with the Department of Agriculture and Rural Development (DARD), which is in charge of agriculture in Quang Ninh Province, the Department of Science and Technology (DOST), which is in charge of technology development, and DONRE. DONRE was interviewed.

In Vietnam, it was not common to add charcoal to farmland, and there seemed to be no particular knowledge of its effectiveness as a soil conditioner. Charcoal furnaces were also not widely used, and there seemed to be no knowledge of carbonization as an effective way to utilize sludge.

On the other hand, when we explained the utility of charcoal as a soil conditioner and its carbon sequestration effect (decarbonization effect), DARD strongly recommended that if sludge is to be carbonized, it should not be used for power generation (e.g., co-firing in coal-fired power plants) but rather for agricultural use, and also expressed support for the project by applying sludge carbonization technology to animal (pig, cattle, chicken) waste and

carbonizing the dung. He also expressed his support for the project, saying that the carbonization of dung could be an effective use of sludge.

DONRE, which is in charge of the environment, expressed interest in the application (burial) of charcoal to the former coal mining site, which had been presented as one of the proposals, and argued that the implementation of agriculture by applying charcoal to the site would not only improve the environment but also produce economic benefits.

DOST offered to help by certifying the technology for sludge treatment, including carbonization, as it is a new technology for Quang Ninh Province to facilitate approval by the People's Committee, and asked for detailed proposals on wastewater and sludge treatment (effective utilization) in rural areas. The committee also asked for detailed proposals on wastewater and sludge treatment (effective utilization) in rural areas.

## 2) DOST's intention

In response to the above request (in December), we made a more detailed proposal (see Appendix 10 in the Appendixes) on wastewater and sludge treatment (effective utilization) in rural areas (in February). This proposal also emphasized the effectiveness of charcoal as a soil conditioner and decarbonization effect, which is not well recognized in Vietnam.

DOST's response was as follows: they would consider introducing a demonstration plant for wastewater and sludge treatment in rural areas from their own budget, and would like to consult with the People's Committee to realize a larger project while determining its effectiveness.

- This proposal on wastewater treatment and sludge treatment is very good as it focuses on rural areas. It is suitable for Quang Ninh province.
- Among the policies of Quang Ninh Province is the goal of improving the standard of living of its citizens, and we would like to raise the standard of living by implementing waste disposal, wastewater treatment, green infrastructure, etc.
- We would like to prepare a proposal for a large model project jointly with private companies in Shiga Prefecture and DOST, and submit it to the People's Committee for implementation.
- We would like to obtain and verify information on the details of water usage, electrical capacity, and methods of technology transfer to implement a large model project.
- A large model project must be consulted by the People's Committee before it can be implemented, and the effectiveness of the project must be demonstrated by a small demonstration project.
- I think the budget of the research center for technology development could be used for small demonstration projects.

- To build the equipment for a small demonstration project, as well as for a larger model project, confirmation of water usage, electrical capacity, and other detailed information is needed.
- DOST will visit rural areas to study suitable project sites. The Japanese side should have an expert on related equipment accompany them on their next trip. We would like to visit the rural areas together, observe the sites, and convey information and exchange opinions from the Vietnamese side to the Japanese side.

## (2) Identification and consultation with counterparties

As with the introduction of Jokaso, the carbonization of sludge and the burial of biochar is not a project that will proceed on a business basis between a private company and a private company, and will require funding from the Quang Ninh Province budget or another source.

However, when we explained to DARD our more detailed proposal for wastewater and sludge treatment (effective utilization) in rural areas (see Appendix 10 in the Appendixes), it became difficult to proceed with the project together with DARD because the discussion became business-based and no longer considered the decarbonization perspective, and it became difficult to proceed with the project together with DARD.

On the other hand, DOST has expressed a strong desire to implement a demonstration project that integrates wastewater treatment and sludge treatment (including biochar burial through carbonization) with its own budget for the development of new technology, and although it seems easiest to proceed with the demonstration project as a new technology development project with DOST, it is necessary to further collect information and consult with DPI to organize and confirm the implementation structure of the project in Quang Ninh Province. Since the DOC has jurisdiction over sludge treatment, it is necessary to collect further information and consult with DPI to organize and confirm the project implementation system on the Quang Ninh Province side.

