City to City Collaboration for Zero-carbon Society in FY2023

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 2024

KANSO TECHNOS CO., LTD.

Shiga Prefecture

Contents

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 degrees above pre-industrial levels and to limit it to 2 degrees (COP26 in 2021 set the goal of limiting the increase to 1.5 degrees 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 accelerating climate change policies by nongovernmental entities, including local governments and cities, in addition to the central government. In Japan, it was declared to aim for a decarbonized society with virtually zero greenhouse gas emissions by 2050. A "Regional Decarbonization Roadmap" has been formulated, which outlines a process and specific measures, with a particular focus on initiatives and measures to be concentrated by 2030, and efforts are underway to create more than 100 leading decarbonization regions and expand them throughout the country.

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 it will formulate a plan to achieve this goal and make reductions. It will be very important for Japanese municipalities and cities to show the movement toward decarbonization and low carbon emissions in cooperation with Vietnamese cities and others.

1.2 Purpose of the Work

The 2023 City-to-City Collaboration Project for Realization of a Decarbonized Society aims to support Japanese cities that have experience and know-how 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 conduct activities to reduce greenhouse gas emissions in Quang Ninh Province, Vietnam in the following four areas where there is a high need, and to form JCM projects that contribute to the reduction of greenhouse gas emissions, and to support Quang Ninh Province in developing a decarbonization plan to promote its efforts to form a decarbonized society.

(1) Introduction of solar power generation and turbo chillers
(2) Introduction of chiller/boiler using waste heat
(3) Introduction of Johkasos

(4) Effective utilization of sludge, etc. (sludge gas power generation and heat supply, carbonization, and biochar application (burial))

1.3 Business Implementation Structure

In the case of City-to-City Collaboration 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 the Commerce and Industry Policy Division of the Ministry of Commerce, Industry, Tourism, and Labor as the contact point, along with the CO_2 Net Zero Promotion Division of the General Planning Department and the Sewerage Division of the Lake Biwa Environment Department, worked with Shiga Prefecture companies and other business groups to help Quang Ninh province create a decarbonized society.

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

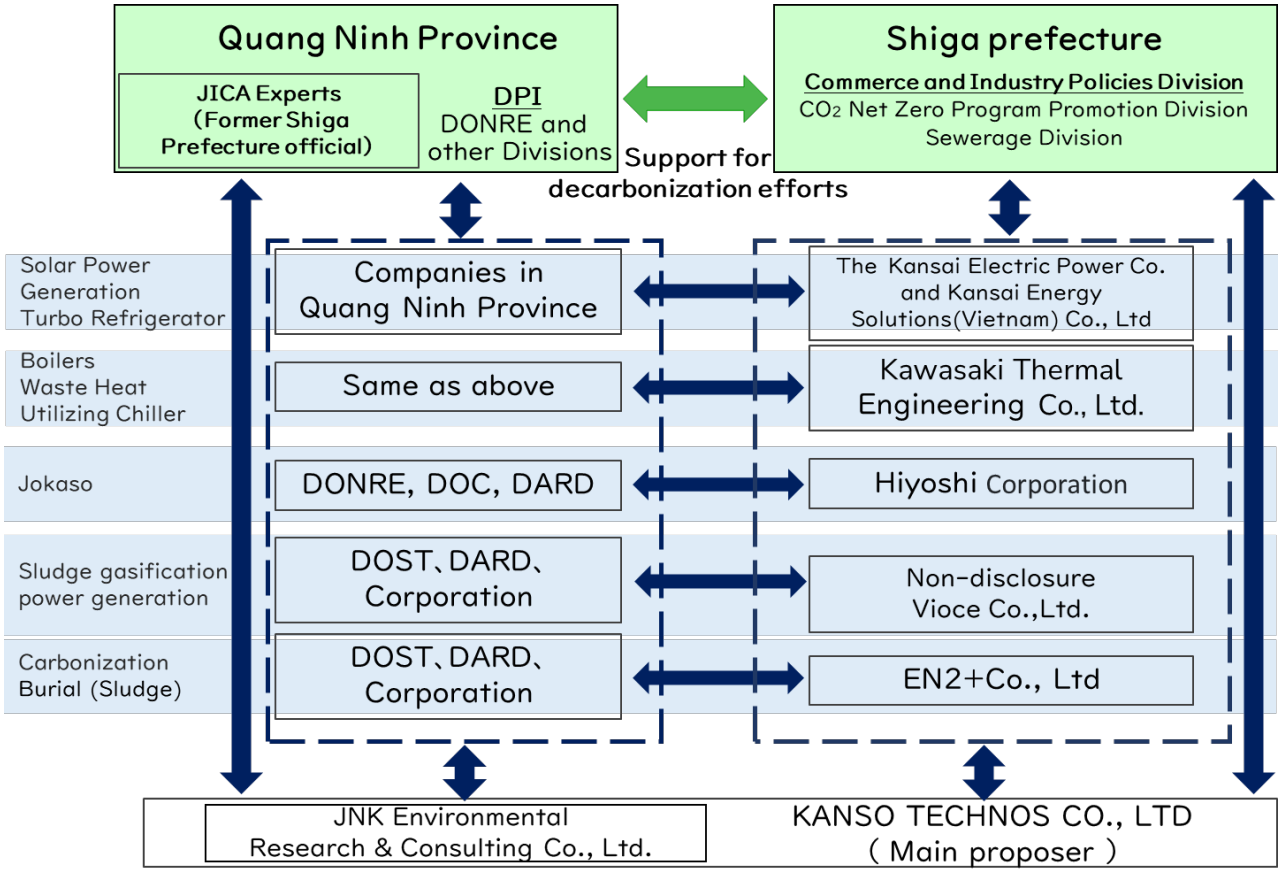


Figure 1 Implementation Structure of the Project

1.4 Business Process

The period of this work is from July 7, 2023 to March 8, 2024, and the main process is shown in Table 1.

Table 1 Process of the Project

項　目		FY2023											
		April	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	March
Coordination with MOE	Agreement												
	Monthly Report												
	Reporting												
	Briefing												Last
Coordination with Quang Ninh Province	Kick-off meeting												
	Identification of needs												
	Detailed explanation of the survey												
	Support for decarbonization efforts (Occasionally)												
	Workshop						Johkaso			COP	WS	Forum	
	Briefing												
Photovoltaics	Identification of needs												
	Understanding of specifications and expectations on the Japanese side												
	Matching												
	Selection of candidate companies												
	Understanding detailed conditions												
	Basic design												
	Detailed design												
	Preparation for the formation of an international consortium												
Turbo refrigerator	Identification of needs												
	Understanding of specifications and expectations on the Japanese side												
	Matching												
	Selection of candidate companies												
	Understanding detailed conditions												
	Basic design												
	Detailed design												
	Preparation for the formation of an international consortium												
Waste heat recovery boiler	Identification of needs												
	Understanding of specifications and expectations on the Japanese side												
	Matching												
	Selection of candidate companies												
	Understanding detailed conditions												
	Basic design												
	Detailed design												
	Preparation for the formation of an international consortium												
Boiler	Identification of needs												
	Understanding of specifications and expectations on the Japanese side												
	Matching												
	Selection of candidate companies												
	Understanding detailed conditions												
	Basic design												
	Detailed design												
	Preparation for the formation of an international consortium												
Johkasou	Identification of needs												
	Appllication for Grant Assistance for Grass-Roots Human Security Projects												
	Application for the Non-Project Grant Scheme												
	Consult with the Embassy, Ministry of Foreign Affairs, etc.												
	Understanding of specifications and expectations on the Japanese side												
	Consultation with counterparts												
	Selection of candidate sites												
	Understanding detailed conditions												
	Basic design												
	Detailed design												
Sludge gas power generation	Identification of needs												
	Understanding of specifications and expectations on the Japanese side												
	Consultation with counterparts												
	Search for local engineering companies												
	Selection of candidate sites												
	Understanding detailed conditions												
	Basic design												
	Detailed design												
Carbonization・ Underground burial	Identification of needs												
	Understanding of specifications and expectations on the Japanese side												
	Consultation with counterparts												
	Interviews and demonstrations with farmers												
	Selection of candidate sites												
	Understanding detailed conditions												
	Basic design												
	Detailed design												

凡例：
- Planned but not implemented
- Implemented as planned
- Additional Implementation

2. Activities related to City-to-City Collaboration projects to realize a decarbonized society

The table below shows the meetings, surveys, etc. related to the intercity collaboration projects conducted this fiscal year.

No	(data) item	Implementation period	summary
1	Prior to the conclusion of the contract		
	Meeting with DPI (online)	4/20 (Thu)	The DPI, the contact point for Quang Ninh Province, was briefed on the overall plan for this fiscal year, as well as the status of proposals for Grant Aid （The Economic and Social Development Programme） schemes and the results of meetings with the Department of Science and Technology (DOST).
	Meeting with Embassy of Japan in Vietnam	4/ 24 (Mon)	A meeting was held to ascertain the status of the introduction of johkasos, etc. under the non-project free-of-charge scheme. Initially, we had expected to submit a proposal to the embassy by June, but we were told that the Ministry of Foreign Affairs had already been informed with the materials we submitted at the end of last year and that there was no need to submit another proposal.
	Meeting with DPI	5/11(Thu)	The contents and schedule of this year's implementation were explained to DPI, which basically agreed, and DPI requested a letter from Shiga Prefecture stating that it will continue to conduct City-to-City Collaboration projects this year, and offered advice on how to proceed with each project.
	Meeting with Ha Long Bay Authority	6/5(Mon)	The progress of the Grant Aid （The Economic and Social Development Programme） scheme was explained and future actions were discussed. The Ha Long Bay Authority's preference was to place the highest priority on the installation of johkasos, while only one large-size and one medium-size garbage collection ship (the introduction of both johkasos and garbage collection ships was proposed in the non-project free-of-charge

			scheme) would be acceptable.
	Meeting with DOST	6/5(Mon.)	In the DOST-led pilot project, the Japanese side was to communicate the various aspects of the small-scale facilities, the required amount of resources to be used, and the operation process, after which DOST would search for a suitable site and then visit the site with Japanese engineers to exchange information and hold discussions for the promotion of the project.
	Johkaso Stakeholders Meeting (online)	6/13(Tue)	Information on the progress of proposals to the Grant Aid （The Economic and Social Development Programme ） scheme was shared with johkaso stakeholders, and activity measures for maintenance (soft measures), which is a prerequisite for the introduction of johkasos and other hardware, were discussed.
	Meeting with Embassy of Japan in Vietnam regarding Grant Aid （The Economic and Social Development Programme） (online)	6/15(Thu)	A meeting was held to discuss the results of the Grant Aid （The Economic and Social Development Programme） scheme proposal. As a result of JICA/Embassy's discussion, the project was registered as a project for FY2025 or later (the best project was registered as a project for FY2024). As for the details of the project, the proposal was complex (johkaso + garbage collection ship) and would be better suited for JICA grant assistance.
	Meeting with Kansai Electric Power Company (online)	7/5(Wed)	*Details are not disclosed as they are currently under investigation and negotiation.*
2	Kick-off meeting		
	Kick-off meeting with the Ministry of the	7/7(Fri)	Kick-off meeting was held with the Ministry of Environment.

	Environment (online)		
3	Meetings, coordination, etc. by JNK		
	Proposal of sludge effective utilization project to DPI	7/7(Fri)	On 6/22, DOST informed us that "the sludge effective utilization project has not been reported to the People's Committee and will be temporarily shelved." After consulting with DPI, the contact point, we were told that DPI would coordinate the project (including reporting to the People's Committee) and that if the Japanese side proposed the project they had in mind, DOST would agree and report back to the People's Committee. With the cooperation of all parties involved, a project proposal for the effective use of sludge was submitted. As a result, the DPI that received the proposal did not fully understand the contents, and the DOST was not informed.
	Meeting with JICA Vietnam office regarding introduction of johkasos, etc. using Grant Aid （The Economic and Social Development Programme） scheme (online)	7/14(Fri)	In response to a proposal to introduce johkasos and garbage collection ships under the Grant Aid （The Economic and Social Development Programme ） scheme, we received guidance from the Embassy of Japan in Vietnam that we should consider introducing them under JICA's grant assistance, and held a meeting with the JICA Vietnam Office. In conclusion, it was decided to proceed with the application for johkasos under the Grant Aid （The Economic and Social Development Programme） scheme and for ships under the JICA grant scheme.
	Report meeting on the results of the johkaso maintenance and management system construction	7/19(Wed)	Mr. Fujimura, JICA expert, shared with JICA Vietnam Office, JICA experts, Ministry of Environment, and parties involved in city-to city collaboration project the draft of the Quang Ninh Province Johkaso Ordinance as a maintenance management system that is a prerequisite for introducing johkasos, and discussed how to proceed with the project.

	survey (online)		
	Opinion exchange meeting for johkaso related parties regarding johkaso system development (online)	8/1 (Tue)	A meeting was held with johkaso-related parties to discuss the future development of the johkaso system. The previous day we received a report that there has been a change in the upper management of the Quang Ninh Provincial People's Committee and that the new vice chairman in charge of green growth has changed his mind: "We will not implement the johkaso project." The day before, we received a report that the new deputy commissioner in charge of green growth had changed his policy, saying that the johkaso project would not be implemented. JICA expert Fujimura consulted with DPI and was advised that we might be able to break the deadlock if we called representatives of inland prefectures and districts, etc., and asked them to raise needs and proposals for johkaso projects. Based on the above advice, it was decided to introduce and explain the benefits of johkasos and the necessity of the johkaso system (maintenance and management regulations, etc.) to representatives of inland prefectures and districts, etc. in September.
	Conference on the promotion and introduction of johkasos in Quang Ninh Province	9/8 (Fri)	A meeting was held for three representatives of the bureaus and provincial people's committees related to wastewater treatment in Quang Ninh Province regarding the introduction of johkasos and other related issues. The need to introduce johkasos to rural areas was explained, and a draft decentralized wastewater treatment ordinance and johkaso maintenance and management regulations, prepared mainly by JICA expert Fujimura, were proposed.
3	First field survey		
	Meeting with DPI	9/26(Tue)	We confirmed with DPI the date and time of this week's meeting and recounted the details

			of the meeting. DPI also advised us to prepare for meetings with the Economic Area Management Bureau (EAMB) and the Department of Industry and Trade (DOIT) regarding information on companies in the province, as well as with the Ha Long Bay Management Office. We were also informed that the People's Committee's policy regarding the introduction of johkasos is to apply for 28 johkasos (10 in Ha Long Bay and 18 in inland provincial cities) for the Grant Aid （The Economic and Social Development Programme）scheme.
	Meeting with DONRE	9/27(Wed)	Quang Ninh Province has completed a greenhouse gas inventory, and a draft plan including measures to be taken will be completed this December and approved after a seminar to hear opinions in January. The following three requests for cooperation were made to Shiga Prefecture. (1) Advice on measures to be taken based on the inventory, (2) Opinions on the first draft of the countermeasures plan, and (3) Participation in a meeting to exchange opinions with engineers from various fields when the draft plan is prepared.
	Meeting with EAMB	9/28(Thu)	The following three methods of providing and obtaining information for matching with companies in industrial parks in Quang Ninh Province were proposed: (1) a centralized explanation method (companies in Quang Ninh Province are gathered in one place for an explanation meeting), (2) an explanation method for each industrial park (an explanation meeting is held at each industrial park), and (3) a questionnaire method for Japanese proposals. The committee recommended (2) the method of explaining to each industrial park. The committee also assured us that it would update the list of companies in the industrial parks and provide additional advice, which was provided in the

			previous fiscal year.
	Meeting with DOIT	9/28(Thu)	We had a meeting regarding matching with companies outside of industrial parks in Quang Ninh Province. The opinion was that the distribution of questionnaires did not collect valid responses from companies and that sufficient information could not be collected. It was the opinion that distributing a questionnaire would not collect valid responses from companies and would not gather enough information; if a seminar were to be held for companies under the jurisdiction of the EAMB, it would be possible to include interested companies among those under the jurisdiction of DOIT.
	Exhibit and display at technology event (Techconnect and Innovation Vietnam 2023)	9/29(Fri)~9/30(Sat)	The company exhibited at a technical event co-sponsored by the Vietnamese Ministry of Science and Technology and Quang Ninh Province DOST. Materials on Kawasaki Thermal Engineering Co., Ltd.'s waste heat utilization chiller and models and materials on high-efficiency boilers were displayed and distributed. Pamphlets and explanatory materials on the JCM scheme were also distributed (to about 200 people), and Kawasaki Thermal Engineering Co., Ltd. representatives conducted a question-and-answer session with visitors.
	Meeting with DOST regarding effective use of sludge	10/5(Thu)	The proposal for effective sludge utilization was explained directly to DOST. The director and deputy director were not present, and the reaction of the section heads and below to the proposal was not very positive. After the meeting, before the Director and Deputy Director made a negative decision, we approached to make a re-proposal based on the comments and opinions of the attendees (10/10).
4	Coordination from Japan, meetings by JNK, etc.		

