FY2018 Project for Ministry of the Environment Japan

FY2018
City-to-City Collaboration Programme for Low-Carbon Society

Project to Accelerate Low Carbonization in Hai Phong City (Feasibility study on low carbonization project mainly through Eco Park in Vietnam)／Kitakyushu-Hai Phong Cooperation Project

Report

February 2019

NTT Data Institute of Management Consulting, Inc.

Contents

Accompanying Materials

Reference a：Materials of Kick-off Meeting with MOEJ

Reference b：Material of First Meeting with MOEJ

Reference c：Material of Second Meeting with MOEJ

Reference d：Material of Final Meeting with MOEJ

Reference e：Material for EIP Workshop in Hai Phong City

Reference f：Material of NamCauKien_JCM Seminar

Chapter 1: Background and Objectives of the Project

Chapter 1 Contents

1.1 General Outline of Hai Phong

Hai Phong City is a centrally-controlled city (Municipalities of Vietnam) with a population of about 2.0 million (as of 2017), and is the third largest city in Vietnam, ranked just behind Hanoi and Ho Chi Minh. Located in a coastal area, about 100 km east of the capital, Hanoi. Hai Phong City is the largest marine logistics base in northern Vietnam, where many large industrial parks exist. It is connected to the capital Hanoi by National Route 5. In addition, an expressway was opened on December 2015 from Hanoi to Hai Phong City, connecting the belt highway 3 to the Dinh Vu port in the Red River delta region of Hai Phong City.

The Hai Phong Port is the largest container port in northern Vietnam, and has a capacity of accepting up to 40,000 DWT (dead-weight tonnage). Lack Huyen port, which is under construction off the shore of Hai Phong Port, and the land space of the port is 1,200 ha. Two large 100,000 DWT class ships alongside each other are able to enter the birth of Lach Huyen port at the same time. Hai Phong City, as the largest harbor logistics base in northern Vietnam, aims to be an environmentally friendly, green port city.

The economy of Hai Phong City is growing at a rate of about 7.5% per year, and the per capita GDP has reached 2,500 USD (in 2013). There are 11 industrial parks in the city, and more than 50 Japanese companies have entered the market. It is expected that more companies will enter for its smoother economic growth and the importance as a logistics base. In particular, Hai Phong City is also known as the area with a 100 year plus history of having many foundries located in itself. Currently approximately 140 foundries are based in the area.

In addition, approximately 60 km southeast of Hai Phong City's mainland, an island called Cat Ba exists. Cat Ba belongs to the administrative units of Cat Hi prefecture in Hai Phong City. Cat Ba Island is the largest island in Halong Bay, which is famous for its World Heritage Sites. About 1.4 million visitors, far more than Cat Ba's population of about 17,000 people, come for tourism each year and enjoy the nature and rich ecosystem of the island.

1.2 Policy on the Reduction of Greenhouse Gas Emissions by the Vietnamese Government

Basic Plan on Climate Change in Vietnam

Basic plans on climate change such as the Sustainable Development Strategy in Vietnam (153/2004 / QDTTg 2004/8/17), the National Target Program for Climate Change (158/2008 / QD-TTg 2008/12/2), the National Climate Change Strategy (2139 / QD-TTg 2011/12/5), the green growth strategy (1393 / QD-TTg 2012/9/25), the Management of GHG Emissions and Carbon Credits (1775 / QD-TTg 2012/11/21), the National Target Program for Climate Change (NTC-RCC) in 2012-2015 (1183 / QD-TTg 2012/8/30), the Resource Management system for Climate Change by Supporters (Ministry of Natural Resources, Ministry of Finance, Ministry of Planning and Investment)(03/2013 /TTLT-BTNMT-BCT-BKHDT), Ministry of Commerce and Industry's Action Plan on Climate Change (4103 / QD - BCT 2010/8/3). In The Green Growth Strategy, GHG emissions target and GHG concentration reduction targets are set.