## (3) Direction of business development

DARD proposed to carbonize sludge and livestock waste in the vicinity of large, high-capacity farms and market biochar by positioning it as agricultural waste or agricultural residue. The reason for this is that registering biochar as similar to fertilizer would require obtaining many certificates and achieving standards, which would make it difficult to market and promote the product on the market. As a source of funding, he mentioned the possibility of utilizing the Quang Ninh Province Science and Technology Development Fund, if approved by the People's Committee under the auspices of DOST.

The DOST expressed a strong desire to implement a demonstration project using the budget related to technology development. It is assumed that after verifying the effectiveness of the demonstration project, a large-scale project with an expanded scale will be submitted to the People's Committee, but it is necessary to further examine the availability and feasibility of using the budget, including the amount available.

At this point, the project is still in the early conceptual stage, and we will be working on the details of the project, including not only the implementing entity and funding source, but also the exit strategy,

such as how farmers and others will think about and react to the use of the biochar. At the same time, we will consult with DPI and other bureaus to determine which bureau will be the counterpart.

## 6. Seminars and company matching

### 6.1 Background of the event

The list of factories in SEZs and industrial parks provided by the Quang Ninh Province Department of Economic and Regional Management included quite a large number of factories, and it was assumed that visiting individual factories would not be enough time.

In addition, Quang Ninh Province's departments have said that they would be interested in holding seminars and other events to attract companies, and DONRE has requested Shiga Prefecture's advice on its plans for decarbonization. In addition, a JICA Green Growth Advisor dispatched to Quang Ninh Province expressed a desire to hold workshops on individual treatment systems such as Jokaso in order to promote their use. In light of this, we approached DPI on a business trip in November with a plan to hold a combined seminar, technology introduction, and matching event, which would not be a workshop but a presentation by Shiga Prefecture based on its past experience and an introduction of decarbonization and energy-saving technologies and products to Vietnamese companies.

The initial plan was to implement the program early in the new year of 2023, but due to a combination of conditions, including the Tet vacation (Chinese New Year) in Vietnam, it was decided to implement the program at the end of February.

### 6.2 Implementation details

As shown in the sequence in Table 11, with the exception of the opening and closing remarks, the entire event was divided into two parts, with the first part sharing Shiga Prefecture's decarbonization efforts and the second part introducing technologies for decarbonization and water environment conservation from companies in Shiga Prefecture and others .

In addition, booths for company matching were set up at the venue to enable information exchange during breaks and other opportunities.

### 6.2 Implementation Results

#### 6.2.1 Number of participants

A total of 106 people (including DPI Deputy Director General Hung, DONRE Deputy Director General Hoang, and DARD Deputy Director General Van) and 48 companies participated. The meeting was a success, with few people leaving the venue before the closing remarks.



Table 11: Seminar and Company Matching Dependent on

| <b>Technical Workshop Seminar</b>  |              |   |  |
|--|--------------|---|--|
| <b>Seminar and Social Event on Decarbonization and Water Conservation for Environmental Protection in Quang Ninh Province</b>  |              |   |  |
| <b>Framework for realizing a decarbonized society and promoting green growth through a city-to-city project between Shiga Prefecture and Quang Ninh Province in FY2023 with support from the Ministry of the Environment, Japan.</b> |              |   |  |
| Time: Monday, February 27, 2023 from 13:30 to 19:30  |              |   |  |
| Place: Novotel Hotel Conference Room, Baichay Street, Ha Long City   |              |   |  |
| No   | Time         | Contents  | Presenter  |
| I  | 13:30-14:00  | Receipt of membership applications and distribution of materials  | DPI Specialist Secretary and others                                |
|  | 14:00- 14:05 | Introduction of representatives, announcement of reasons, and introduction of opening delegates                               | Ms. Tam of DPI   |
|  | 14:05-14:15  | Opening remarks by DPI  | Representative of DPI  |
|  | 14:15-14:25  | Greetings from Shiga Prefecture   | Representative of Shiga Prefecture                                 |
|  | 14:25-14:35  | Greetings from a representative of the Department of Natural Resources and Environment  | Representatives of Department of Natural Resources and Environment |
| II   | <Section 1>  | Share the situation and efforts related to decarbonization in Quang Ninh Province and Shiga Province.                         |  |
|  | 14:35-14:55  | Introduction of Shiga Prefecture's past efforts to realize a low-carbon, decarbonized society                                 | Shiga Prefecture CO2 Net Zero Program Promotion Division (online)  |
|  | 14:55-15:15  | Energy Saving and Energy Creation Efforts in Shiga Prefecture's Sewage Works  | Shiga Prefecture Sewerage Division                                 |
|  | 15:15-15:35  | Break, business matching, technical information sharing on the Japanese side  | Shiga Prefecture officials and Vietnamese companies                |
| III  | <Section 2>  | Introduction of technologies related to decarbonization and environmental conservation by companies in Shiga Prefecture, etc. |  |
| 1  | 15:35-15:55  | High-efficiency boilers and heat recovery chillers  | Kawasaki Thermal Engineering Co., Ltd.                             |
| 2  | 15:55-16:15  | Jokaso Installation, Maintenance, and jokaso Regulations  | Japan Education Center of Environmental Sanitation(online)         |
| 3  | 16:15-16:35  | Jokaso manufacturing information sharing  | FujiClean Co., LTD.  |
| 4  | 16:35- 16:55 | Maintenance of wastewater treatment facilities  | Hiyoshi Corporation  |
| 5  | 16:55-17:15  | Methane Fermentation System   | Vioce Co.,Ltd(online)  |
| 6  | 17:15- 17:35 | Q&A and exchange of opinions  | Event attendee   |
| 7  | 17:35- 17:45 | Event Closing Remarks<br>Greetings from DPI Representative  | Shiga Prefecture<br>DPI  |