	Interim report meeting to the Ministry of the Environment	10/12(Thu)	As an interim report to the Ministry of the Environment, we reported on the progress of the work from the pre-contract period to just prior to the contract.
	Coordination of presentations at COP28	10/12(Thu) ~	The Ministry of the Environment requested us to make a presentation at COP28, and we coordinated the participants and prepared a draft of the presentation.
	Meeting with Embassy of Japan in Vietnam and JICA Vietnam office regarding Grant Aid （The Economic and Social Development Programme） scheme	10/17(Tue)	All Japanese parties gathered to discuss future policy on the proposed introduction of johkasos and garbage collection ships under the Grant Aid （The Economic and Social Development Programme） scheme. As a result, it was decided to formally split the application into johkasos (Grant Aid （The Economic and Social Development Programme） scheme) and ships (JICA grant assistance) and reapply.
	Coordination on support for institution building related to decarbonization	10/24(Tue)	In response to DONRE's request for Shiga Prefecture's input in developing a plan for decarbonization, we coordinated with the CO2 Net Zero Promotion Division of Shiga Prefecture's General Planning Department to exchange views with DONRE.
	Identification of Japanese companies with decarbonization technologies	10/25(Wed)	In order to discover a Japanese company that possesses decarbonization technology, we visited MOKUBEI Shipyard Co. It is not clear whether the technology owned by Mokubei Shipyard can be used in the City-to-City Collaboration project between Quang Ninh Province and Shiga Prefecture, but the company seemed to be a strong candidate for the future.
	Discussions with EAMB and others regarding the installation of a chiller/boiler using waste	Appropriately	In October, the items promised at the September 28 meeting were materialized and communicated to the EAMB, and during the month, we persistently used various means to make progress on the plan with the Bureau and other relevant bureaus. As a result, 68 companies (44 industrial park

	heat		companies and 24 Mongkai Border SEZ companies) finally expressed their willingness to participate in the information session.
	Meeting with UNESCO Hanoi office regarding Grant Aid （The Economic and Social Development Programme） scheme	10/31(Tue)	We visited the UNESCO Hanoi office to discuss the early introduction of johkasos and garbage collection ships, which was an issue discussed at the meeting on October 17. After a detailed explanation of the proposal and the status of the application, UNESCO agreed to cooperate fully in publicizing the application to the relevant government agencies in Japan and Vietnam, as the application is in line with the direction of the agency's support for the Ha Long Bay World Heritage Area.
	Coordination on support for institution building related to decarbonization	11/13 (Mon)	Quang Ninh Province DONRE requested Shiga Prefecture to participate as an advisor in a meeting between DONRE and a consultant who is preparing a plan on decarbonization (the meeting was not held in November but on 1/2 of the following year), and we coordinated the form of participation and response. Note that the meeting with the consultants was not held during November.
5	Second field survey		
	Discussions with EAMB and others regarding the installation of a chiller/boiler using waste heat	11/21(Tue)	With the cooperation of DOIT, we were introduced to two companies in the province under the bureau's jurisdiction that were interested in this technology, and with the bureau's mediation, we arranged interviews with them during the field survey period but were unsuccessful. (The interview is scheduled to be conducted in March after the Vietnamese New Year (Tet) in February.)
	Meeting with EAMB on effective use of sludge	11/23(Thu)	With DOST's decision to pull out of the sludge utilization project, we decided to change course and focus our efforts on finding companies in the province that would be interested in the effective utilization of sludge and food waste. A meeting was held with the EAMB, which

			has jurisdiction over the companies and factories in the industrial park, to request referrals. The EAMB had a very positive impression of the project and was willing to assist with company matching. It was decided that if the number of possible companies is small, we will visit them directly on an individual basis, and if the number is large, we will discuss the possibility of holding an explanatory meeting.
6	Meetings, coordination, etc. by JNK		
	Meeting with Embassy of Japan in Vietnam and JICA office regarding introduction of johkasos (Grant Aid （The Economic and Social Development Programme） scheme)	11/30(Thu)	In anticipation of JICA expert Fujimura's return to Japan in December, we discussed with JICA how to proceed with City-to-City Collaboration projects in Quang Ninh Province. The committee also discussed the details of a meeting scheduled for mid-December with the Vice Chair for Green Growth. Confirmed that the completion inspection of the johkaso installed on Dau Go Island under the Grant Assistance for Grass-Roots Human Security Projects Scheme will be conducted on 12/6 (to be handled by the Embassy and JICA).
	Discussions with EAMB and others regarding the installation of a chiller/boiler using waste heat	Appropriately	In October, the items promised at the September 28 meeting were materialized and communicated to the EAMB, and in November, efforts were continued to develop an implementation plan for the Bureau and other relevant bureaus. As a result, we were finally able to initiate an official letter of intent survey of 54 companies confirming their intention to participate in the briefing (response deadline 1/15).
	Presentation at COP28	12/6(Wed)	Shiga Prefecture officials and Quang Ninh Province officials presented at COP28 on behalf of their respective municipalities.
	Meeting with Quang Ninh Province PPC and JICA office	12/12(Tue)	Prior to the return of Expert Fujimura on December 20, a final briefing was held for the Quang Ninh Provincial People's Committee (Vice Chairman for Green Growth) on the

regarding introduction of johkasos (Grant Aid （The Economic and Social Development Programme） scheme)		results of his 2.5 years in Quang Ninh Province. The City-to-City Collaboration /Shiga team has confirmed that it will support the introduction of johkasos on tourist islands in Ha Long Bay under a Grant Aid （The Economic and Social Development Programme） scheme in the future. It was confirmed that Mr. Fujimura's successor is scheduled to arrive in 1.5 years and that JICA will act as coordinator in the interim.
Coordination on support for institution building related to decarbonization	12/27 (Wed)	Upon receiving notification that a consultation meeting on the "Draft Report on Greenhouse Gas Inventory and Proposed Reduction Measures and Their Effectiveness" in Quang Ninh Province will be held on 1/2, the team worked on reading materials for participation on the day of the meeting.
Support for building institutions for decarbonization	1/2 (Tue)	Consultation meeting on "Draft Report on Greenhouse Gas Inventory and Proposed Reduction Measures and Their Effectiveness" in Quang Ninh Province was held. Since DONRE requested input on the draft plan from Shiga Prefecture, which is preparing and developing a plan on Net Zero, the draft plan was given to Shiga Prefecture, which is in the process of listening to the input.
Coordination of the installation of chillers and boilers using waste heat	1/5(Fri) ~	As a result of a survey conducted with the cooperation of the EAMB on the intentions of companies in the province under the jurisdiction of the Bureau, one company expressed interest, and we have begun coordinating specific dates for interviews (scheduled to be coordinated in March after the Lunar New Year in February).
Coordination of introduction of chiller/boiler using waste heat and effective use of	1/8(Mon) ~	The EAMB introduced 8 candidate companies and factories with high potential for installing chillers and boilers using waste heat or for generating electricity from sludge gas, apart from the intentionality survey.

	sludge		
7	Third field survey		
	Meeting with Ha Long Bay Management Authority regarding johkaso introduction policy	1/15(Mon)	We were informed that the People's Committee was negative about receiving support from the Japanese funding scheme, so we confirmed their intention. We were informed that the Ha Long Bay Management Office was not negative but positive. We reaffirmed our understanding that the johkasos and garbage collection ships, which were planned to be introduced under the Grant Aid （The Economic and Social Development Programme）scheme, would be introduced separately if there were any difficulties in the scheme.
	Discussion of non-project free scheme for johkaso installation	1/16(Tue)	It was confirmed that the Embassy of Japan in Vietnam, JICA Vietnam Office officials, and the Shiga team will work together to confirm the details of Quang Ninh Province's request for the introduction of johkasos (including garbage collection boats) to tourist islands in Ha Long Bay, which is currently registered as a project for FY2025 and beyond.
	Meeting with Cam Pha City regarding the introduction of johkasos	1/17(Wed)	Cam Pha City in Quang Ninh Province is interested in introducing johkasos on its own and has consulted us for assistance. At present, the city is considering two options: (1) introducing the system to ordinary households (targeting the wealthy), and (2) Cam Pha City introducing a decentralized wastewater treatment facility for an area of a certain size, and requested the Japanese side to provide specifications and dispatch engineers.
	Meeting with DOIT regarding effective use of sludge	1/26(Fri)	Proposals for effective use of sludge were made to DOIT, which has jurisdiction over factories and other enterprises, in order to introduce them to companies with the potential to make effective use of sludge and food waste. The committee expressed a negative view of the proposal due to the small cost savings

			relative to the capital investment and the fact that Quang Ninh Province provides guidance that does not allow in-house use of surplus electricity generated by on-site power generation.

3. Decarbonization Initiatives

3.1 Introduction of solar power generation and turbo refrigeration

3.1.1 non-disclosure

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

Figure 2　non-disclosure

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

3.1.2 Gathering Information on Potential New Companies

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

3.2 Installation of a chiller/boiler using waste heat

3.2.1 Explanation to EAMB and DOIT

(1) Background, etc.

In FY2022, a technical seminar and company matching event was planned for February 27, 2023, and about 60 companies were requested to participate through DPI. In the end, 48 companies participated, but only about 10 companies came to pick up materials and 2 companies provided detailed explanations of the contents of the materials.

In FY2023, we decided to focus our contacts on companies with high potential to install Kawasaki Thermal Engineering Co., Ltd.'s products. Specifically, detailed information on facilities (heat source, required heat quantity, timing of introduction, etc.) was collected through the EAMB and DOIT, which are departments with jurisdiction over factories and hotels, etc. After screening, a technical briefing session was held (or individual visits were conducted if there were only a few candidate companies) to provide information, and interviews were set up with companies that showed interest. Those companies that showed interest were invited to a meeting with Kawasaki Thermal Engineering Co., Ltd.

(2) Meeting with EAMB

The EAMB manages industrial parks and special economic zones in Quang Ninh Province.

In FY2023, they also provided us with a list of factories in industrial parks and special economic zones, and assisted us in identifying and reviewing companies and factories that could potentially install Kawasaki Thermal Engineering Co., Ltd.'s waste heat utilization chillers and boilers. This fiscal year, we prepared more specific company matching opportunities for the formation of JCM projects.

(i) September 28, 2023

- A survey of companies and factories in the province under the jurisdiction of the EAMB was conducted to determine their willingness to participate in a technical briefing by Kawasaki Thermal Engineering Co., Ltd., and based on the results of the survey, a decision was made on how to hold the meeting.
- The EAMB is to update the list of companies and factories provided last year and provide advice on the feasibility of implementation.

(ii) October and November 2023 (as appropriate)

- The EAMB conducted a selection process of companies and factories that might be willing to participate in the technical briefing and selected 68 companies (44

industrial park companies and 24 companies from the Mongkai Border SEZ).
() The number was eventually narrowed down to 54 companies.

・The Japanese side prepared the following documents at the request of the EAMB.

- Request for Cooperation in Investigation" addressed to DPI and EAMB
- Request for Participation in Information Sessions" to companies and factories (see Fig. 3; EAMB will prepare a separate announcement letter)

(iii) December 12, 2023

・The Japanese side handed over a formal written request to the EAMB (including its counterpart DPI).

December 2023 Date

Dear Businesses in Quang Ninh Province

Kawasaki Thermal Engineering Co.
KANSO TECHNOS Co.
JNK Environmental Research & Consulting Co.

Request for Participation in Briefing Session on Kawasaki Thermal Engineering Products

Together with Shiga Prefecture in Japan, we are implementing a project to promote decarbonization in Quang Ninh Province. We would like to introduce Kawasaki Thermal Engineering's boilers and chillers to companies in Quang Ninh Province as a promising technology and product to promote decarbonization through energy conservation.
Kawasaki Thermal Engineering's products are highly energy-efficient, so fuel costs are greatly reduced, which is sure to be a big plus for the management of each company.
We also introduce a scheme (JCM scheme) that enables a significant reduction (up to 30-40%) in the cost of equipment (initial investment), although various conditions and procedures are required.
Therefore, we plan to hold explanatory meetings for this product in each industrial park and economic zone in November or later. We invite companies that are constructing new factories, updating equipment, considering reducing fuel costs, and other companies to come to the information sessions at the industrial park or economic zone nearest you.
If your company is interested in participating in the briefing, please contact us at the address below with your company name, address (name of the industrial park where you are located), contact person, and contact information (phone and e-mail) so that we can assist in setting the location and date of the briefing.

Contact: Quang Ninh Province Economic Area Management Department
Ms. Duong (hd.nguyen155@gmail.com)
JNK ENVIRONMENTAL RESEARCH & CONSULTING CO., LTD.
Ngoc (hd.nguyen155@gmail.com), Van (vanntb@jnk-vn.com)

◆Scheduled briefing sessions
1. briefing dates and times:
2. location of the briefing session: Conference room at each industrial park
3. Implementation details: ① Introduction of Kawasaki Thermal Engineering products, ②Introduction of JCM scheme, ③Individual consultation
*Expected to last approximately 2 hours.
*The attached materials will be explained in more detail on the day of the event.
*After tabulating the results of this intention confirmation, the date, time, and location will be decided.
◆Attachments: ①Introduction of Kawasaki Thermal Engineering's products
②Introduction of JCM Scheme

Figure 3: Request for participation in a briefing session on Kawasaki Thermal Engineering Co., Ltd. products (Japanese version)

Boiler lineup

	Water tube	Fire tube	Small once-through	Large once-through
Visual image				
Max.working pressure (MPa)	0.98～3.82	0.98～1.56	0.98～1.56	0.98～3.2
Actual steam output (kg/h)	4,000～20,000	1,000～12,000	629～1,677	2,516～5,031
Max. Boiler efficiency (Gas fired @FW 15℃)	91% (without economizer)	89% (without economizer)	98% (with economizer)	98～99% (with economizer)

No.1 Efficiency in general boiler !

Kawasaki Powering your potential

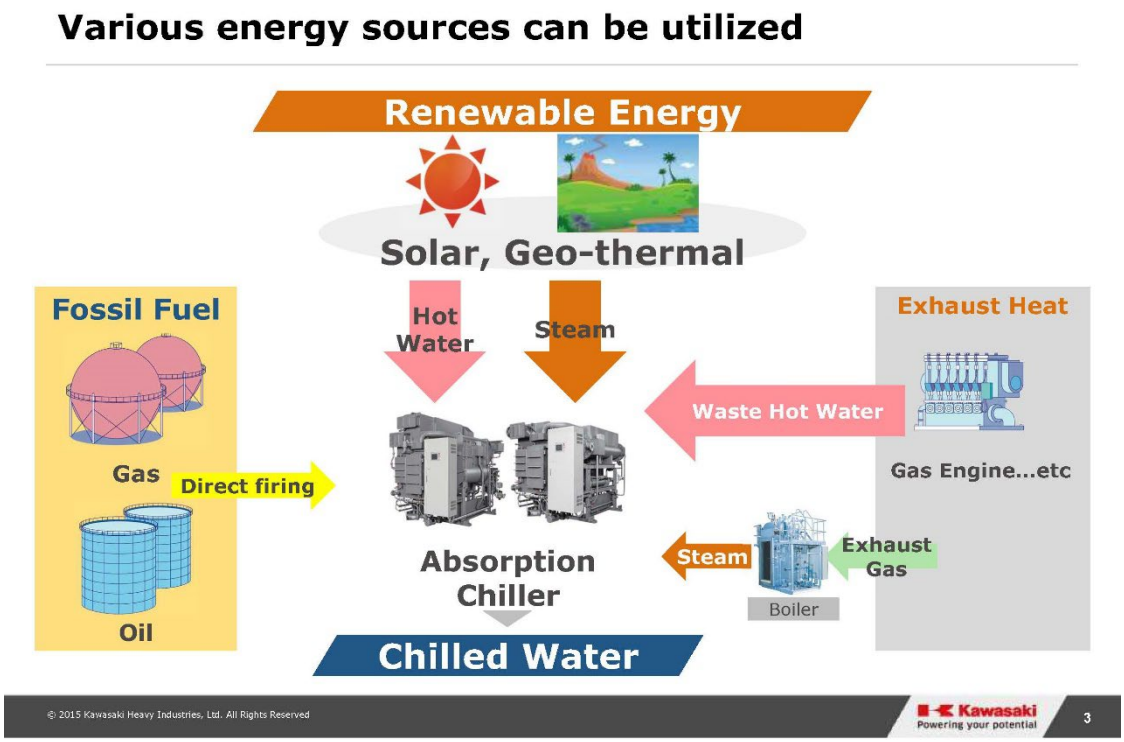
Comparison of Boiler Type

		Water Tube	Fire tube	Once-through (KF Series)	Once-through (IF Series)
Actual Evaporation	t/h	5	5	1.68×3	5
Weight	**ton**	**12**	**11.5**	**2.4×3=7.2**	**7.8**
Control	Combustion	Continuous		Intermittent (3 positions)	Continuous
	Water Feeding	Continuous		Intermittent (2 positions)	Continuous
Heating Surface Area(m^2)		1,174	693	106×3=318	317
Max. Boiler Efficiency (%)		**91**	**89**	**98**	**98～99**
Dimension (m^2)		**25**	**12.6**	**2.5×3=7.5**	**7.3**
Retained Water Volume (L/t)		**3,000**	**6,000**	**275×3 =825**	**990**

Note) 1) The boiler efficiency is indicated on the steam pressure of 0.49Mpa, the feed water temperature of 15 deg C and the room temperature of 35 deg C. The boiler efficiency shall have +/-3% allowance in concideration of the mesurement tolerance.
2) Boiler efficiency for water tube and fire tube is based on without economizer

Kawasaki Powering your potential

Fig. 4: Overview of Kawasaki Thermal Engineering Co., Ltd. products (attachment to Fig. 3, English version) Part 1