Figure1.2-1 GHG emissions and concentration reduction targets of Green growth strategy

Term	Amount of GHG emission reduction	Reduction ratio	Reduction of energy consumption to GDP	Domestic efforts	International Support
2011 ～2020	BAU 10～20%	2010 比 8～10%	1～1.5% year	10%	10%
～2030	BAU 20～30%			10%	20%
～2050	1.5～2% year				

（1） Outline of Economy

Vietnam has been promoting its transition toward market economy since the late 1980s, through ways of joining ASEAN and the WTO and others. In the 2000s, Vietnam achieved an economic growth of more than 7% on average, with a per capita income of 2,160 USD. It became one of the lower middle income countries. Since the possibility of economic growth in Vietnam is high in the future as a country adding to the economic growth of the world, the importance of Vietnam is increasing. However, such economic growth in Vietnam brings issues, such as the inadequate development of social infrastructure and the deterioration of environmental problems.

Figure1.2-2 Major economic indicators and others in Vietnam (1990, 2011, 2012,2017)

index	1990	2011	2012	2017
population	6.602 million	8,784million	8,877milion	9554 million
Gross national income	6,595 million USD	117,758 million USD	148,961 million USD	213,005.97 million USD
Gross national income(per person)	130USD	1,270USD	1,550USD	2,160 USD

Source: Ministry of Foreign Affairs, "Official Development Assistance (ODA) Country Specific Da ta Book"

Vietnam has environmental problems, mainly air pollution caused by exhaust gas come from factories and the transportation sector, dust pollution coming from the construction sector, water pollution resulting from poor drainage systems of both industries and households, strong odors due to inappropriate disposal and management of waste methods, loud noise as a result of the transportation sector, and soil contamination due to high concentrations of harmful substances. However, in recent years, an increase in energy consumption has also begun to be recognized as another environmental problem.

Comparing the annual energy consumption in Vietnam with the growth rate of their GDP (2000-2007), it is clear that energy consumption is increasing in with economic growth in Vietnam and it is expected that energy consumption in Vietnam will also keep increasing alongside economic growth in the future too.

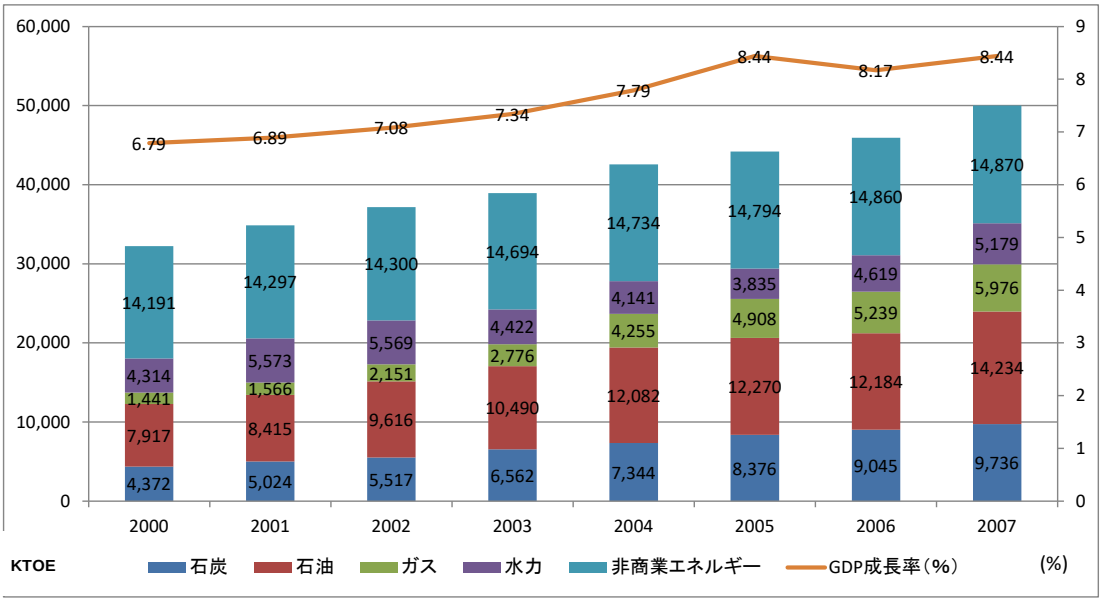


Figure 1.2-3　Primary energy consumption and GDP growth rate by resource in Vietnam (2000 - 2007)