Seminar Implementation Status



Matching Implementation Status  
(1)



Matching Implementation Status  
(2)



Q&A and exchange of opinions



Commemorative photograph  
(Quang Ninh Province and Shiga  
Prefecture officials)



## 6.2.2 Summary of each presentation

In the first part, the CO<sub>2</sub> Net Zero Promotion Division of Shiga Prefecture introduced Shiga Prefecture's past efforts to realize a decarbonized society, and the Sewerage Division introduced the history and current status of sewage treatment in Shiga Prefecture and the effective use of sewage sludge. In the second part, the following presentations and technology introductions were made by companies in Shiga Prefecture and others.

Details are shown in Appendix 11 in the Appendixes.

(Kawasaki Thermal Engineering Co., Ltd.)

The presentation included an introduction of high-efficiency boilers and waste heat recovery chillers, an introduction of the JCM equipment subsidy program, and a case study of an installation in Indonesia using the JCM equipment subsidy.

(Japan Education Center of Environmental Sanitation)

Based on the system related to Jokaso in Japan, he referred to institutional issues in decentralized sewage management in Vietnam, and introduced the ordinance of Hung Yen Province as an advanced case in Vietnam.

(FujiClean Co., Ltd)

The characteristics of Jokaso as a form of decentralized sewage treatment and the status of installation and maintenance of Jokasos on Ti Top Island in Quang Ninh Province were presented.

(Hiyoshi Corporation)

The importance of maintenance and management in septic tanks and the status of maintenance and management were introduced, as well as the history and system regarding septic tanks in Omi Hachiman City as a recommendation for Vietnam.

(VIOCE CO.,LTD. Corporation)

The presentation included an on-site methane fermentation system specialized for small size, remote monitoring and control using IoT, and the installation and handover of the system.

## 6.2.3 Company Matching

Many participants from the Vietnamese side attended the event, and through the presentations on products and technologies of the Japanese participating companies, the understanding of those products and technologies by the Vietnamese participating companies was deepened. On the other hand, due to the strong intention on the part of Quang Ninh Province to have the matching time immediately before the technical presentations, fewer companies visited the matching booths than expected. Although FujiClean Co., Ltd, which exhibited a model of its products, received various questions and inquiries from interested parties, only about 10 companies took materials from Kawasaki Thermal Engineering Co., Ltd. with them, and only about only 2 companies were given detailed explanations of the materials by Kawasaki Thermal Engineering Co., Ltd. We have not heard

of any specific conversations with either company that could lead to business negotiations at this time, and coordination with the local community is an issue for the future.

## 7. Identification of Japanese companies with decarbonization technologies

*We are in discussions with the company concerned and have not obtained their consent for the company's name to be mentioned, so this information is not disclosed.*

## 8. Future plans

### 8.1 Support for Institution Building in Quang Ninh Province

Quang Ninh Province has traditionally created a climate change action plan and is aware that it must start moving toward decarbonization. There has been a move to update Quang Ninh Province's plan in line with the commitments made at COP26.

As regional characteristics and political aspects are likely to play a major role in the updating and planning of Quang Ninh Province's climate change action plan (decarbonization plan), Shiga Prefecture will focus on activities to realize a decarbonized society and support measures to spread and activate activities, for example, making decarbonization activities visible, using knowledge and experience gained through activities Shiga Prefecture has been involved in.