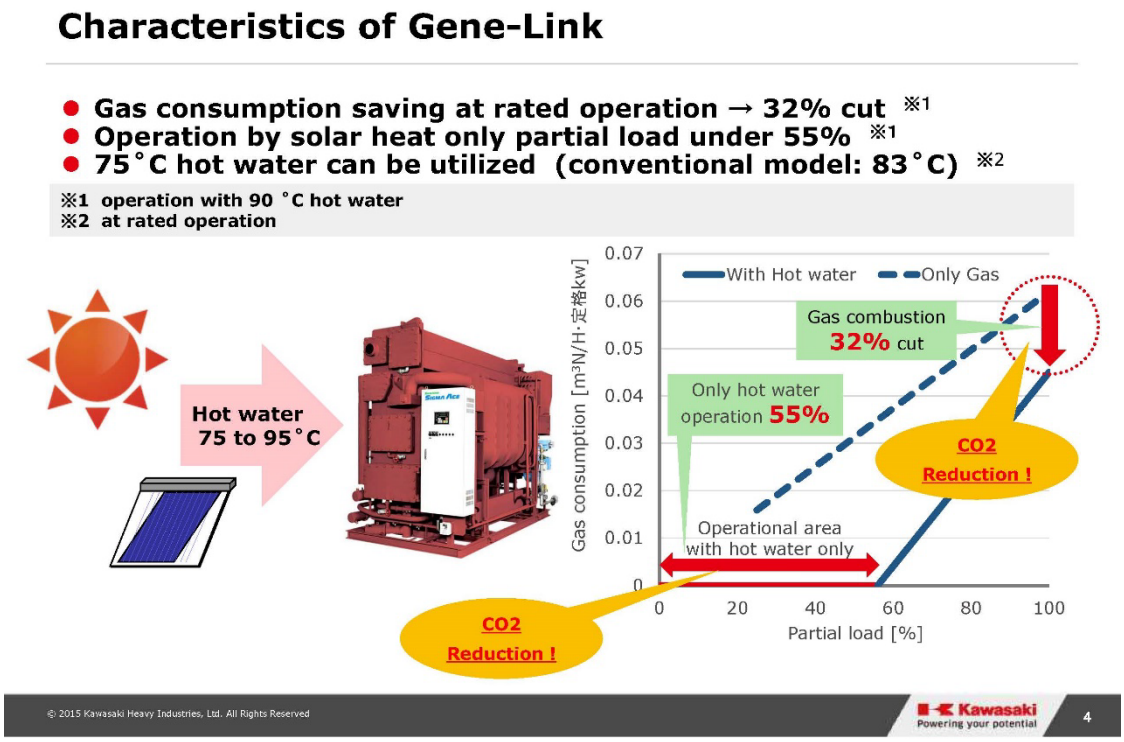
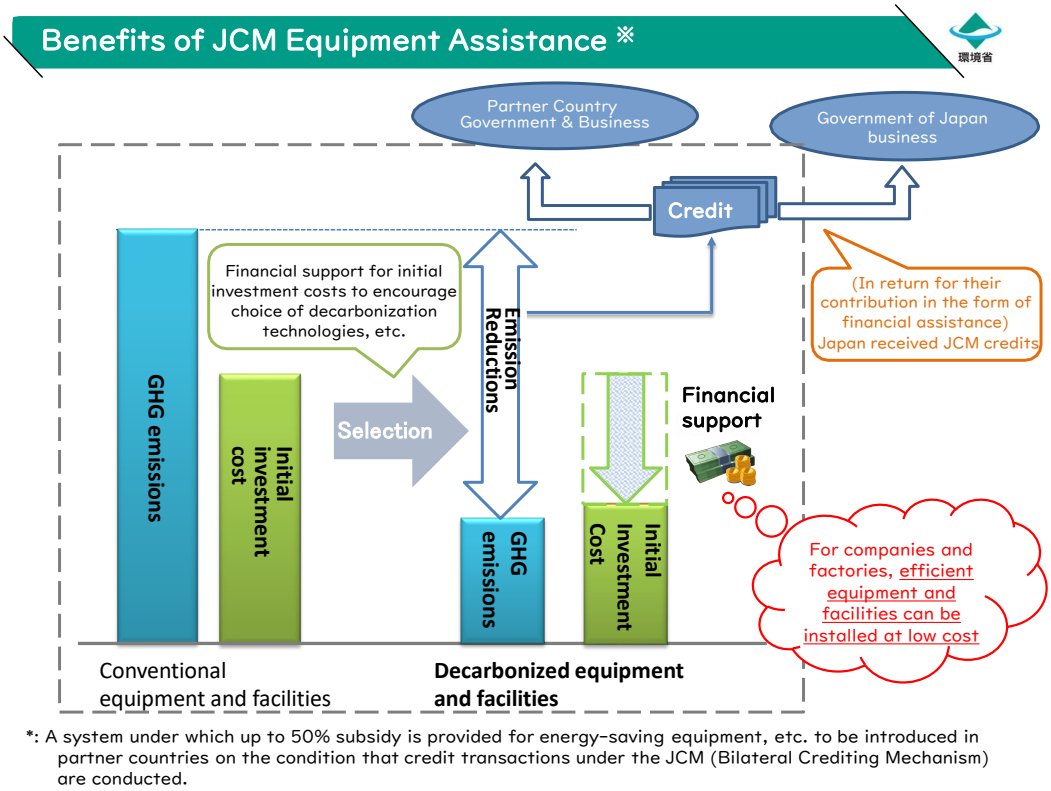


Fig. 5 Summary of Kawasaki Thermal Engineering Co., Ltd. products (attachment to Fig. 3, English version) Part 2



*: A system under which up to 50% subsidy is provided for energy-saving equipment, etc. to be introduced in partner countries on the condition that credit transactions under the JCM (Bilateral Crediting Mechanism) are conducted.

Conditions for JCM equipment subsidies by Japan's Ministry of the Environment

環境省

Description of assistance	Details
Subsidy rate	It is determined by the number of JCM projects using the same technology in Vietnam. – 0 cases: 50%. – 1-3 cases: 40%. – 4 or more: 30%.
Subject to subsidy	Projects that install facilities and equipment to reduce CO_2 emissions (including construction, equipment, and administrative costs)
Terms and Conditions of Assistance	**Details**
Formation of an international consortium	Composed of Japanese private companies, etc. and local companies, etc. (The Japanese organization is the grantee.)
Completion Date	Construction must be completed within three years of the decision to subsidize.
Decarbonation effect	– Cost-effectiveness: 4,000 yen/t-CO_2 or less – Need to measure, report and verify decarbonization effects

Figure 6 Overview of the JCM subsidy scheme in Japan Introductory material (attached to Figure 3, Japanese version)

(iv) January 5, 2024

・With the cooperation of the EAMB, a survey was conducted of companies and factories in the province under the jurisdiction of the EAMB to determine their willingness to participate in a presentation of Kawasaki Refrigeration Industries products, and the following one company expressed interest in the event.

1	Company Name	Thanh Cong Viet Hung Technology Complex Industrial Park Joint Stock Company
	Address	Viet Hung Industrial Park, Ha Long City, Quang Ninh Province
	Business Overview	Manufacture of automobiles and other motor vehicles

(v) January 8, 2024

・Due to the poor results of the intention survey, the EAMB introduced the following eight companies/factories that were considered likely to install waste heat utilization chillers/boilers so that Kawasaki Reinetsu Kogyo could meet with more companies/factories.

1	Company Name	Texhong Vietnam Industrial Park Company Limited
	Address	Tek Hong Hai Ha Industrial Park, Hai Ha City, Quang Ninh Province
	Business Overview	Construction of industrial parks, technical infrastructure investment and services
2	Company Name	Bac Giang Vietnam Textile and Garment Company Limited
	Address	Texhon Haiha Industrial Park, sites 10.10, 10.11, 10.12
	Business Overview	Dyeing and Textile Mills
3	Company Name	Tien Phong Industrial Park Joint Stock Company
	Address	Hong Gai Town, Ha Long City, Quang Ninh Province
	Business Overview	Construction of industrial parks, technical infrastructure investment and services
4	Company Name	Bac Tien Phong Industrial Park Joint Stock Company
	Address	Hong Gai Town, Ha Long City, Quang Ninh Province
	Business Overview	Development of a seaport and industrial park complex in Quang Ninh Province
5	Company Name	Amata Ha Long Urban Joint Stock Company

	Address	Son Quai District, Quang Yen City, Quang Ninh Province
	Business Overview	Amata City Ha Long Industrial Park construction project, infrastructure projects
6	Company Name	JINKO SOLAR Industrial Co.
	Address	Son Quai District, Quang Yen City, Quang Ninh Province
	Business Overview	Business project to supply photovoltaic equipment
7	Company Name	Viglacera Van Hai Joint Stock Company
	Address	Qua Rang Island, Bandung District, Quang Ninh Province
	Business Overview	Agnsana Quan Lạn Hạ Long Việt Nam Hotel&Resort
8	Company Name	Eastern Waste Treatment Joint Stock Company
	Address	Ha Long City, Quang Ninh Province
	Business Overview	Solid waste treatment plant in Moncay

(3) Meeting with DOIT

DOIT manages enterprises and factories in Quang Ninh Province outside of the industrial parks and special economic zones under the jurisdiction of EAMB, and we thought that if we could match enterprises with the cooperation of the two departments, DOIT and EAMB, we could cover all enterprises and factories in the province, and we proceeded with discussions with DOIT in conjunction with our discussions with EAMB.

(i) September 28, 2023

・Since EAMB was willing to cooperate in holding a technical briefing session on Kawasaki Thermal Engineering Co., Ltd. products, we informed DOIT that we would work with EAMB to hold the briefing session and asked for their cooperation in this matter. As a result, DOIT responded that they would cooperate in holding a technical briefing session.

(ii) November 15, 2023

・DPI issued an official letter to EAMB and DOIT requesting Shiga Prefecture's cooperation in this matter.

(iii) November 21, 2023

- In response to a request from DPI on November 15, DOIT introduced us to the following two companies willing to participate in a briefing session (individual visit) on Kawasaki Refrigeration Products.
- During the second field survey conducted in November, we asked DOIT to coordinate interviews with two companies, but due to conflicts between the two parties' schedules, we had to reschedule after the Tet (Lunar New Year) vacation.

1	Company Name	Environment One Member LLC - TKV
	Address	Cam Pha City, Quang Ninh Province
	Business Overview	Mining, processing and sales of coal and various ores
2	Company Name	Cam Thinh Industrial Joint Stock Company
	Address	Cam Pha City, Quang Ninh Province
	Business Overview	Infrastructure investment development in Kam Tinh Industrial Park

(4) Future actions

As a result of this year's efforts, EAMB and DOIT introduced a total of 11 candidate companies and factories with high potential for introduction. After the Tet (Vietnamese New Year) vacation, we plan to provide information and conduct interviews with each company. After that, interviews with Kawasaki Thermal Engineering Co., Ltd. will be scheduled with the companies and factories that have expressed interest.

3.2.2 Exhibiting at Techconnect and Innovation Vietnam 2023 in Quang Ninh Province

(1) Background

- At a meeting with Quang Ninh Province DOST in December 2022, we were informed that a science and technology exhibition will be held in the second half of FY2023 jointly with the Ministry of Science and Technology as a project to commemorate the 60th anniversary of the establishment of Quang Ninh Province.
- The Japanese participants believe that introducing waste heat chillers and boilers to companies and government officials at this exhibition in Quang Ninh Province will lead to business matching not only with companies in Quang Ninh Province but also with those in Vietnam, and to the discovery of JCM projects. We have requested detailed information from DOST of Quang Ninh Province as needed to make the most of this exhibition as a venue for technology introduction.
- On the other hand, JNK (a local subsidiary based in Hanoi), a subsidiary of KANSO TECHNOS CO., LTD. was looking for a partner to collaborate with the central government with the aim of having environmental technologies of Shiga Prefecture companies developed in Vietnam. As a result, on August 10, 2023, the Institute for Regional Development, Ministry of Science and Technology (hereinafter referred to as IRRD) (hereinafter referred to as "IRRD"), and the two parties signed an MOU on technological cooperation.
- JNK explained to IRRD about the project of city to city collaboration between Quang Ninh Province and Shiga Prefecture, the scheme of JCM, and Kawasaki Thermal Engineering Co., Ltd.'s waste heat utilization chiller/boiler, which we aim to introduce as a key technology for JCM. JNK requested IRRD's cooperation and support for the project in Quang Ninh Province, and the two companies reached an agreement.

Photo 1: Scene of the ceremony for signing the MOU for technical cooperation collaboration between IRRD and JNK

- With the signing of this MOU, we were invited to participate in a technology exhibition (Techconnect and Innovation Vietnam 2023) held in Quang Ninh Province on September 29-30, 2023, by the Ministry of Science and Technology, not by Quang Ninh Province. The company was invited to participate in the exhibition.

(2) Report on participation in technical exhibitions

(ⅰ) Outline of the event

Date: Friday, September 29 - Saturday, September 30, 2023
Venue: Exhibition of Planning and Expo Center, Quang Ninh Province
Trần Quốc Nghiễn, Tuần Châu, Thành phố Hạ Long, Quảng Ninh, Viet Nam
Organized by: Ministry of Science and Technology (MOST), Quang Ninh Provincial People's Committee

Photo 2: Joint exhibition booth of Deputy Prime Minister Quang and Kawasaki Thermal Engineering Co., Ltd. and JNK

(ⅱ) Details of the event (from publicity materials of Quang Ninh Province and the Ministry of Science and Technology)

- The event, themed "Innovation - Sustainable Development," began with an opening ceremony followed by seminars on policy consulting, technology, intellectual property, quality metrics, finance, technology matching, collaborative innovation for businesses, and in-depth workshops on innovation.

- In the exhibition zone, 460 technologies, technical products, machinery and equipment were exhibited by ①Hgh-tech companies, ②AI companies, ③Rsearch institutes and universities, ④Freign technology companies wishing to transfer technology to Vietnam, ⑤Quang Ninh Province companies, and ⑥90 units (research institutes, universities, companies, organizations, domestic and foreign companies) engaged in technology innovation activities. The exhibition was held in Quang Ninh Province, Vietnam.
- At Techconnect and Innovation Vietnam 2023, 16 MOUs and technology transfer cooperation agreements were signed, 460 technologies were introduced from 90 units (two Japanese companies, Kawasaki Thermal Engineering Co., Ltd. and JNK, participated), and 46 new technologies with potential applications in the fields of new materials technology, renewable energy technology, and health technology. Forty-six new technologies with potential applications in the fields of new materials, renewable energy, and health technologies were introduced.
- Reporting at the closing ceremony, Nguyen Mai Duong, Director of the Department of Technology and Applied Development, said that after two days, the event provided organizations and businesses with a lot of information on policies, technology, technology trends, cooperation, and investment opportunities.
- The event received 375 technology needs from companies and organizations. 46 new technologies with potential applications were presented by Vinfuture's network of experts, scientists participating in joint research projects of the Horizon Europe network, Eureka, and foreign Vietnamese science and technology representatives and others. In particular, during the event, 40 business matching opportunities between units, organizations and enterprises were offered and 16 proceedings and cooperation agreements on technology transfer and innovation between units, organizations and enterprises were awarded.
- In particular, more than 100 articles and newsletters were published on the activities within the framework of the event by more than 30 press and media outlets from the central to the provincial level, approximately 7,000 visitors who directly participated in the activities of the event, 500,000 visits to the official website of the event from August 2023 to the present, 500,000 access, and broadcast on national TV channel VTV1 and Quang Ninh Province TV before and during the event, thereby widely informing the public nationwide.
- Techconnect and Innovation Vietnam 2023 activities contribute to the promotion of technology application, transfer, and innovation in local businesses and organizations, and to the implementation of government resolutions on the transformation from a model of socio-economic development dependent on natural resources to a knowledge economy, green economy, and low carbon circular economy. The project has contributed to the implementation of government resolutions on the transformation from a model of socio-economic development dependent on natural resources to a knowledge economy, green economy and low-carbon circular economy. The recognition of enterprises as the

center of the national innovation system, a place where the results of scientific and technological activities can be rapidly applied for rapid and sustainable development, and where innovation practices bring added value and contribute to promoting economic growth, trade, and investment, especially in Quang Ninh Province, and the country as a whole.

- At the closing ceremony, Deputy Minister of Science and Technology Bui Za Duy said that there are still many difficulties in the application, transfer, and innovation activities of technology, and that much time and resources are needed. The Vice-Minister said that the event should be more practical, with more consulting, etc.; to expand connections and share lessons learned from successes; to strongly communicate and promote the importance of innovation to businesses and people, especially in today's digital transformation context; and to ensure that this activity brings practical results, especially in the expressed the hope that it will contribute to the socio-economic development process of the region and the country as a whole.

Photo 3: Director General of the Department of Technology and Applied Development of the Ministry of Science and Technology, Duong Province, greeting at the event; Photo taken on November 9, 2023 when KANSO President and JNK Director ourtesy visit to Director General Duong.

Figure 7 : Layout of the exhibition hall and location of the joint exhibition booth of Kawasaki Thermal Engineering Co., Ltd. and JNK

（iii） Exhibit Outline

- JNK, and KANSO TECHNOS CO., LTD. were on site during the event to introduce their technologies to visitors (see Table 2).

Table 2: Overview of technologies exhibited on the day

name of company	Technology	Exhibits and Handouts
Kawasaki Thermal Engineering Co., Ltd.	Biler	• Model (IF-6000CGE) (on display) • WF boiler (99% efficiency) introduction poster (A0 version, on display) [English version • IF boiler (99% efficiency) introduction poster (A0 version, on display) [English version • Technical introduction catalog (200 copies) [English version
	Ciller	• Technical introduction catalog (200 copies) [English version
	Chiller (hot water use)	• Technical introduction catalog (200 copies) [English version
	Hydrogen-fired boilers	• Technology Introduction Poster (A0 size, display)*2 [English version • Technical introduction catalog (200 copies) [English version
Vioce Co.,Ltd	Small Methane Gas Power Plant	• Power Point materials (200 copies) [Béléguage version].
Clean Tech Japan	Extracting rare metals from e-waste + CTJ's proprietary technology using a TiO2 catalyst decomposes organic matter into water and CO_2 and recovers only inorganic matter.	• Technology Introduction Poster (A0 version, display) [English version • Power Point materials (200 copies) [English version • Q&A material on technology (200 copies) [bae language version].
JNK (KANSO)	JCM system	• Outline of the JCM system, conditions for utilizing the system, etc. (200 copies) [Bilingual version].
	Explanation of Quang Ninh Province-Shiga Prefecture City-to-City Collaboration project and benefits of introducing Kawasaki Thermal Engineering Co., Ltd. 's technology	• Power Point document (shown on a loop on a TV monitor) [Bilingual version].
	Decentralized wastewater treatment facilities in Japan (johkaso)	• Pump prepared by the Ministry of the Environment "Characteristics of Johkasos" (200 copies) [bae language version]. • Pamphlet prepared by Ministry of the Environment "Appropriate Treatment of Domestic Wastewater" (200 copies) [Bilingual version].

Photo 4: Kawasaki Thermal Engineering Co., Ltd. and JNK joint exhibition booth (overall)

Photo 5: Product explanation by Kawasaki Thermal Engineering Co., Ltd.

Photo 6: Event participants

3.3 Introduction of Johkasos

In introducing johkasos, the study proceeded according to the policy shown in Figure 8, based on the recognition that the wastewater treatment business is not a profitable one and that it is necessary to obtain public funds (funds) because the business does not develop on a business basis in Japan, where the introduction of johkasos is promoted through a subsidy system and other means.