Source：Ministry of Natural Resources and Environment "Viet Nam's Second National Communication to the United Nations Framework Convention on Climate Change"

Figure 2 shows the annual CO2 emissions in Vietnam and annual electric power consumption per capita. Although the annual CO2 emissions have repeatedly increased and decreased from the 1960s to 1990, the annual per-capita electric power consumption and annual CO2 emissions have grown remarkably since 1990. Implementing measures to reduce electric power consumption in Vietnam (where economic growth is expected in the future), would be an effective measure to not only secure a stable electric power supply, but to also reduce CO2 emissions.

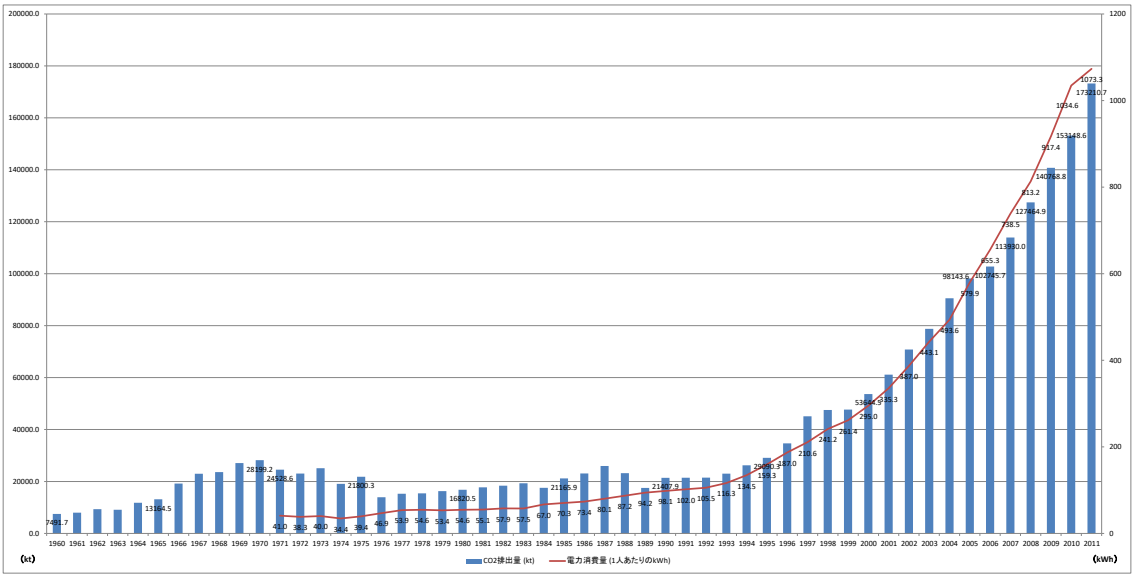


Figure 1.2-4　CO2 emissions (kt) and electricity consumption per capita (kWh) in each sector of Vietnam[1]

[1] (Note) Data of the amount of CO2 emission and those of the per-capita electric power consumption have been released since 1960 and 1971, respectively. Therefore, no data for the 1960s are presented in Figure 2. Created on the basis of the World Bank. World Data Bank.

1.3 Hai Phong City's efforts and issues to reduce greenhouse gas emissions efforts of Hai Phong City

The efforts of Hai Phong City until present to reduce greenhouse gas emissions are described below.

① Formulation of the Green Growth Strategy Action Plan

② Formulation of a green growth promotion plan in Hai Phong City (supported by Kitakyushu City)

③ Public relations activities with citizens on waste sorting and energy saving

Regarding private-sector initiatives, the introduction of energy-saving equipment has begun mainly in companies that are financially prosperous, such as the introduction of exhaust heat recovery systems at Chinfon cement factories, and the introduction of LED lighting to commercial facilities, hotels, etc.