The basic method of support will be to exchange opinions, etc., online, but if necessary, we will ask officials from the CO<sub>2</sub> Net Zero Promotion Division of Shiga Prefecture to accompany us to conduct on-site surveys to further deepen our relationship with Quang Ninh Province.

### 8.2 Introduction of solar power generation and turbo refrigeration

*Details are not disclosed as they are currently under investigation and negotiation.*

### 8.3 Installation of waste heat recovery chiller/boiler

We asked Kawasaki Thermal Engineering Co., Ltd. to select companies and factories they would like to approach for possible delivery of their products from a list of factories in SEZs and industrial parks, a list of companies using boilers, and so on. 125 companies and factories (with possible overlaps) were listed. Since it would be difficult to reach out to all of these companies at the seminar/company matching, we requested participation from approximately 60 companies as a first step.

Forty-eight companies participated in the seminar and company matching held on February 27, but only about 10 companies came to pick up materials and two companies received detailed explanations about the contents of the materials.

We will collect detailed information on facilities (heat source, required heat quantity, timing of installation, etc.) through the Department of Economic and Regional Management and the Department of Industry and Trade (DOIT), which are the departments with jurisdiction over factories and hotels, etc. After screening, we will provide information through individual visits, etc. and set up meetings with companies that have expressed interest in the project to form JCM projects. After screening, information will be provided through individual visits, etc., and meetings will be set up with Kawasaki Thermal Engineering Co., Ltd. for companies that have expressed interest, with the aim of forming JCM projects.

### 8.4 Introduction of Jokaso

We have submitted a proposal to the Grassroots Grant Scheme, but as of the end of February, we have not yet received word of the results. We have been told that if a decision on adoption (review) is not

made, the proposal will be reviewed along with next year's projects.

Currently, a written request has been submitted to the Embassy as part of the application process for a Non-Project Grant Aid (Grant Assistance (Economic and Social Development Program)). Non-Project Grant Aid are based on the Vietnamese government's request and are approved by the Japanese government via the Embassy, which takes much longer than the grassroots grant scheme. The Halong Bay Management Department and Quang Ninh Provincial Government will take the lead in the process, but we will continue to provide support from the side.

In non-urban (inland) areas where the population is not dense, Quang Ninh Province is willing to promote individual treatment using Jokaso etc., since it is unlikely that sewage systems, etc., will be installed in the future from an efficiency standpoint. We would like to look for funding schemes other than non-project grants as a source of funds for the introduction of Jokasos, and to consider a wide range of available methods, including the use of PPP schemes.

#### 8.5 Introduction of sludge gasification power generation

In Vietnam, the need for sludge disposal is not so well recognized. The DOC, which has jurisdiction over the sludge, only said that the disposal of the sludge is left to the private sector, but did not seem to have confirmed the method or destination of disposal, and since the landfill is not so strained, there seemed to be little sense of urgency.

Furthermore, the need for power generation from sludge gas was not very high in Vietnam due to low electricity prices and the fact that the grid is covered in Quang Ninh Province.

The plan for the future is to check the power generation needs again, and if the power generation needs are low, to consider using sludge gas as a heat source for carbonizing the sludge.

#### 8.6 Carbonization of sludge and effective use of biochar

The need for wastewater treatment in rural areas is recognized, and it is recognized that waste disposal, though not necessarily sludge, is becoming an issue.

On the other hand, charcoal is not widely used in agricultural lands, and its effectiveness as a soil conditioner is not well known. The carbonization technology is also not widely used, but when we explained that it contributes to decarbonization, they showed interest. We would like to first actively explain the benefits of charcoal as a soil conditioner and carbon sequestration to deepen their understanding and increase the maturity of the project concept.

As a contact point for the project, it will be difficult to proceed with discussions in the future with DARD, which does not assume decarbonization but only considers economic benefits (cost performance), and it will be easier to proceed with the project with DOST as a counterpart, which has indicated a desire to implement a pilot project for wastewater and sludge treatment (effective use). On the other hand, since sludge treatment is essentially under the jurisdiction of the DOC, the project implementation system



should be established by consulting with DPI while providing information and confirmation to the DOC.

As for funding schemes, we will review the amount available for disbursement, the procedures for disbursement, and the possibility of disbursement from Quang Ninh Province's Science and Technology Development Fund and/or DOST's Technology Development Budget, and at the same time, we will examine the funds available in Japan.