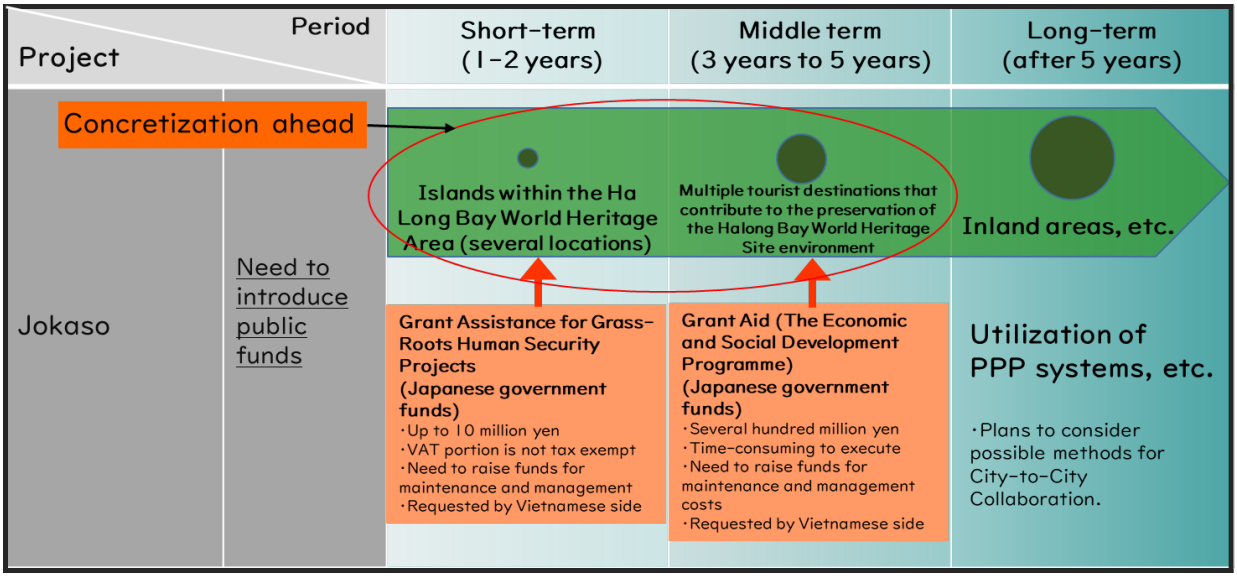


Figure 8: Policies for promoting johkasos envisioned in the City-to-City Collaboration Project

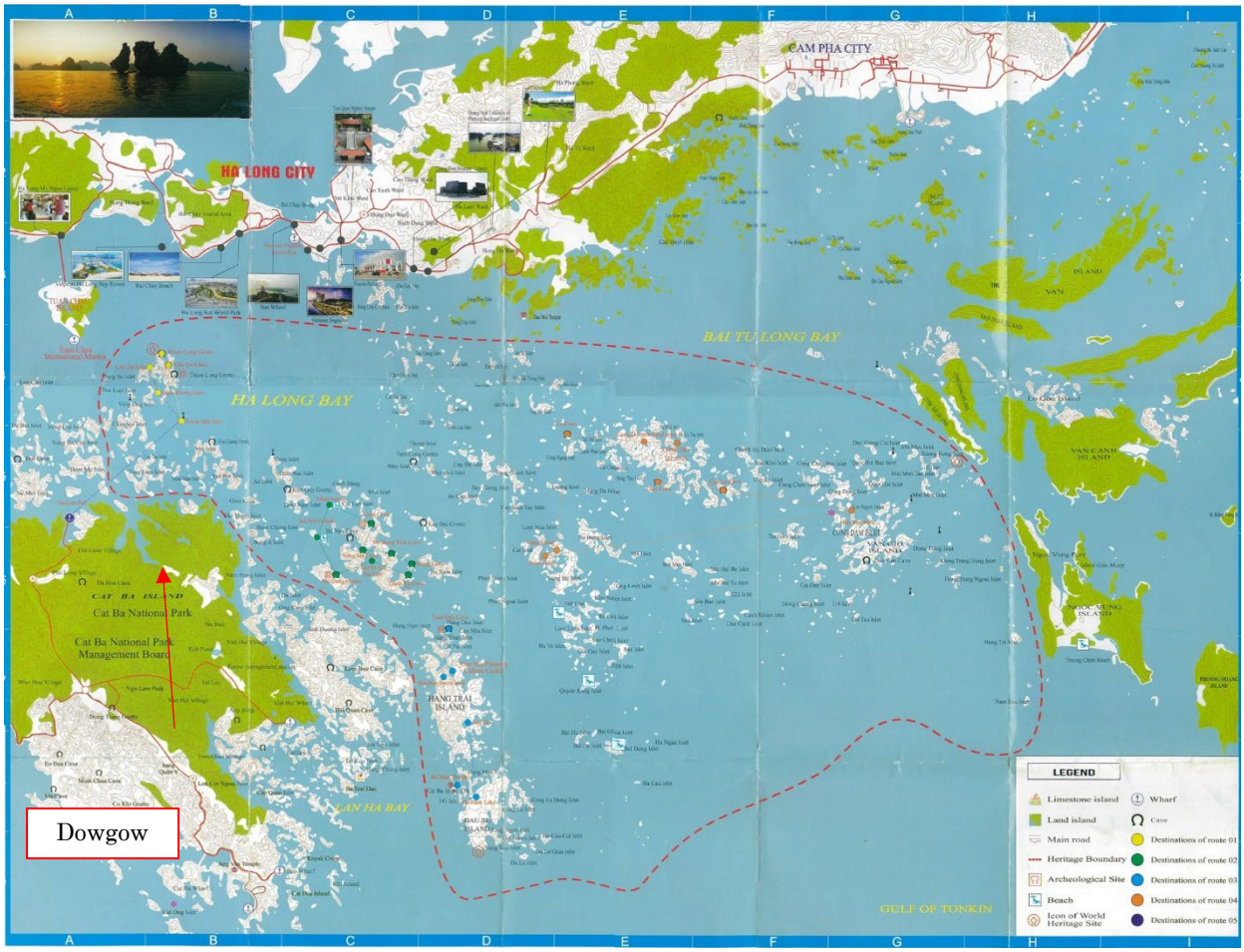
3.3.1 Introduction through the Grant Assistance for Grass-Roots Human Security Projects schemes

(1) Proposal details

The proposing entity is the Ha Long Bay Administration, an agency under the People's Committee.

The Ha Long Bay Administration's proposal to the Japanese government (under the jurisdiction of the Ministry of Foreign Affairs) for the Grant Assistance for Grass-Roots Human Security Projects scheme is as follows

- ✓ Introduction: Two restrooms in the vicinity of Dau Go Cave on Dau Go Island (see Figure 9).
- ✓ Toilets for tourists ($5m^3$ / day models x 2)
- ✓ Toilets for staff ($1m^3$ /day model x 1 unit)



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

Figure 9: World Heritage-designated areas in Ha Long Bay

(2) Proposal Results

The proposal for the introduction of johkasos into the Grant Assistance for Grass-Roots Human Security Projects Scheme was adopted in March 2023, and the adoption ceremony was held on March 10 at the official residence of the Japanese Ambassador to Vietnam, where the gift agreement was signed by Ambassador Yamada, Japanese Ambassador to Vietnam, and Mr. Hau, Vice Chairman of Ha Long Bay Management Office.

Photo 7: Signing the gift agreement

Photo 8: All the people involved

(3) Status during construction and after completion of installation

Construction progressed steadily, and a construction completion inspection was conducted by the Embassy on December 6, 2024. The status of the johkaso during construction and after installation is as follows

Photo 9: Under construction (August 15, 2023)

Photo 10: Under construction (September 12, 2023)

Photo 11: Under construction (November 10, 2023)

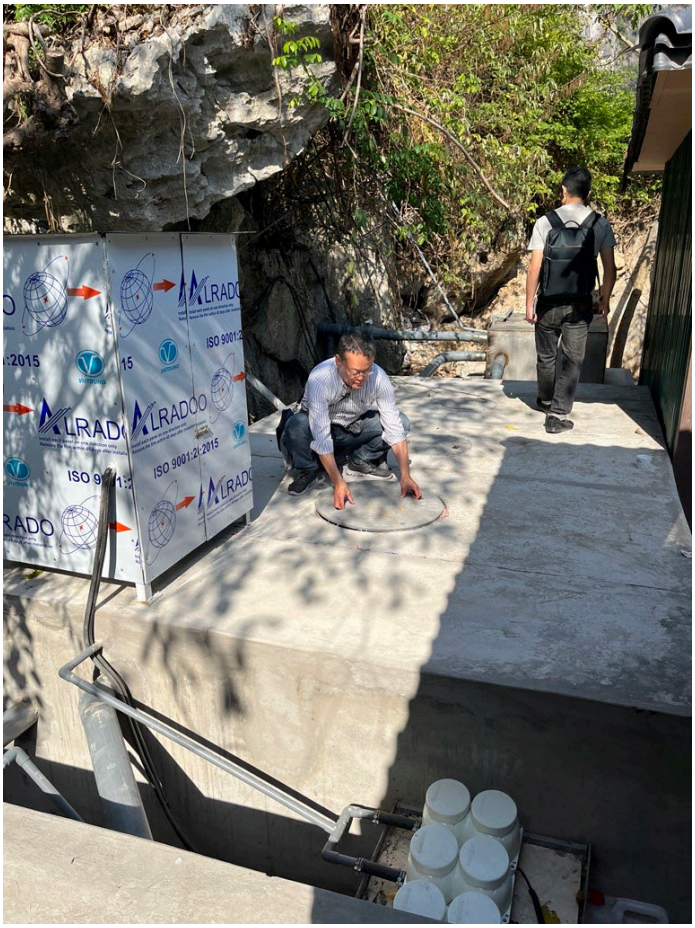


Photo 12: Johkaso in almost complete condition (November 25, 2023)

Photo 13: Johkaso in almost complete condition (November 25, 2023)

3.3.2 Introduction under Grant Aid (The Economic and Social Development Programme) scheme

(1) Proposal to the Embassy of Vietnam

Based on the intention of the Ha Long Bay Management Authority, the proposal submitted to the Embassy in December 2022 includes 31 johkasos for tourist sites in Ha Long Bay and, although not directly related to decarbonization, a garbage collection ship and an environmental monitoring and environmental education implementation ship to raise awareness and promote environmental protection and conservation of the Ha Long Bay environment. A summary of the proposals for the Grant Aid （The Economic and Social Development Programme） scheme is shown in Table 3.

Table 3: Summary of Proposals for Grant Aid （The Economic and Social Development Programme） Schemes

	Contents	Number of units
1	Installation of johkasos at 16 tourist sites in Ha Long Bay (see Table 4)	31 units
2	Waste collection ship	Four ships
3	Ships for Environmental Monitoring and Environmental Education	One ship
4	Onboard monitoring equipment	1 formula
5	High-speed ships for environmental protection patrols	One ship

The proposal we submitted to the Embassy at the end of December 2022 was only an outline document (called a "concept note" by the Embassy), and we were aware that it was to be an internal document of the Embassy. Therefore, we thought that we would need to prepare a new document (application form) when the embassy reported the plan to the Ministry of Foreign Affairs by the following summer. However, at a meeting with the embassy in April, we were told, "There is no need for you to submit a new application form; it has already been reported to the Ministry of Foreign Affairs. Therefore, no additional work was required.

Table 4: Ha Long Bay Management Authority's johkaso installation plan

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	Planed 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	Planed to open in 2 years	3	1m3/day

(2) Proposal Results and Subsequent Actions

In the afternoon of June 14, 2023, we received a notice from the Embassy stating, "As a result of discussions between JICA and the Embassy, the application from the Ha Long Bay Management Office has been registered as a project for FY2025 onward. The next day, June 15, we had a meeting with the Embassy.

A summary of the results communicated at the meeting is as follows

- At present, the Ha Long Bay Administration has already registered an application for a project (project cost: 17,000 million VND) for the 2025 fiscal year and beyond.
- Although the shortest implementation date is no longer FY2024, it is a postponement and not a rejection of the project.
- The proposal is complex, involving a johkaso and a ship, and it was commented that the JICA grant scheme might be more suitable.
- We would like you to discuss this proposal with JICA, including whether it will be handled under the JICA Grant Assistance Scheme.

Based on the above, a meeting was held with the JICA Vietnam Office on July 14, 2023 to discuss a course of action. At the meeting, JICA made the following comments, and as a result, it was decided to proceed in the direction of applying for the Grant Aid （The Economic and Social Development Programme） scheme for the johkasos and the JICA grant scheme for the ships.

- The budget for the JICA grant aid scheme is limited, and it is not possible to implement one project every year. Under such circumstances, it is difficult to incorporate ships into the JICA grant aid scheme.
- The JICA grant aid scheme has a three-year waiting list before an application can be submitted, and it is very difficult to move up the order (application is four years later, not implementation).
- It is recommended that the johkaso and ship be separated and only the johkaso be re-requested to the Grant Aid （The Economic and Social Development Programme） scheme.
- If the johkaso and the ship are separated and both are applied for the Grant Aid （The Economic and Social Development Programme） scheme, it is quite possible that they will not be received for the ship.

(3) Change of policy by Quang Ninh Province and subsequent actions

On August 1, 2023, JICA Specialist Fujimura, stationed at DPI, contacted us as follows.

- There was a change in the upper echelon of the Quang Ninh Provincial People's Committee. The Chairman of the Committee became the head of the Ministry of Construction (MOC) of the Vietnamese Government, and Vice Chairman Huy, in charge of ODA, became the Acting Chairman. The previous Vice Chairman in charge of Green Growth has stepped down and Acting Chairman Huy will also be in charge of Green Growth.
- Acting Chair Huy said, "The johkaso project will not be implemented. The garbage collector project will be implemented. He indicated a change in policy.
- When we consulted with Mr. Tam, DPI's section chief, who serves as the contact person for the City-to-City Collaboration project, he thought that

even if we applied to the People's Committee for a project to introduce johkasos, there was a high possibility that the application would not be approved. As a breakthrough, it was suggested that it might be a good idea to ask local cities (including rural areas) to raise their requests and proposals for johkaso installation.

In response to the above proposal from DPI, on September 8, 2023, DPI convened officials from local cities at a meeting room of DPI in Quang Ninh Province to explain the effectiveness of introducing johkasos in rural areas and to introduce the draft decentralized wastewater treatment ordinance and the draft johkaso management regulations (see below, "3.3.4 Efforts to raise awareness of the need for johkaso maintenance and management ").

In addition to the Japanese counterparts, the Vietnamese counterparts who participated in the conference are as follows

- Quang Ninh Province DPI
- Quang Ninh Province DONRE
- Quang Ninh Province DOST
- Quang Ninh Province DARD
- Ha Long Bay Management Department, Quang Ninh Province
- Ha Long City People's Committee
- Representative of Hai Ha District People's Committee (DONRE)
- Binh Lieu District People's Committee Representative (DONRE)

The main comments from the Vietnamese participants were as follows, and they were very favorable to the introduction of johkasos. When the Japanese side informed the participants that the ultimate goal is to have local cities submit a proposal to DPI and the Quang Ninh Provincial People's Committee requesting the introduction of johkasos, all participants from local cities agreed.

- The johkasos can be applied in mountainous and less man-made areas, and if the pilot project is successful in rural areas, it can be deployed in provincial cities throughout Quang Ninh Province. (DONRE, Quang Ninh Province)
- It is possible to conduct demonstration tests in some areas of Binh Lieu District to evaluate the effectiveness of the project. (Binh Lieu District Representative)
- We would like to set up equipment to attract attention to the treatment of wastewater from households, especially in rural areas in Hai Ha district. At the stage of preparing a proposal to Quang Ninh Province DPI and People's Committee, we would like Japanese experts to visit the site. (Hai Ha district representative)
- I agree with the Japanese explanation. Local cities and relevant departments should prepare proposals for the introduction of septic tankes. On the other

hand, since the cost of johkasos is higher than the johkasos (decomposition tanks) currently in use, introduction of johkasos may require higher treatment standards (QCDP) and other requirements. (Quang Ninh Province DOST)

At the meeting with DPI on September 28, based on the results and opinions of the above meeting, DPI informed us that it had decided to apply for the 28 johkasos proposed for the Grant Aid （The Economic and Social Development Programme） scheme, dividing them into 10 in Ha Long Bay and 18 in regional cities. The decision was made by the People's Committee.

(4) Coordination with Embassy and re-proposal

With regard to the projects (johkasos, garbage collection ships, etc.) that had been applied for the Grant Aid （The Economic and Social Development Programme） scheme, the Embassy pointed out that the provision of ships was difficult to handle as a scheme, and JICA pointed out that the budget for the JICA grant scheme was limited and it would take several years before the application could be submitted, In addition, Quang Ninh Province wants to introduce the scheme not only to the Ha Long Bay area but also to local cities (including rural areas), etc. On October 17, 2023, JICA and Embassy officials gathered and explained the future policy (the direction of the re-proposal).

The following is a summary of the presentations by JICA expert Fujimura and Shiga Prefecture officials.

- Separate the johkaso and the garbage collection ship, and apply only for the introduction of the johkaso to the Grant Aid （The Economic and Social Development Programme） scheme, while applying for the garbage collection ship to the JICA grant scheme.
- Regarding the application for johkasos, after consultation and coordination with DPI, the parties concerned are working to re-sort the proposal to 10 units in the Ha Long Bay area and 18 units in local cities, and to re-submit the proposal to the Embassy.

Comments and remarks from the Embassy in response to the explanation were as follows

- A total of around 100 million yen is a small amount for a Grant Aid （The Economic and Social Development Programme） scheme.
- Emphasizing "World Heritage" makes it a cultural story and is not persuasive. In terms of water quality improvement, the question is whether the introduction of johkasos in the target area can be a potential case study for the country of Vietnam.

- If the project is to be introduced in poor rural areas, the Grant Assistance for Grass-Roots Human Security Projects scheme would fit the bill.
- The inflow of wastewater may be to Ha Long Bay, but if the goal is to improve water quality, the introduction of a johkaso to treat 100 people in an area where 500 people live would have limited effect.
- The conditions for adoption place considerable emphasis on what the project is intended to accomplish. It is difficult unless the policy issue of whether Japan needs to support the project is met. From this perspective, it would be good if the project can be explained in terms of environmental (water quality improvement) objectives.
- The project is similar to the International Organization Cooperation Grant Aid Scheme, considering the content of the project, "World Natural Heritage Area" and "Water Quality Improvement. The Vietnamese provincial government and international organizations will be asked to prepare and submit proposals, but unlike the Grant Aid （The Economic and Social Development Programme） Scheme, this scheme is easier to use because it does not limit itself to the provision of goods. The project scale is 100 to 500 million yen per project.