① Formulation of the Green Growth Strategy Action Plan

Hai Phong City has established the Green Growth Strategy Action Plan (1463 / QD-UBND, hereinafter referred to as the HPGGSAP) at the same time as a sustainable economic development plan, with the aim of preserving the environment and reducing greenhouse gas emissions.

In the HPGGSAP, the rough policies for promoting green growth and the role of each department of Hai Phong City are described clearly. Furthermore, it is required that each department set up concrete projects, and that they are obliged to provide a status update on their progress to the Hai Phong People's Committee every year. The main role of each major department specified by HPGGSAP is shown below.

HPGGSAP was established in accordance with the following top three plans, prepared by the central government, and based on the prime minister's decisions, and therefore has legal grounds.

- "Green Growth Strategy (1393 / QD-TTg, decided by Prime Minister in September 2012)"
- "Green Growth Action Plan (403 / QD - TTg, decided by Prime Minister in March 2014)"
- "Development of Hai Phong city at the time of industrialization and modernization of the state <Green Port City> (72-KL / TW, Communist Party Politburo)"

Figure 1.3-1 Main roles of major departments (Hai Phong City Green Growth Strategy Action Plan)

department	Main role
Common to all departments	· Thorough knowledge of HPGGSAP · Human resources development in the administration, civic awareness reform · Concrete the content of HPGGSAP as a project and report on its progress to the city People's Committee on November 10 every year.
Department of Planned Investment	・Establish target evaluation indicators for the whole city (indicators on energy consumption, green production, greening of lifestyle). · Attracting project implementers (domestic and foreign organizations) and examining its management system · Participation in international events / seminars on green growth and international cooperation · Review of the award system for institutions, companies and individuals practicing green growth.
Department of Commerce & Industry	・Establish and oversee indicators on energy consumption and green production in the industrial and commercial fields. We will also promote the spread of green production technology. · To list energy-intensive enterprises, to check the energy usage situation of energy-consuming enterprises, and to support efficiency improvement. · Thoroughly familiarize about energy saving and efficient energy use. Encourage enterprises to introduce energy saving systems. · Conduct inspections of companies that produce and import products such as electric appliances, whether energy saving / labeling system is properly operated or not.
Department of Agricultural rural development	・Lifestyle greening in rural areas · Proper treatment of waste in traditional village village and support for green production · Encourage the use of recycled energy in rural areas · Introduction of technology to reduce greenhouse gas emissions in agriculture, forestry and fishery industry, improvement of production management capacity · Afforestation, maintenance and quality improvement of forest resources (especially forest conservation in biosphere protected areas of Katba Island) · For the fishery industry, promote the energy saving of fishing boat lighting and the introduction of energy conservation technology at aquaculture and fishery processing plants. · Promote circulation agriculture such as the use of organic fertilizer.
Department of Science and Technology	・revitalize existing technology and equipment exchanges and try to disseminate energy saving technologies.
Department of Transportation	・Promote the use of public transportation such as buses. · From the truck transportation, try to convert to mass transit using railway and feeder ship (modal shift).

Department of Mineral Recourse	・Increase the urban green space and waterfront space, to secure the per capita green space area. ・Human resource development and database creation to periodically check greenhouse gas emissions
Department of Construction	・Promotion of energy conservation of construction activities and public lighting ・Introduction of construction technology with less environmental impact ・Reduce the amount of final disposal by intermediate treatment of waste and recycling.

HPGGSAP comprehensively defines the main plans of Hai Phong City, including a sustainable development strategy, various programs such as sightseeing, medical care, as well as a master plan. (in 2011-2020).