The comments and suggestions from the JICA Vietnam Office were as follows.

- The JICA grant aid scheme continues to provide grant aid for ships, and it is difficult to provide a garbage collection ship. However, we do not intend to reject the proposal at this time for this reason, and will keep it as a candidate list, although it will not be on the same level as those that have already been specifically proposed.

In response to the opinions and suggestions of the Embassy and JICA, and after consulting with DPI, it was decided to go back to the previous policy and explain to the People's Committee the direction to introduce johkasos on the tourist islands in Ha Long Bay, a World Natural Heritage site. The number of johkasos will be changed from the original 28 to 17 due to the depreciation of the yen and the rising cost of materials and equipment.

Furthermore, considering that the introduction of the johkasos will be after 2025, which will take more time than expected, we visited the UNESCO Hanoi Office together with the JICA Vietnam Office, and received active cooperation from the office in publicizing our request in various fields in order to realize it as soon as possible.

After that, a final debriefing session was held on December 12, 2023 for the Quang Ninh Provincial People's Committee before the return of JICA expert Fujimura (Acting Chairman Huy did not attend), where he explained the policy of introducing johkasos on tourist islands in Ha Long Bay under a Grant Aid （The Economic and

Social Development Programme） scheme. The meeting proceeded without any particular objections or opposition, and the debriefing session was concluded.

In February 2024, the Ministry of Foreign Affairs requested an update of the proposal for the Grant Aid （The Economic and Social Development Programme） scheme, and after discussions with the DPI of Quang Ninh Province, the JICA Vietnam Office, and the Embassy of Japan in Vietnam, the proposal (concept note) was updated to include the withdrawal of the ship and the number of johkasos to be 17. The details of the updated proposal are shown in Table 5 and the details in the Appendix (Attachment 1:Details are not disclosed).

Table 5: Proposals as Non-Project Free Schemes (Comparison of Old and New Schemes)

Changes

- The johkasos will be introduced under the Grant Aid （The Economic and Social Development Programme） scheme and the garbage collection ships under the JICA grant scheme.
- The number of johkasos installed is expected to be 17 at tourist sites in the Ha Long Bay World Natural Heritage Area.

Proposal	2022.12 **Application**		2024.2 **Correction**
Objective 1. Installation of wastewater treatment systems (johkasos) at tourist sites in the Ha Long Bay World Natural Heritage Area.	1. contents	Installation of wastewater treatment systems at 16 tourist sites in Ha Long Bay	Installation of wastewater treatment systems at **10** tourist **sites** in Ha Long Bay
	2. quantity	31 Base [*1]	**17 Foundation** [*2]
	3. amount of money	Approx. 100 million yen	Approx. 100 million yen
Objective 2 To equip ships with equipment to collect, process and transport solid waste/sludge and marine debris to shore in Ha Long Bay.	1. contents	Four state-of-the-art ships to minimize floating waste in Ha Long Bay	— The application under the Grant Aid （The Economic and Social Development Programme ） scheme will be withdrawn and the project will continue to be considered as a candidate for the JICA grant aid scheme. [*3]
	2. quantity	4 ships	—
	3. amount of money	Approx. 260 million yen	—
Objective 3 To develop ships and equipment to conduct monitoring and environmental education to improve the environmental monitoring capacity of Ha Long Bay and at the same time raise awareness of environmental conservation in Ha Long Bay among tourists, students, and the local community.	1. contents	① Develop one multi-purpose ship (environmental monitoring/environmental education) ② Maintain one high-speed patrol ship. ③ Monitoring equipment (for onboard use)	— The application was withdrawn because Quang Ninh Province's request (shipbuilding on the Vietnamese side) did not meet the Grant Aid （The Economic and Social Development Programme） scheme.
	2. quantity	2 ships (multi-purpose ship, high-speed patrol ship)	-
	3. amount of money	Approx. 140 million yen	-

Note: 1. 3 units on Dau Go Island out of 31 units were selected for the FY2022 GrassRoots Grant Scheme(Grant Assistance for Grassroots Human Security), and delivery to the Ha Long Bay Administration was completed in December 2023.

2.2.2024.2.2 JICA Vietnam Office confirmed with Mr. Tam, Director, Department of Planning and Investment, Quang Ninh Province.

3.2024.2.2 Report from Mr. Inamori, Planning and Research Fellow, JICA Vietnam Office.

3.3.3 Study of Introduction in Cam Pha City

(1) Background, etc.

JNK was contacted by Cam Pha City to hold a meeting to discuss their interest in introducing johkasos, and a meeting was held on January 17, 2024 at a coffee shop in Ha Long City. The three participants from Cam Pha City were as follows

- Mr. Tam, Vice Chairman of the People's Committee
- Mr. Dung (Construction Bureau)
- Mr. Thanh (Department of Natural Resources and Environment)

Cam Pha City has not had any particular contact with Japan, and Cam Pha City has not participated in the briefing sessions for local cities on the introduction of johkasos. They learned of the Japanese johkaso efforts through Quang Ninh Province DONRE.

Cam Pha had previously planned and promoted the introduction of a wastewater treatment facility on a piece of land in the city to collectively treat wastewater, but the project was halted due to the cost of laying pipelines, etc. The city of Cam Pha has now turned its attention to decentralized wastewater treatment.

Photo 14: Meeting with Cam Pha city officials

(2) Concept of Cam Pha City

The City of Camfa is currently considering the following two options for johkaso installation.

- ✓ Proposal to install johkasos in ordinary homes (target wealthy people and collect money)
- ✓ Proposal for Cam Pha to introduce its own decentralized wastewater treatment facility for a certain size of area (if support from the Japanese side is possible, we would like to receive it).

In order to change the current treatment in septic tanks to more advanced wastewater treatment, we recognize that legal enforcement is necessary and that there is no law in Vietnam, so we would like to create a law (ordinance) on wastewater treatment unique to Cam Pha City after consulting with the Ministry of Construction (MOC) of the Vietnamese government.

In addition, since the budget is insufficient for collective processing, we are considering implementing the project by utilizing private funds and other resources through the PPP system.

(3) Requests from the City of Cam Pha

Cam Pha 's requests to the Japanese side can be summarized as follows.

i. I would like to know the capacity and other specs of the johkaso.
ii. Cam Pha City will draw up a plan for wastewater treatment (number of houses to be treated, etc.) based on the johkaso specifications in i. above, and we would like your suggestions and advice on the plan.
iii. At a certain stage of planning, we would like to have Japanese engineers visit the site and hold discussions (including cost estimates).

In response to these requests, we sent a summary of the johkaso specifications (brochures, etc.) as well as items that Cam Pha City should be aware of, and proposed a site visit in late February, but due to the Tet (Vietnamese New Year) vacation, we were unable to make arrangements.

3.3.4 Efforts to raise awareness of the need for johkaso maintenance and management

(1) Background, etc.

In Vietnam, treatment in septic tanks is common, and the sludge that accumulates in the tanks is not properly treated, leading to deterioration of wastewater quality and groundwater contamination, which in turn causes water pollution of public water bodies such as rivers and the sea.

Johkasos are expected to be one of the decentralized wastewater treatment systems in Vietnam because they are relatively inexpensive to install and, like other treatment systems, have high treatment efficiency. However, there are several obstacles to the widespread use of johkasos in Vietnam in the process of installation and operation.

In order to examine the potential for the spread of johkasos in Quang Ninh Province, JICA expert Fujimura and JNK conducted a survey in FY2021 on the current status and challenges of johkaso introduction in Vietnam and Quang Ninh Province. As a result, it became clear that the development of regulations on the installation and maintenance of johkasos is an urgent issue for the future diffusion of johkasos.

In FY2022, in light of these issues, the committee researched advanced cases in Japan and Vietnam regarding johkaso installation standards, manufacturing certification, maintenance and management regulations, securing local budgets and individual contributions, and the project scale of johkaso maintenance, and prepared a draft ordinance on decentralized domestic wastewater management for Quang Ninh Province.

(2) Organize study sessions on promoting the introduction of decentralized wastewater treatment and johkasos in Quang Ninh Province

Since the development of regulations for the installation and maintenance of johkasos was an urgent issue for the future spread of johkasos, a study session was held to introduce a draft ordinance on decentralized domestic wastewater treatment that had been studied by JICA expert Fujimura and to propose the establishment of regulations for johkaso maintenance and management.

(i) Outline of the event

- ✓ Date and Time: Tuesday, September 8, 2023, 14:00-17:00
- ✓ Department of Planning and Investment Conference Room, 6th floor of the 2nd Building, Quang Ninh Province.
- ✓ Participants (22 persons)

belong to	identity	Position, Department, etc.
Department of Planning and Investment, Quang Ninh Provincial People's Committee	Toshiki FUJIMURA	JICA Expert, Green Growth Advisor
JICA Vietnam	Makiko INAMORI	planning researcher
	Ms. TRA	staff
Japan Education Center of Environmental Sanitation	Shinhi KUMOKAWA	Leader, International Cooperation Center for Johkaso Systems
	Tsuyoshi YAHASHI	Research Manager, Business Planning Group
	Yurie SHIRAKAWA	Senior Researcher, International Cooperation Center for Johkaso Systems
	Ayako SUZUKI	International Cooperation Center for Johkaso Systems researcher
Hiyoshi Corporation	Kazuhiko MATSUI	General Manager, Overseas Business and New Business Planning and Promotion Office

KANSO TECHNOS CO., LTD.	Isao NAKAGAWA	General Manager, Environment Dept.
JNK Environmental Research & Consulting Co.	Yoshiyuki FUJII	General Director
	Phan Hong Ngoc	Technical Staff
	Nguyen Thi Bich Van	Staff, Interpreter
Quang Ninh Province Relevant departments	Tran Thi Thanh Tam	DPI Deputy Director
	Pham Thanh Tung	DPI
	Pham Quang Vinh	DONRE.
	Nguyen Viet Hung	DOC
	Le Thi Thu Hai	DARD
	Nguyen Manh Hung	DOST
	Mai Thi Trang	Ha Long Bay Management Department
Quang Ninh Province Local City (County/District)	Vu Manh Hung	Binh Lieu District
	Tran Quoc Hung	Ha Long City
	Hoang Van Bang	
	Tran Van Tuan	
	Vu Manh Hung	Hai Ha District

Photo 15: Meeting Scene

A. Details of implementation

(a) Explanation of the purpose of the briefing (Mr. Fujimura: JICA expert)

- Outline of JICA's support for the materialization of Quang Ninh Province's Green Growth Strategy
- Explanation of the purpose of the study group

[What will be discussed at the meeting]

- Significance of Introducing Johkasos in Rural Cities
- Introduction of ordinance on decentralized domestic wastewater treatment

- Proposed maintenance regulations focused on maintenance

[Effects expected to be achieved at the meeting]

- Better understanding of the need for johkaso maintenance in local cities
- Better understanding of the need for maintenance and management regulations (systems) for wastewater treatment facilities
- Better understanding of JICA and Shiga team's efforts to improve living conditions in Quang Ninh Province

[Future initiatives expected from Quang Ninh Province officials]

- A "Proposal for the introduction of johkasos using Japanese ODA" is submitted by a local city to the JICA/Shiga team.
- Numerous comments (corrections and additions) from Quang Ninh Province officials to make the maintenance regulations more concrete will be submitted to the JICA/Shiga team.

[Future support from Japanese parties]

- Proposal for maintenance regulations to PPC based on input from Quang Ninh Province officials.
- Proposal to prepare a working group to establish maintenance regulations

(b) Necessity of johkasos and decentralized domestic wastewater treatment (Mr. Kumokawa: JECES)

・Need for decentralized domestic wastewater treatment
・The need for johkasos

- Overview of johkaso functions and characteristics
- Effects of maintenance (social benefits)

・Introduction of government-level studies at MOEJ and MONRE

- History and results of activities from 2020 to 2022
- Performance evaluation test methods, treatment facility staffing calculation standards, and launch of training courses.
- MONRE/MOEJ's future development policy

(c) Brief explanation of the "Draft Ordinance on Decentralized Domestic Wastewater Treatment" (Fujii: JNK)

- Overview of stakeholders' efforts on decentralized wastewater management in Vietnam
- Results of a Survey on the Establishment of a Management System for Johkasos in Quang Ninh Province
- Issues in the diffusion of decentralized domestic wastewater treatment facilities
- Current status of domestic wastewater treatment in Quang Ninh Province
- Plan to install johkasos on tourist islands in Ha Long Bay using ODA
- Results of interviews with relevant departments in Quang Ninh Province regarding the establishment of a johkaso management system
- Purpose of drafting the proposed ordinance
- Structure of the Draft Ordinance on Decentralized Domestic Wastewater Management in Quang Ninh Province
- Matters to be confirmed and considered in the future for the adoption of the ordinance

(d) Specific proposal for "maintenance and management" rule in the draft ordinance (Fujii: JNK)

- Outline of Chapters 1-3 of the proposed ordinance *Except for the Maintenance Regulations
- Maintenance Regulations (Chapters 4-7)

(e) Exchange of opinions

- Feasibility/intention to introduce johkasos on the county/district side based on the new rural development plan.
  - JICA can support the installation of johkasos using ODA (grant aid scheme) (installation is expected to start in 2025 or later).
  - County/district representatives are required to complete an application for johkaso maintenance using ODA
  - Ha Long Bay Management Authority has already introduced johkasos through ODA and possesses the know-how.
  - If requested by Quang Ninh Provincial People's Committee, JICA/Shiga team can assist the provincial/district representatives in preparing the application.
- Questions and comments on the draft ordinance (overall and maintenance regulations)

(f) Summary (future policy)

- Based on the results of this discussion, we will consult with the Quang Ninh Provincial DPI to determine ①johkaso development in the province and district, and ②future actions to be taken on the current draft ordinance.
- Based on the policy decision of Quang Ninh Provincial People's Committee, JICA and Shiga team will develop the future support system.

(ⅱ) Main reports

The "Draft Ordinance on Decentralized Domestic Wastewater Treatment," one of the documents distributed at the study session, is shown in the Materials section (see Appendix 2).

Table 6 shows the current status of the decentralized wastewater management being studied in collaboration with the project stakeholders and JICA officials, and Table 7 shows the structure of the proposed ordinance on decentralized domestic wastewater treatment.

Table 6: Summary of efforts of stakeholders on decentralized wastewater management in Vietnam

correspondent	Outline of Implementation	Related Information
JICA Expert Adachi (MONRE)	Recommendations for the Environmental Policy of the Republic of Vietnam." ・ Environmental Protection Act of 2020, effective 2022. ・ Revision of QCVN (effluent standards, etc.), which have not been revised since 2009, is in progress. ・ Since the Vietnamese standards are directly based on the Korean standards, and there are comments within MONRE that they have not been fully discussed, we will work with the Japanese Embassy to compile Japanese comments and forward them to the government.	・ Wastewater treatment water quality standards are related to wastewater treatment technical standards and facility maintenance. ・ Revision of environmental, effluent, and emission standards is underway. (The regional classification to which the standards are applied has been changed) *Note the basin plan to be developed in the future. ➢ General Environmental Standards (revised March 2023, effective May 2023) 1. Water quality (surface water) environmental standards (10 general items, 40 health items) ➢ Draft effluent standards* set for grace period until 2025 1. Domestic wastewater (11 general items) 2. Industrial wastewater (general and health 66 items in total)
JICA Specialist Tamoto (MOC)	Recommendations for Vietnam's Sewerage Policy." ・ Vietnamese government prepares to enact "Law on Water and Sewerage" by 2025; discussions begin within MOC. ・ In particular, we plan to compile policy proposals and submit them to the Vietnamese government with regard to the following Stormwater Solutions, PPP, Sludge Treatment and Reuse, Small and Medium Sized Sewage Treatment	・ Based on the trend of legislation on wastewater treatment, it is necessary to prepare for the establishment of a maintenance and management system at the provincial level. ➢ October 2023: Outline of the law submitted to the Diet ➢ May 2024: Draft law submitted to the Diet ➢ October 2024: Public comment ➢ May 2025: Final approval
Mr. Kumogawa (Japan Environmental Maintenance and Education Center)	JICA Dissemination and Demonstration Project (May 2018 - January 2023) "Project for Promotion and Demonstration of the Improvement of Decentralized Wastewater Treatment Levels through the Introduction of Johkasos in Hung Yen Province."	・ The johkaso installation and the proposed ordinance were proposed ahead of Quang Ninh Province. ➢ Test installation of johkasos (1 large, 2 medium, 1 small) ➢ Demonstration of effectiveness through appropriate maintenance and management (human resource development)

		➢ Advocate for the need to strengthen related systems and operations (proposal to DONRE for a "decentralized wastewater management ordinance" (based on Japan's Johkaso Law, prefectural guidelines for handling johkasos, and domestic wastewater control ordinances, etc.)
	Ministry of the Environment projects (FY 2020 - 2023) *CP: MONRE *Cooperation: MONRE-VEA-CECT, Hanoi University of Construction	・The Ministry of Environment is also developing a project to contribute to the development of decentralized wastewater management in Vietnam. ➢ Proposed Staffing Calculation Criteria for Decentralized Wastewater Treatment Facilities ➢ Proposed Performance Evaluation Testing System ➢ Human resource development materials, trial training for instructor development (MONRE training, English translation of johkaso law, etc.)
JICA Expert Fujimura (Quang Ninh Province)	Policy Recommendations to Promote Quang Ninh Province's Green Growth Strategy." (～FY2023)	<Planning, coordination, implementation and financing ・Introduction of johkasos (JICA/Ministry of Foreign Affairs grant) ・Advocate for the need for johkaso maintenance and management systems (proposal for a "decentralized wastewater management ordinance") ・Effective use of sludge
Shiga Prefecture and other parties involved in this project	Commissioned by Ministry of the Environment Quang Ninh Province - Shiga Prefecture " City-to-City Collaboration Project" (FY2022-2023) *If adopted, extension through FY2024. *Solar power generation, chiller/refrigeration equipment, and boilers will be installed, aiming to make the project a JCM project. *Carbonization of sludge is also positioned as a decarbonization	<Promoting the decarbonization of Quang Ninh Province by utilizing Shiga Prefecture's environmental technology and expertise>. ・Introduction of johkasos (JICA/Ministry of Foreign Affairs grant) ・Effective use of sludge ・Under discussion with provincial government on "Demonstration Project for Effective Utilization of Sludge (Wastewater and Waste (Kitchen and Livestock) in Rural Areas".

Table 7: Composition of the draft ordinance on decentralized domestic wastewater treatment in Quang Ninh Province

chapter	Title.	Contents
Chapter 1	general rules	• Objectives, Definitions, and Stakeholder Responsibilities
Chapter 2	Regulations pertaining to installation	• Method of estimating the treatment capacity (wastewater volume and BOD load) of the facility • Installation Standards • Construction based on construction plans and construction guidelines • Registration System for Construction Contractors • Maintenance of ledgers • Quang Ninh Province's obligation to promote conversion of existing septic tanks
Chapter 3.	Water quality standards for effluent	• Relaxed QCVN14 standard for ammonia, depending on discharge destination
Chapter 4.	Regulations pertaining to maintenance and management	• Maintenance is the responsibility of the construction manager • Maintenance = sludge removal + maintenance and inspection • Outsource maintenance to a maintenance contractor • Registration system for maintenance contractors
Chapter 5.	Monitoring of effluent	• Obligation to undergo water quality testing • Water quality testing by designated inspection agency
Chapter 6.	Reuse of sludge and treated water	• Effective use of sludge • Reuse of discharged water
Chapter 7.	Costs associated with decentralized domestic wastewater treatment	• Obligation to pay construction and maintenance fees by the facility manager • Subsidy program for installation costs

(4) Future actions

Based on the opinions of this study group and others, it was decided that DPI will consult with the People's Committee in the direction of establishing a working group to formulate Quang Ninh Province's own maintenance and management ordinance (decision document) for detailed study. As of February 2024, no further action has been taken. The Shiga team will continue to collect information and plans to provide support in cooperation with JICA in terms of both software and hardware to promote the introduction of johkasos and decarbonization efforts through the use of sludge, which are under consideration in this project.

Table 8 summarizes the items to be confirmed and discussed with Quang Ninh Province officials and central government officials with the cooperation of JICA in a working group to be established in the future, based on the discussions at this study session.

Table 8: Items to be identified and considered for future enactment of maintenance and management ordinances in Quang Ninh Province

clause	(data) item	Items for confirmation and consideration
Articles 4 and Articles 5	Designation of areas and facilities where decentralized domestic wastewater treatment facilities are to be introduced	・ Will the Quang Ninh Provincial Department of Construction (?) be responsible for designating areas where decentralized wastewater treatment facilities should be installed?
Article 8 and Article 9	Installation Obligations and Standards	・ Water quantity and water quality data by building type, PE and performance evaluation test methods in Vietnam. ・ Consideration of the need for guidelines on underground infiltration facilities or soil treatment facilities
Article 10 and Article 11	Manufacturing and design certification of decentralized domestic wastewater treatment facilities	・ Do I have to take a processing performance certification test each time I renew?
Article 12.	Procedures for treatment performance certification testing	・ （If an application is filed in lieu of a treatment performance certification test (e.g., by a company outside of Vietnam), can it be determined whether the QCVN standard is met based on the application documents?
	Treatment Performance Certification Test Methods	・ Can we find at least 3 sites for testing facilities by ourselves? ・ The Provincial Construction Bureau needs to develop a detailed regulation for the implementation of the treatment performance certification test. Can you respond?
Article 19 and Article 20	Registration of construction contractors, technical workshops on construction	・ The applicant must regularly attend technical training sessions held by the Ministry's Construction Bureau.
Article 21.	Existing decentralized domestic wastewater treatment facility	・ How do you determine if an existing facility's treatment function has declined? ・ What are the measures to promote conversion? ・ Is it appropriate to restrict the facility to commercial facilities with a processing capacity of 2 m^3 or more? (Couldn't it be larger, such as 50 m^3/day or more?) ・ What exactly are the recommendations for improvement?
Article 22.	Water Quality Standards for Discharge Water from Decentralized	・ The concept (proposal) needs to be considered in line with the revision of the QCVN.

	Domestic Wastewater Treatment Plants in Quang Ninh Province	・ I propose a standard for ammonia that is more lenient than the national effluent standard (hemdashi), but will it be acceptable in Quang Ninh Province?
Articles 30-32.	Water quality testing of effluent, designated inspection agency	・ How can we ensure the competence of personnel who conduct water quality analysis? Isn't there a system of environmental metrologists, etc. in Vietnam yet?
Articles 33 and Articles 34	Sludge management, reuse of discharged water	・ Is the Quang Ninh Provincial People's Committee the authority for planning and developing sludge treatment facilities? ・ Does JUDENCO have the organizational strength to operate a sludge treatment facility? ・ Wouldn't the processing fee need to be smaller than the sludge hauling fee declared by the maintenance contractor?
Article 35 and Article 36	Obligation to pay by facility management, assistance programs	・ Isn't securing financial resources (financing) insufficient?

3.4 Effective Utilization of Sludge, etc.

3.4.1 Study of gasification of sludge, etc. and its potential for use in power generation and heat supply

(1) DOST-led pilot project plan

(ⅰ) Status in the last fiscal year

The DOST was willing to consider implementing a model project with its own budget to facilitate approval by the People's Committee since the technology for sludge treatment, including carbonization, is new to Quang Ninh Province, and to submit the project to the People's Committee for a larger project after determining the effectiveness of the project.

(ⅱ) June 2023 meeting

A meeting was held on June 5. The summary is as follows, and DOST had a very positive attitude.

- We are considering sites near the mountains in Quang Ninh Province where ethnic minorities live (Tien Yen, Hai Ha, Binh Lieu), but have not yet decided on a location.
- We would like to make a plan and apply to the People's Committee by the end of 2023, and start the project in 2024.
- (When data on a food waste treatment facility in Keihoku Town was provided), we would like to introduce a smaller model, and would like to know the requirements for a 200 kg/day processing facility.
- We would like to see two dispatches of experts from Japan (wastewater, garbage, methane, carbonization) for the intercity collaboration project: the first to discuss the required amount of utilization resources and explain the operation process, and the second to visit the sites determined by DOST to discuss how to proceed with the pilot project.

(ⅲ) DOST's policy change and subsequent actions

At the end of June, the Japanese side confirmed the following details to DOST.

- We are considering the scale of 100kg/day as a pilot project to be implemented by DOST, but is it possible to collect 100kg/day of sludge and livestock dung?
- Are you interested in introducing sludge gasification equipment (brought in from Japan and brought back one year later), although it will be partially borne by DOST through the JICA scheme?

Two days later, the director of DOST sent me a message saying, "The model project we were discussing with the Japanese side has been shelved because it has not been reported to the Quang Ninh Provincial People's Committee." The message was sent

to me.

Through JICA expert Fujimura, we confirmed and consulted with Mr. Tam, Deputy Director (now Director) of DPI, who serves as the contact person for this inter-city partnership project, who gave us the following advice.

- It does not appear that the project was cancelled, only postponed.
- Maybe there is not enough information to report to PPC.
- It seems that they were thinking of making a proposal directly from DOST to PPC, but it was originally to be submitted by DPI.
- We would like you to prepare a detailed document on the model project that we can propose to the PPC. We will get DOST's approval for it and DPI will propose it to the People's Committee on behalf of DOST.

Since there was a lack of enthusiasm in the DOST's response, and since DPI was trying to explain and persuade both the DOST and the People's Committee, we decided to go with DPI's suggestion and get the People's Committee's approval through DPI's channels.

In early July, we prepared detailed materials on the model project and sent them to DPI, but we did not receive a response after that, and when we checked with them in late August, they replied that they did not understand the meaning of the materials and could not explain them to DOST or to the People's Committee.

Therefore, the Japanese side decided to explain the situation to DOST again during the next trip.

(ⅳ) October 2023 meeting

The requested meeting date in late September was changed to October 5 to accommodate the convenience of the director and deputy director, but the director did not attend and the deputy director only made initial remarks.

The model projects were explained using Proposal 1: Mini Model Project (see Figure 10) and Proposal 2: Full-Scale Model Project (also includes sludge gas power generation, and a Japanese government subsidy will be used to increase the decarbonization effect of the project. The detailed plan will be defined after the implementation of the FS.) The main comments and opinions from the DOST were as follows, with many negative comments and opinions about the projects.

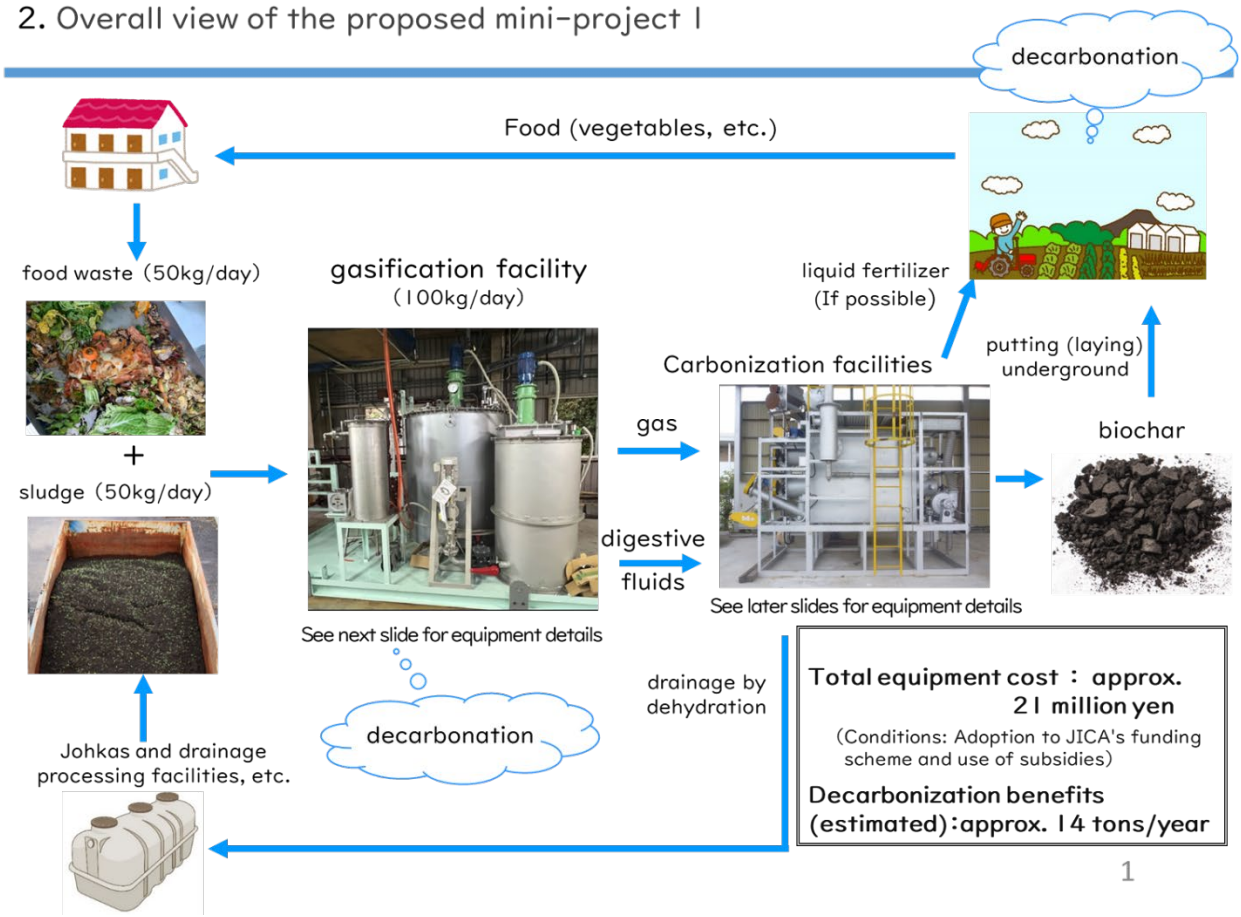


Figure 10: Overall diagram of the project for effective use of sludge (mini-model project)

- Since the Director General and Deputy Director General are not participating, we alone cannot draw conclusions on the Japanese proposals. We only listen to the proposals and opinions. After reporting to and consulting with our superiors, we will reply.
- The mini-model project proposed is not a good return on investment. In addition, the large project in Proposal 2 may require more equipment for gas power generation, which will further increase costs due to the larger size of other equipment.
- It is better to place the equipment near food factories, etc., but it will be necessary to treat wastewater. On the other hand, if the equipment is placed near an area where ethnic minorities live, they will not be able to use food scraps because they cannot separate garbage. In conclusion, this proposal is not feasible.
- I understand approximately the content of the proposal. We will report to the Director and Deputy Director, who will in turn report to the People's Committee.

Although we provided rebuttals and additional explanations to DOST's negative comments/opinions, we felt that this did not mean they had a positive attitude.

Therefore, in order to keep DOST connected, we communicated through JNK that we would like to propose a cost-effective model project (Draft 2) in concrete form DOST replied as follows, and we started to prepare a new proposal.

- The Director and Deputy Director will be informed of Japan's readiness to re-propose. In addition to specific proposals, the next proposal should include the following

  - ✓ Labor required by Quang Ninh Province to manage the project (preparation, operation and management)
  - ✓ Budget amount to be prepared
  - ✓ Role of Quang Ninh Province (preparation of project financing, site selection, land provision, waste collection and transportation, operation and management, etc.)

We prepared a new proposal incorporating the above requests, and when we requested a meeting with him during his trip in November, the Director of the Bureau said, "DOST can't handle it. We are too busy to have a meeting." and refused to have a meeting.

At this stage, we decided to abandon the DOST-led project and focus on companies in Quang Ninh Province.

(2) For expansion into the private sector

In order to be introduced companies that might be interested in the effective use of sludge, we briefed the EAMB, which manages the industrial park, and DOIT, which manages factories and other facilities in the province, on the materials on gasification and carbonization of sludge (Appendix 3 : Details are not disclosed).

(i) EAMB

The EAMB seemed to have a good impression of the Sludge Effective Utilization Project and agreed to assist with company matching The main comments from the EAMB are as follows

- I think this is a useful technology for Quang Ninh Province companies.
- The industrial park managed by EAMB has many workers and generates a large amount of sludge derived from domestic wastewater and food waste from meals, which is quite expensive to treat. In addition, a lot of industrial sludge is also generated, which could be solved with this technology.
- Quang Ninh Province has a problem with livestock waste disposal. Livestock and dairy enterprises do not have facilities to dispose of cattle manure. I think this problem can be solved by introducing this facility.

・Each industrial park has wastewater treatment facilities, but they are troubled with sludge treatment due to the mixing of industrial wastewater. We would like you to consider this as a measure against sewage sludge in urban areas in Quang Ninh Province.
・Although there is a price issue, I think there is a possibility that companies will introduce the system. Corporate matching is possible.

After the new year, a total of eight companies were introduced by EAMB early in January 2024. JNK conducted interviews with four of these companies and determined that there was little possibility of their introduction, and will conduct interviews with the remaining four companies listed below at the beginning of Tet (Vietnamese New Year).

- ✓ Công ty NHH KCN Texhong Việt Nam
- ✓ Công ty TNHH Dệt may Bắc Giang Việt Nam
- ✓ Công ty CP Đô Thị Amata Hạ Long
- ✓ Công ty TNHH Công nghiệp JINKO SOLAR (Việt Nam)

(ⅱ) DOIT

DOIT, which manages companies, factories, etc. in Quang Ninh Province, was not proactive in holding meetings with us, despite the fact that we had sent them materials in advance and explained the main purpose of the project. DOIT was in the position of introducing the company to the company, and the company felt that from their perspective, decarbonization was not an obligation and there was no incentive for them to do so. DOIT's main comments were as follows.

・According to the proposal, the amount of electricity generated per ton of food scraps is low.
・From the company's point of view, it can generate about 100,000 kWh of electricity in a year, but each kWh costs 2,000 VND, so it saves 200 million VND per year. On the other hand, the cost of waste disposal is 50 million dong, or 100 million dong even if we assume that the cost is high. In other words, the annual savings would be 300 million dong at most (approximately 1.8 million yen). Considering the investment cost, it is difficult to introduce the system. The fact that it may take nearly 20 years to amortize the investment is a challenge.
・...companies are not obligated to decarbonize, so they make decisions based on cost only. In addition, Vietnamese companies are not environmentally conscious, and SMEs are even less conscious.
・Another problem is that the electricity generated cannot be used by the company itself. Individual households can use it, but not corporations. These issues have only recently begun to be considered. Companies that have already set up operations are allowed to use surplus power, but those that are planning

to do so are prohibited from doing so. In fact, there is a case in which a cement company was considering expanding into a factory and gave up when they found out that they could not use the surplus power for their own purposes. This is not a legal requirement.

Regarding the last comment on the issue of the prohibition of private consumption of surplus electricity, it is stated that this is an administrative guidance rather than a legal one, but it seems to be a very inappropriate administrative guidance considering that the northern region of Vietnam is currently experiencing rolling blackouts due to power shortages. We will need to check the details in the future, but as long as this administrative guidance is still alive, no new projects related to power generation can be implemented in Quang Ninh Province, which is a major barrier to the implementation of decarbonization projects.

As for the point regarding cost benefits, the price of electricity in Vietnam is about 1/3 of that in Japan, making it difficult to realize cost benefits from power generation. In fact, the example price (2,000 VND/kWh) provided by DOIT would be approximately US$0.08/kWh in the current exchange rate, which is consistent with the figures in Table 9.

In order to increase cost advantages for Vietnamese firms, it is necessary to consider expanding the scale of facilities or utilizing subsidy programs such as JCM.

Table 9: Electricity Prices in Southeast Asian Countries

Country Name	Electricity Rates (USD) (as of March 2023)
Cambodia	0.1501
Indonesia	0.0951
Japan	0.2461
Laos	0.0351
Malaysia	0.0491
Myanmar	0.0291
Philippines	0.1841
Singapore	0.2221
Thailand	0.1121
Vietnam	0.0791

Source: Compiled from World Population Review HP
https://worldpopulationreview.com/country-rankings/cost-of-electricity-by-country

3.4.2 Investigate the possibility of carbonizing sludge and other materials and producing and applying (burying) biochar

Gasification of sludge and other materials and the use of the gas for power generation and heat have not yet materialized, and the conversation has not yet progressed to the use of residuals.