② Formulation of Green Growth Promotion Plan in Hai Phong City (Supported by Kitakyushu City)

(A) Relationship with HPHHSAP

In 2014, with the support of Kitakyushu City, "Green Growth Promotion Plan in Hai Phong City" was formulated as a practical edition that clearly shows the concrete action plan of HPGGSAP. The relationship between the plan and HPGGSAP is shown in Figure 1.3.1. The plan was formulated after a discussion between Hai phong City and Kitakyushu City, and has been legally permitted by the Hai Phong People's Committee.

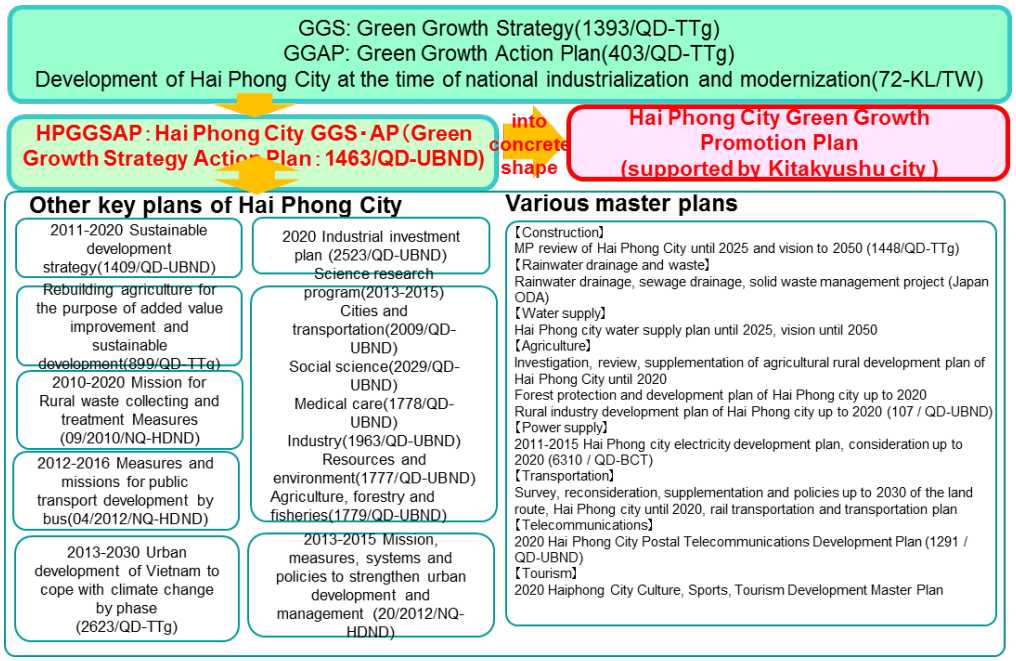


Figure1.3-2Relationship between legal position of HPGGSAP and green growth promotion plan

(B) Outline of the plan

The fields covered by the plan are classified into seven categories of waste, energy, transportation, Cat Ba Island, water supply and sewage / rainwater drainage, environmental conservation and green production. Among them, waste, energy, transportation, and Cat Ba Island, which are closely related to the emission of greenhouse gases, were positioned as the main fields and the rest as other fields. According to these categories, the Green Growth Promotion Plan in Hai Phong City was formulated by the following procedure (Figure 1.3-3)

①Understanding of current status （Understanding current situation and future plans, extracting tasks）
↓
②Strategy formulation （Setting vision and sectoral targets and numerical targets）
↓
③Concrete measures （considering measure by field, Pilot project making）
↓
④Method of verifying strategy and measure
（Feasibility and validity of measures, Study on effect verification method after operation, etc.）
↓
⑤Ordering and fund raising （Fund raising method, Project implementation scheduling and others）
↓
⑥ Schedule managing

Figure 1.3-3　Flow of Hai Phong City Green Growth Plan Formulation

Flow of plan development support flow ③ In the concrete measures, the details of specific measures implemented by Hai Phong City, its implementing body, implementation time, and evaluation index were clarified. For reference, specific concrete measures in the energy field are shown as an example in Figure1.3-5.