3.5 Support for Institution Building Related to Decarbonization

3.5.1 Background

The Vietnamese government declared at COP26 in 2021 that it will reduce greenhouse gas emissions to virtually zero (net zero) by 2050. At present, Quang Ninh Province has not formulated a decarbonization plan in response to the net zero declaration, but we were told that the province plans to prepare a draft plan in 2023 that will include a greenhouse gas inventory and measures to be taken. We were asked to seek advice from Shiga Prefecture, which has already implemented the Net Zero Declaration and the decarbonization plan, and made various arrangements.

In December 2023, the "Draft Report on Greenhouse Gas Inventory and Proposed Reduction Measures and Their Effectiveness" was completed and a consultation meeting was held on January 2, 2024.

3.5.2 Meeting with DONRE and coordination with Shiga Prefecture

At a meeting with DONRE on September 27, 2023, it was reported that Quang Ninh Province is proceeding with a greenhouse gas inventory study and that a draft plan including measures to be taken will be completed in December of this year and approved after a seminar to hear opinions is held in January. At that time, the following three requests for cooperation were made to Shiga Prefecture.

- Advice on measures to be implemented based on the inventory
- Opinions on the first draft of the countermeasure plan
- Participation in meetings to exchange opinions with engineers from various fields during the drafting of the plan

In response to this request, Shiga Prefecture sent DONRE the Japanese version of the "Shiga Prefecture CO_2 Net Zero Society Creation Promotion Plan" (formulated in March 2022) and the English version of the Net Zero Promotion Plan (specific initiatives) section, and started coordination between the CO_2 Net Zero Promotion Section, General Planning Department, Shiga Prefecture and DONRE to exchange opinions.

Then, on October 24, Shiga Prefecture informed DONRE of its readiness to provide support for the planning process (attendance at consultation meetings, submission

of opinions on the draft plan, and exchange of opinions between the Japanese and Vietnamese technical experts in charge of the project).

On November 13, DONRE informed us that a consultation meeting on the "Draft Report on Greenhouse Gas Inventory and Draft Reduction Measures and Their Effectiveness" would be held in November. After coordinating the form of participation and response, it was decided that JNK, located in Vietnam, would attend the meeting as a representative of the Shiga team and report back to Shiga Prefecture in order to respond flexibly to inquiries from Quang Ning Povince. This was also approved by DONRE. (The meeting was not held in November but was eventually held on January 2 of the following year.)

3.5.3 Participation in consultation meetings

(1) Outline of the event

JNK attended the following meeting held in Quang Ninh Province to gather opinions on the "Draft Report on Greenhouse Gas Inventory and Proposed Reduction Measures and Their Effectiveness" and to propose emission reduction measures.

- ✓ Date and Time: Tuesday, January 2, 2024, 8:00 a.m. - 12:00 p.m.
- ✓ Quang Ninh Province, Second Office Building, 7th Floor, Natural Resources and Environment Department Meeting Room
- ✓ Participants (50 persons)

①Departments concerned

DOIT, Department of Agriculture and Rural Development, Department of Transportation, Department of Construction, Department of Tourism, Department of Planning and Investment, Department of Health Care, Economic Zone Administration

②Department of Thermal Energy, Faculty of Mechanical Engineering, Hanoi University of Science and Technology
③district and municipal people's committees
④Vietnam National Coal and Mineral Industry Holding Company (VINACOMIN)
⑤Northeastern Company (DONG BAC Corporation)
⑥JNK Environmental Research & Consulting Co., Ltd.
⑦13 enterprises in the province (thermal power plants, cement plants, solid waste treatment plants)
⑧Key departmental officials under the Ministry of Natural Resources and Environment (10 persons)

✓ Main contents

- Explanation of purpose and introduction of participants
- Study Report 1: Greenhouse Gas Inventory Results and Projections to 2030 Based on Business-as-Usual (BAU) Development Scenarios
- Study Report 2: Assessing the Potential for Reducing Greenhouse Gas Emissions in Quang Ninh Province and Proposing Solutions to Reduce Greenhouse Gas Emissions
- Question and answer session on the report

Photo 16: Meeting Scene

(2) Summary of Report

The report (160 pages) distributed at the meeting reads as follows

(See Appendix 4 in the Documentation section for a summary version of the report.)

(i) Composition

- Chapter 1: GHG Emissions in Vietnam
- Chapter 2: Socioeconomic Background and GHG Emissions in Quang Ninh Province
- Chapter 3: GHG Emissions in 2018, 2020 and projected GHG emissions in 2030 (BAU)
- Chapter 4: The Energy Sector
- Chapter 5: Industrial Process Sector
- Chapter 6: Agriculture and Land Use Sector
- Chapter 7: The Waste Sector
- Chapter 8: Feasibility Assessment and Proposed Solutions for Reducing GHG Emissions in Quang Ninh Province

(ii) Main contents

[GHG emissions in Quang Ninh Province]

- Estimates for the years covered (see Table 10) are calculated according to IPCC guidelines. In some cases, estimates are utilized due to the absence of statistical data.
- In 2018, it is 52,245 thousand t-CO_2 , in 2020 it is 49,572 thousand t-CO_2 , and in 2030 (BAU) it is 123,570 thousand t-CO_2 , which means that GHG emissions in 2030 are expected to be 2.4 times higher than in 2020.
- The main reason for this is the increase in energy use due to population growth and continued economic growth.

Table 10 GHG emissions in Quang Ninh Province by 2030 (BAU scenario)

Unit: thousand t-CO_2

Department	2018	Year 2020	Year 2030
Energy Sector	48,491	45,371	115,723
Industrial Process Division	2.377	2.611	4,590
Agriculture and Land Use Sector	918	969	1,508
Waste Division	458	619	1,748
Total amount	52,245	49,572	123,570

[GHG emission reduction potential in Quang Ninh Province]

- (Energy Sector) The GHG emission reduction measures shown in Table 11 are expected to reduce GHG emissions by 17,367,000 t-CO_2 in 2030.

Table 11: GHG Emission Reduction Potential in Quang Ninh Province in 2030 (Energy Sector)

solution	Scenarios for Emission Reduction Potential Assessment
Improved public transportation	Urban transit market share will meet approximately 2% of urban travel demand by 2030.
Encourage the development of electric bikes	By 2030, electric scooters (motorcycles) will account for 9% of all motorcycles on the market.
Promote development of electric vehicles	By 2030, electric vehicles will account for 2.4% of the total market.
Development of electric buses	By 2030, electric buses will account for 5% of all buses in the province.
Promoting the use of biofuels	E5 gasoline accounts for 40% of all gasoline sales. Ethanol supply is 145,000 m/year nationwide.[3]
Use of high-efficiency air conditioners for home use	By 2030, high-efficiency air conditioners will account for 75% of all households using air conditioning, up from 15% in 2018 in urban areas; similarly, 8% to 55% in rural areas. High-efficiency air conditioners with higher cooling capacity will cost about 30% more, but will save 30% in electricity consumption.
Use high-efficiency refrigerators.	By 2030, high-efficiency refrigerators will increase from 15% in 2018 to 80% in urban areas and similarly from 10% to 65% in rural areas. High-efficiency refrigerators of comparable capacity will cost about 15% more, but will save 30% in electricity consumption.
Use of energy-saving lighting lamps	By 2030, the use of energy-efficient lighting (LEDs) will increase from 17% in 2018 to 70% of all lighting in 2030, replacing filament lamps (or other similar traditional lamps).
Use of solar water heaters	By 2030, solar water heating will increase from 1% to 30% of all households in urban areas and similarly from 0.3% to 5% in rural areas.
Biogas Replaces Coal in Rural Home Cooking	By 2030, biogas installations will increase from 0.7% in 2018 to 5% of all rural households as an alternative to coal for cooking.
Optimization of clinker combustion cycle	By 2030, combustion cycle optimization will be applied to about 50% of clinker production.
Use of vertical crushers in cement production	By 2030, the use of vertical crushers will apply to about 50% of cement production.
Application of innovative technology in the production of fired bricks	By 2030, innovative technological means will replace conventional technology in about 70% of conventional baked brick production.
Use of high-efficiency electrical equipment in commercial services	By 2050, electricity demand will be about 15% lower with high-efficiency equipment compared to BAU.
Development of rooftop solar power generation	Install 431 MW of rooftop solar PV by 2030.
Development of ground-based solar power generation	Install 52 MW of ground-based solar PV by 2030.
Development of water-based solar power generation	Install 1,830 MW of water-based solar PV by 2030.
Wind Power Development	Develop more than 2,500 MW of wind power by 2030, including 2,000 MW of onshore wind power and 500 MW of offshore wind power; develop wind power in provinces such as Co To, Binh Lieu, Ba Che, Hai Ha, Ha Long, Van Don, Mong Cai, Uong Bi, Dong Trieu and their Develop wind power in potential areas in the region.
LNG Electrification Development	By 2030, develop more than 4,640 MW of LNG power generation at Quang Ninh and Quang Ninh 2 gas power plants and coal-fired power plants in Quang Yen, Hai Ha and Mong Cai.

solution	Scenarios for Emission Reduction Potential Assessment
Garbage - Landfill Power Development (Waste to Energy)	By 2030, approximately 28.85 MW of waste power will be installed in Ha Long, Cam Pha, and several possible provinces.
Biomass power generation	By 2030, approximately 120 MW of biomass power will be installed in Ba Che and Tien Yen districts and several potential provinces.
Private electricity	The company will install approximately 61.5 MW of on-site power generation using waste heat at Hai Ha Industrial Park and Cement Factory in Hai Ha District and Lam Thach 2 Cement Factory in Uong Bi City.
Use cleaner fuels for cooking in rural areas	By 2030, the number of rural households using LPG will increase from 30% (BAU) to 50%.
Improve energy efficiency in all subsectors (except the 03 subsector producing bricks, cement, and steel)	By 2030, measures to improve energy efficiency in the industrial sub-sector (excluding the 03 sub-sector producing bricks, cement iron, and steel) through efficiency improvements in boilers, electric motors, and appliances could save up to 6.5% of energy demand.

- (Industrial Process Sector) The reduction of clinker content in cement shown in Table 12 is expected to result in a reduction of 57 thousand t-CO_2 in 2030.

Table 12 GHG Emission Reduction Potential in Quang Ninh Province in 2030 (Industrial Process Sector)

solution	Scenarios for Emission Reduction Potential Assessment
Reduction of clinker content in cement	Reduce clinker content to 72% by 2030 and 68% by 2050.

- (Agriculture and land use sector) The GHG emission reduction measures shown in Table 13 are expected to reduce GHG emissions by 611 thousand t-CO_2 in 2030.

Table 13: GHG Emission Reduction Potential in Quang Ninh Province in 2030 (Agriculture and Land Use Sector)

solution	Scenarios for Emission Reduction Potential Assessment
Use of alternating wet and dry irrigation and rice intensification systems (SRI)	The goal is to implement alternating dry and wet irrigation and SRI by 2030, with 1.5 times more irrigation infrastructure in the field by 2050.
Rice water withdrawal in the interim period	Implement measures to dry rice in the middle by 2030, aiming to increase use by 1.5 times by 2050.
Conversion of inefficient rice cropland into shrimp farmland	Convert inefficient double cropland to rice storage for aquaculture by 2030 and continue toward transition by 2050.
Conversion of inefficient rice cultivation land to shallow rice paddies	Convert inefficient rice acreage to shallow crops by 2030 (projected 3,200 ha) and continue toward transition by 2050.
Agricultural Waste Recycling	Realize a recycling-oriented society by 2050 through the cyclical reuse of livestock excrement as compost for organic agricultural production.
Biogas	A new household-scale tunnel-type biogas production facility will be built by 2030 and continue until 2050.
Improved feed for dairy cows	The goal is to improve fattening rations for 1,000 dairy cows by 2030 and 3,000 cows by 2050.
Beef cattle feed improvement	The goal is to improve fattening rations for 15,000 beef cattle by 2030 and 30,000 cattle by 2050.
Improved buffalo diet	The goal is to improve fattening rations for 200 buffalo by 2030 and 500 by 2050.
New plantations of 5,000 ha of protection and production forests	Protect and sustainably maintain 370,213 hectares of forest through solutions that will have the least impact on the forest. Plant 5,000 ha of new protection and production forests.

- (Waste Sector) Based on the GHG emission reduction measures shown in Table 14, a reduction of 464,000 t-CO_2 is expected in 2030.

Table 14: GHG Emission Reduction Potential in Quang Ninh Province in 2030 (Waste Sector)

solution	Scenarios for Emission Reduction Potential Assessment
Reduction of solid waste generation	Increased public awareness will reduce solid waste generation by 5% by 2030 and 10% by 2050 compared to the business-as-usual scenario.
Solid Waste Recycling	Recyclable waste: 45% of recovered paper and paperboard and 95% of glass and metals by 2030; 90% of recovered paper and paperboard, glass and metals by 2050.
Compost production from solid waste	Utilize biodegradable organic solid waste to produce compost from food, plant, and wood waste.
Combustion of solid waste for power generation	Use solid waste with high calorific value to generate electricity by combustion: by 2030, 70% of waste will consist of cloth, diapers, plastic, leather, 50% of paperboard, and 55% of vegetation and wood; by 2050, 70% of waste will consist of cloth, diapers, plastic, leather, 50% of paperboard, and 50% of vegetation and wood vegetation and wood.
Production of RDF fuel plates from solid waste	Utilize solid waste with high calorific value and burn electricity generated from waste; 25% of waste by 2030 and 20% by 2050 will consist of cloth, diapers, plastic, and leather.
Optimization of domestic wastewater treatment conditions to reduce GHG emissions	Apply to 30% of wastewater discharge by 2030 and 70% by 2050.
Application of biotechnology to remove CH_4 from domestic wastewater treatment processes	Apply to 30% of wastewater discharge by 2030 and 70% by 2050.
Optimization of industrial wastewater treatment conditions to reduce GHG emissions	Apply to 30% of wastewater discharge by 2030 and 70% by 2050.
CH from industrial wastewater treatment$_4$ gas recovery	Apply to 30% of wastewater discharge by 2030 and 70% by 2050.

- The GHG emission reduction potential for 2030 is shown in Table 15, with an overall reduction of 18,501 thousand t-CO_2
- However, this reduction is only about a quarter of the increase in GHG emissions from 2020 to 2030 (BAU) of 73,998,000 t-CO_2, and more challenging efforts must be included to reach net zero.

Table 15 GHG Emission Reduction Potential by Sector in Quang Ninh Province by 2030

Unit: thousand t-CO2

Department	GHG emission reduction potential	
	thousand t-CO_2	%
Energy Sector	-17,367	93.9
Industrial Process Division	-57	0.3
Agriculture and Land Use Sector	-611	3.3
Waste Division	-464	2.5
Total amount	-18,501	100

(3) Main comments from conference members

[Energy Sector]

- The 2030 inventory calculations and projections should include the transition to renewable energy sources such as wind, solar, and biomass.
- The trend of energy shift to hydrogen and ammonia fuels should also be included in emissions calculations and projections.
- Hanoi University of Science and Technology is planning to build a self-contained thermal power plant (12 MW) at But Son Cement Company using waste heat from the plant, and this effort should be included in future plans.

[Agriculture]

- Solutions for conversion of inefficient rice land to fruit trees, i.e., conversion of two-crop rice to one-crop rice and one-crop rice to other food crops, should be clearly indicated. Note that the solution for conversion of rice land to other agricultural land should be noted, as rice land is special and conversion must be based on a plan.
- Solutions to improve nutrition of cattle and buffalo should be clearly presented.

[Traffic]

- According to the national decision document 876/QD-TTg (2022), the direction for 2030 regarding the green energy transition and reduction of carbon and methane emissions in the transportation sector is "the share of public passenger transport in urban areas of the first class will reach at least 5%", which needs to be aligned with this.
- The policy in decision document 876/QD-TTg to convert all buses to electricity and green energy in the period from 2023 to 2030 and new investments need to be aligned with this.

[Tourism and Fisheries]

- Data on aquaculture, services (restaurants, hotels, etc.), and tourism in Ha Long Bay are unclear; by 2030, the direction of development of the services industry in Quang Ninh Province will be so great that it must be carefully considered for future projections.
- Information needs to be updated to assess GHG emissions from aquaculture (shrimp farming).

[Cement factory]

- Introduction of GHG reduction measures in cement plants
  - Electric furnace inverter reduces power consumption

- Reduction of clinker use
- Conversion from high-voltage lighting to energy-efficient LED lighting
- Power saving by installing inverters
- Conversion from coal-fired to biomass-fired

[Thermal power plant]

- Calculations regarding the emissions of thermal power plants need to strictly follow the 8th National Electricity Development Plan. In particular, the conversion process of biomass and ammonia fuels for power plants that have been in operation for 20 years, specifically the Cam Pha thermal power plant, must be clearly stated in accordance with the Plan.
- For solutions to reduce GHG emissions, detailed and specific solutions applicable to thermal power plants are needed.

[Sorbent measures]

- Achieving net zero requires not only a reduction in GHG emissions, but also an increase in forest absorption.
- In Ba Che District, about 74% of the total area (about 60,000 ha) is forest. Quang Ninh Province has announced a policy on forest development (afforestation of large-diameter trees and afforestation of native trees), which needs to be harmonized.

[Comment from JNK]

- The technological factors and solutions to the technological transformation need to be more specific. Solutions must be relevant to reality, feasible, and useful to the goal.
- Shiga Prefecture is ready to exchange opinions and other information for the formulation of the Net Zero Plan, and we will receive comments on the contents of today's report, which we hope you will make use of.
- Since last year, Shiga-based companies have been visiting Quang Ninh Province to promote the introduction of solar power generation equipment, waste heat chillers, boilers, johkasos, sludge gasification and power generation, carbonization of sludge, and other decarbonization technologies. We hope that they will take an interest in our efforts, and we would like to have the opportunity to collaborate with them toward the goal of Net Zero emissions.

(4) Future actions

DONRE requested input on the draft report from Shiga Prefecture, which has developed and is developing a plan for net zero, so a draft plan has been given to Shiga Prefecture, which is in the process of listening to the input. Shiga Prefecture

plans to continue to support the formulation of a net-zero plan for Quang Ninh Province in the next fiscal year and beyond.

4. Identification of Japanese companies with decarbonization technologies

4.1 Mokube shipyard Co., Ltd.

4.1.1 Background

At the conceptual stage before implementing the intercity partnership project between Quang Ninh Province and Shiga Prefecture, we consulted with Shiga Bank, which has a wealth of information on companies in the prefecture, in order to find a company in Shiga Prefecture with decarbonization-related technologies. Shiga Bank is a unique company that promotes global environmental conservation through its business activities, including the development and provision of financial products and services that promote SDGs and ESG initiatives. One of the Shiga Prefecture companies with decarbonization technologies that was introduced to us by Shiga Bank was Mokubei Shipyard, which has experience in manufacturing EV ships.

Last year, when we proposed the City-to-City Collaboration project and in the first year of the project, we did not fully understand the needs of Quang Ninh Province, so we did not approach them. However, when we received a request from the Ha Long Bay Management Office to introduce trash collection boats and environmental education boats, we visited Mokei Shipyard and confirmed their intention.

4.1.2 Company Profile and Performance

Founded in 1872, Mokube shipyard Co., Ltd. is a shipbuilding company that has manufactured many ships, including sightseeing boats that cruise around Lake Biwa (such as "Michigan" owned by Lake Biwa Kisen), environmental education boats (such as "Uminoko," a floating school on Lake Biwa owned by Shiga Prefecture), and rescue ships.

Source: Lake Biwa Floating School HP

Photo 17: Lake Biwa Floating School "Uminoko

In addition to its experience in manufacturing garbage collection ships (the "Otori III" ordered by the Ministry of Land, Infrastructure, Transport and Tourism), the company has also manufactured a 100% lithium battery EV ship as a result of joint research with Tokyo University of Marine Science and Technology, and delivered a second ship to Mihama Town, Fukui Prefecture, in August of last year.

The company is a strong candidate for a partner company because it can respond to Quang Ninh Province's request for the introduction of garbage collection ships and environmental education ships, and because the introduction of EV ships will lead to decarbonization.

Photo 18: Garbage collector and patrol ship (Otori III) manufactured by Mokube shipyard Co., Ltd.

5. Reports, Presentations, etc.

5.1 Presentation at COP28

5.1.1 Background

The Quang Ninh-Shiga Prefecture intercity cooperation project was promoted in collaboration with JICA expert Fujimura, who was stationed at the DPI in Quang Ninh Province, because there was a lot of overlap between the green growth promotion support project in Quang Ninh Province based on JICA's Clean City Initiative and the Quang Ninh-Shiga Prefecture intercity cooperation project. In particular, for the introduction of johkasos, frequent information exchange with the Ha Long Bay Management Authority and other related organizations led to proposals for the Grant Assistance for Grass-Roots Human Security Projects Scheme and the Grant Aid Scheme（The Economic and Social Development Programme）, and the introduction of johkasos was realized under the Grant Assistance for Grass-Roots Human Security Projects Scheme.

The Ministry of the Environment, together with JICA, launched the Clean Cities Partnership Program (C2P2) in February 2023, also in collaboration with Japanese local governments, private companies, financial institutions, and international development finance institutions (MDBs), to support partner cities in addressing climate change, environmental pollution, circular economy, and natural revitalization, including The program aims to support urban issues including climate change, environmental pollution, circular economy, and natural revitalization in partner cities. We have heard that this project was recommended by both the Ministry of Environment and JICA as a good example of C2P2 at the side event of COP 28 held in Dubai this time, in view of its excellent collaboration with JICA.

5.1.2 Summary of the presentation

The venue is the Japan Pavilion at EXPO CITY DUBAI in Dubai (see Photo 19).

The program is shown in Figure 11. After introductions by the Ministry of Environment, JICA, and the Asian Development Bank on Japan's efforts to address urban issues in overseas partner cities, presentations and introductions were made by Shiga Prefecture and Quang Ninh Province as the first of the C2P2 good practices and promising projects. This was followed by an introduction of the initiatives of Urasoe City (Okinawa Electric Power Co., Inc.) and Ai Lai Province, Palau, and an introduction of the initiatives of Sakai City and Ba Ria Vung Tau Province, Vietnam, as well as the MOU conclusion ceremony.

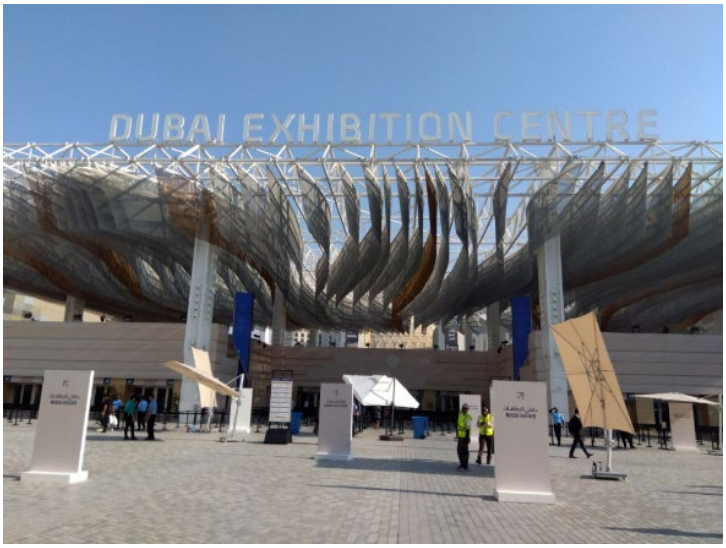


Photo 19: Exterior view of EXPO CITY DUBAI, the venue

Clean City Partnership Program (C2P2) Seminar

～ Urban Agenda on Climate Change, Pollution and Biodiversity Loss ～

Date December 6, 10:30~11:45 (local time)

Venue Japan Pavilion

Organisers Ministry of the Environment, Government of Japan (MOEJ)

Co-Organisers Japan International Cooperation Agency (JICA), Institute for Global Environmental Strategies (IGES)

Session 1 Efforts by the Government of Japan

- Mr. Yuta MATSUZAWA, Vice Minister for Global Environmental Affairs, Ministry of the Environment, Japan
- Mr. Takahiro MORITA, Director General, Global Environment Department, JICA

Session 2 Efforts to cities by Multilateral Development Banks

- Mr. Norio SAITO, Senior Director, Water and Urban Development Sectors Group, ADB

Session 3 C2P2 Good Practices and Expected Projects

① Quang Ninh Province, Viet Nam x Shiga Prefecture, Japan

A good case of collaboration with JICA: Soft and hard support for the introduction of jokaso in the Ha Long Bay areas

- Mr. Tadaaki INOUE, Assistant Section Chief, Commerce and Industry Policies Division, Department of Commerce, Industry, Tourism and Labor, Shiga Prefecture, Japan
- Ms. Tran Thi Thanh Tam, Manager, Foreign Economic Relations Division, Department of Planning and Investment, Quang Ninh Province, Viet Nam

② Airai State, Palau x Urasoe City, Okinawa, Japan

Renewable energy promotion in the island context

- Mr. Xavier E. Matsutaro, National Climate Change Coordinator and Focal Point to the UNFCCC
- Mr. Hidenori ISHIGURO, Submanager, International business Unit, JAPAN NUS CO LTD(JANUS)
- Mr. Hiroyuki MOTONAGA, President, Okinawa Electric Power Company

③ Ba Ria Vung Tau, Viet Nam x Sakai City, Osaka, Japan

Zero carbon Eco-Industrial Park Initiative

- Mr. Masahiko TSUJIO, Director, Carbon Neutrality Promotion Department, Environment Bureau, Sakai City, Japan
- Mr. Dang Son Hai, Deputy Director, Department of Natural Resources and Environment, Ba Ria Vung Tau province, Viet Nam

④ Ba Ria Vung Tau, Viet Nam x Sakai City, Osaka, Japan

Signing Ceremony of Memorandum of Understanding on City-to-City Collaboration between Sakai City and Ba Ria Vung Tau Province

- Mr.Hideki NAGAFUJI, Mayor of Sakai City, Japan (Video Message)
- Mr. Nguyen Cong Vinh, Vice Chairman, People's Committee of Ba Ria Vung Tau province, Viet Nam

Session 4 Introduction of the City-to-City Collaboration Program

- Ms. Yatsuka KATAOKA, Program Director, City Taskforce, Institute for Global Environmental Strategies (IGES)

Figure 11: Clean Cities Partnership Program Seminar Program

The presentation by Shiga Prefecture included an introduction of Shiga Prefecture, the Lake Biwa Model, and the Green Growth Promotion Project in Quang Ninh Province, followed by an explanation of the City-to-City Collaboration Project with Quang Ninh Province, including a project overview, project implementation structure, project promotion policy, the status of introduction of johkasos, and the seminar and exchange meeting on decarbonization and water environment conservation held last fiscal year (see Appendix 5 in the Materials section).

Photo 20: Presentation by Shiga Prefecture (Presenter: Mr. Inoue, Chief, Commerce and Industry Policy Division, Commerce, Tourism and Labor Department)

Quang Ninh Province also introduced Quang Ninh Province, followed by its initiatives and future plans for green growth, which have been implemented with JICA and other organizations, and its efforts to maintain and manage johkasos, including a draft ordinance on decentralized wastewater treatment and johkaso management regulations (see Appendix 6 in the Materials section).

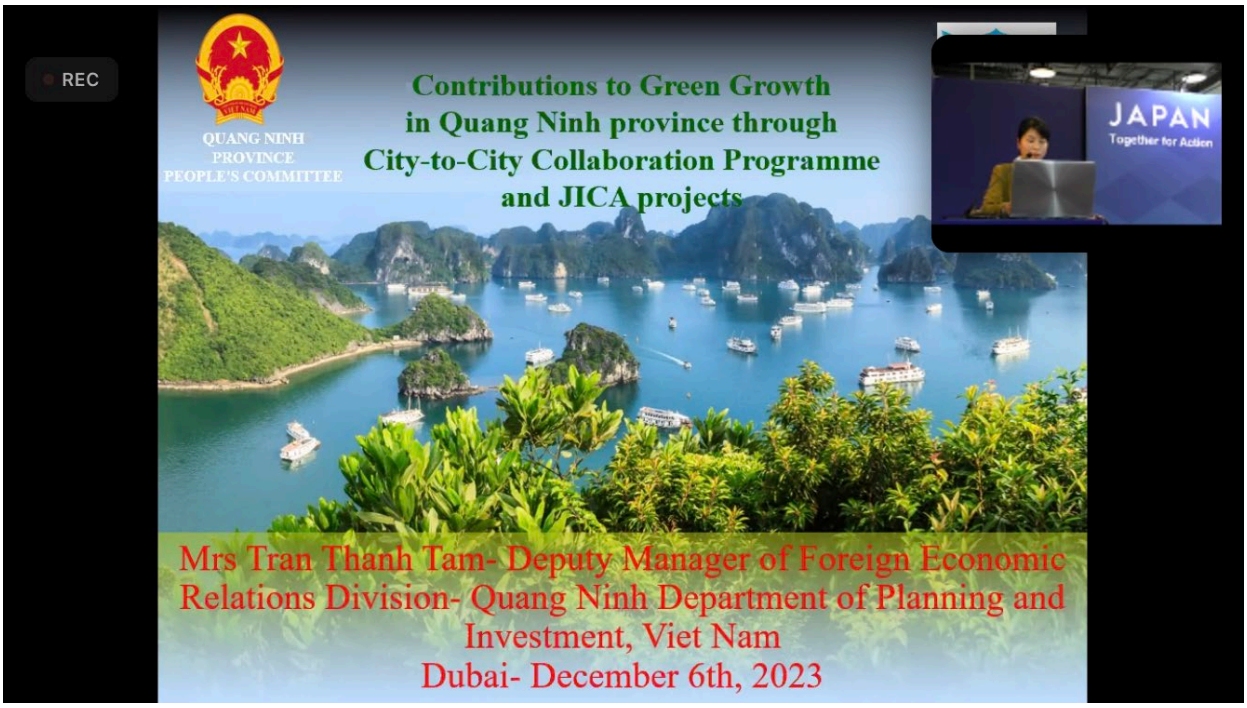


Photo 21: Presentation by Quang Ninh Province (Presenter: Mr. Tam, Director, Overseas Economic Relations Division, Department of Planning and Investment)

6. Future plans

6.1 Introduction of solar power generation

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

6.2 Installation of a chiller/boiler using waste heat

At this time, due to the Tet vacation and other circumstances, we have not been able to contact a total of 11 companies introduced by EAMB and DOIT. First, we will focus on explaining the superiority of Kawasaki Thermal Engineering Co., Ltd. 's products to these 11 companies and encourage them to introduce our products.

In addition, we will continue to reach out to new factories and companies by having the EAMB provide us with information on new companies that are moving into industrial parks in Quang Ninh Province.

6.3 Introduction of johkasos

We have proposed the introduction of johkasos and ships to the Grant Aid (The Economic and Social Development Programme) scheme, which has been registered as a project for FY2025 or later. We will communicate with the Embassy and provide materials as requested by the Ministry of Foreign Affairs to ensure that the project will be implemented in FY2025 or later. The Grant Aid （The Economic and Social Development Programme） scheme is based on the Vietnamese government's request and is approved by the Japanese government via the Embassy. The Ha Long Bay Administration Board and Quang Ninh Provincial Government will take the lead in the process, but we will continue to provide support from the side.

In response to the city of Cam Pha, which wishes to introduce decentralized wastewater treatment, we will accompany a site survey to the target area, propose an appropriate scale and number of tanks, support the city's consideration of an introduction plan, and propose issues and solutions for the realization of the project, such as pipeline installation and maintenance management after the introduction of johkasos.

In addition to Cam Pha City, if there are any local cities or districts in Quang Ninh Province that wish to introduce decentralized wastewater treatment, we will actively share information and promote its introduction.

6.4 Effective utilization of sludge, etc. (sludge gas power generation and heat supply)

DOST has lost interest in the project and DOIT has not been active in introducing firms, but EAMB has introduced us to potential firms, although we have not yet been able to contact them. In addition, there are companies that are not under the jurisdiction of DOIT and EAMB, but are under the jurisdiction of DPI or DONRE. For example, the Ha Long Beer Company (official name: Ha Long Beer and Beverage Joint Stock Company), which exists in Ha Long City, is managed by DPI and the People's Committee of Ha Long City. We would like to explore the possibility of introducing a sludge gas power generation and heat supply project by providing explanatory opportunities to these companies that have not yet been approached.

As for the issue of banning private consumption of surplus electricity, administrative guidance to the contrary has been issued by the DOIT of Quang Ninh Province amid concerns about power shortages. It is unlikely that the decision was made by the Vietnamese government or the Quang Ninh Provincial People's Committee. We hope to understand this point in detail in the next fiscal year. This is a problem that will hinder the implementation of all projects, including power generation.

With regard to the cost issue pointed out in the DOIT, we will examine the possibility of using facilities of a scale that can achieve economies of scale, and at the same time, we will hold hearings with related organizations to discuss the possibility of utilizing JCM-related facility subsidy schemes, particularly NEDO's "Low Carbon Technology Promotion Project Using the Joint Crediting Mechanism (JCM)," which provides 100% subsidies.

6.5 Effective utilization of sludge, etc. (carbonization of sludge and application (burial) of biochar)

The decarbonization effect of biochar application (burial) has been globally recognized with the addition of a method for calculating carbon fixation associated with charcoal inputs to agricultural and grassland soils in the 2019 Improved IPCC Guidelines. In Japan, we have heard that credits from biochar application (burial) are priced and traded under the J-Credit system.

However, in Vietnam, the central government has only declared a net zero, and no specific instructions have been issued to the People's Committees of provinces and cities under direct control, and no plans for decarbonization have been made. Except for DONRE, which is in charge of decarbonization, there is no awareness or momentum for decarbonization in the relevant bureaus, companies, or citizens. Therefore, even if a project is proposed, the decarbonization effect will be minimal at this point. Therefore,

even if a project is proposed, the decarbonization effects are not taken into account at this point, and only cost benefits are being discussed.

Sludge carbonization and biochar application (burial) are projects that are unlikely to generate revenue on their own if their decarbonization effects cannot be counted, and have been paired with sludge gas power generation and heat supply projects to explain their introduction. On the other hand, since the sludge gas power generation and heat supply project is difficult to introduce because it is judged only in terms of cost, as mentioned above, we will promote the sludge gas power generation and heat supply project by considering the use of NEDO's "Low Carbon Technology Promotion Project Utilizing Bilateral Credit System (JCM)" and other programs, and we will also promote the sludge gas power generation and heat supply project, even if the possibility of introducing the project is small. In addition, even though the possibility is small, we will consider trying to promote the introduction of carbonization of sludge and application (burial) of biochar alone by explaining the benefits to the public organizations concerned.

6.6 Support for Institution Building in Quang Ninh Province

Quang Ninh Province has traditionally recognized that it must create a climate action plan and move toward decarbonization, and it is moving to update its plan in line with its commitments at COP26.

In December 2023, Quang Ninh Province DONRE prepared a draft report on GHG inventory, reduction measures and reduction effects, and on January 2, 2024, relevant departments of Quang Ninh Province, People's Committees of cities and districts in the province, universities, and enterprises in the province gathered for consulting on the draft report. The meeting was held in Quang Ninh Province. Shiga Prefecture has also been asked to provide advice on the draft report, which is currently under consideration.

The draft report presents GHG emissions and reduction measures for each sector (energy, industrial processes, agriculture/land use, and waste), and estimates future emissions in the Business As Usual (BAU) and countermeasure cases.

The emissions of the 2030 action case (105 Mt CO_2) are slightly more than twice the 2020 emissions (49.5 Mt CO_2), which is only about 15% (18.5 Mt CO_2) less than the 2030 BAU emissions (123.5 Mt CO_2).

Quang Ninh Province has a large number of coal-fired power plants and is a hub for electricity supply, so there is a problem that major reductions will be difficult to achieve immediately. In addition, the Vietnamese government's declaration of net-zero emissions does not mean that all provinces need to achieve net-zero emissions across the board. However, a 15% emission reduction from BAU in 2030, the transitional point toward 2050, is probably too small. Although it is a policy issue for Quang Ninh Province and therefore difficult for the Japanese side to intervene, we would like to share our knowledge and

expertise in Shiga Prefecture to show that the reductions currently envisioned and that further reductions are not impossible.