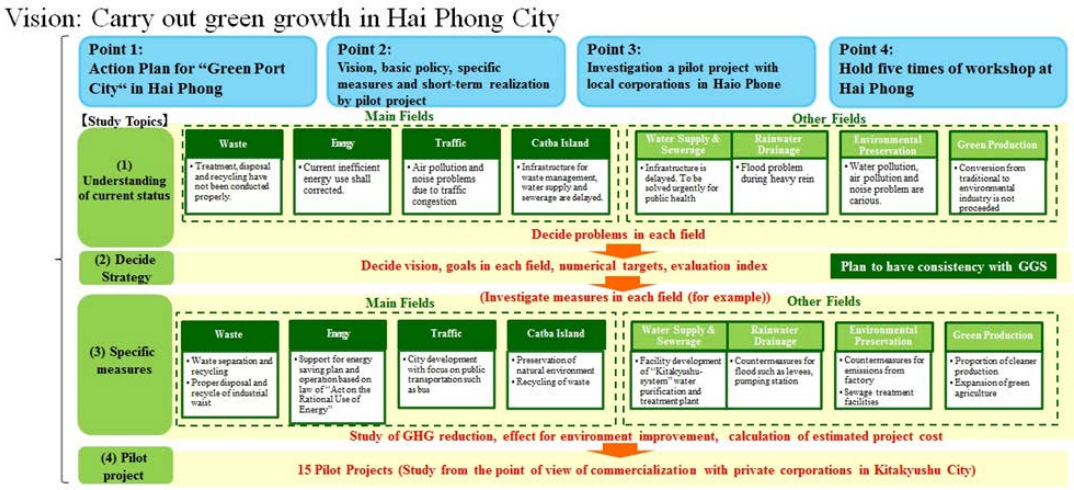


Figure 1.3-5　Flow of Hai Phong City Green Growth Promotion Plan Formulation Support

Figure 1,3-5　Specific measures in the energy field

Business classification	Contents	Main Actor	Project term	KPI
1. Efficient use of energy	・To promote energy conservation efforts in energy consuming enterprises, conduct energy-saving diagnosis by utilizing	Company, DOIT	Short	Energy saving

at factories	energy conservation center etc. and propose methods of efficient use of energy.			amount GHG reduction amount
	・Propose concrete measures such as energy saving and energy reuse that can be applied to small and medium enterprises, and aim for more efficient use of energy.		Medium	
2. Efficient use of energy in commercial facilities, office buildings, etc.	・promoting energy conservation diagnosis in large commercial facilities and office buildings with an annual energy consumption of over 500 TOE, which is the object of the Energy Conservation Law, energy conservation such as lighting and air conditioning equipment with large electricity consumption, introduction of distributed power sources such as renewable energy etc. , We propose a method of efficient use of energy.	Company, DOIT	short	Energy saving amount GHG reduction amount
	・Specific examples of energy conservation and introduction of renewable energy such as newly constructed and remodeled buildings with a floor space of over 2,500 m 2, which is subject to the building energy saving standard (QCVN 09: 2013 / BXD) We propose measures to make energy use more efficient.		Medium	
3. Introduction of cleaner production in factories	・Promote energy conservation by reviewing the production process (cleaner production) that can realize efficient use of raw materials and energy at each factory including supporting industries (casting, metal processing etc).	Company, DOIT	Short	Energy saving amount GHG reduction amount
4. Promotion of introduction of renewable energy	・In order to cope with the shortage of basic electric power, as part of the introduction of distributed type power supply, promote the introduction of renewable energy such as solar power generation, solar heat, small scale wind power generation, geothermal energy use.	Company citizen	Short	Energy saving amount GHG reduction amount
5. Energy saving of public facilities	・Hai Phong Municipalities will promote energy saving and energy efficient use of the facilities related to the city, People's Committee, etc.	Administrative agency	Short	Energy saving amount GHG reduction amount
	・Promote energy saving lighting such as LEDs for existing and new road lights and street lights.	DOT		
6. Promotion of energy management	・Introduce a system of energy management utilizing smart meters etc. in factories, office buildings, commercial facilities, and homes to promote optimization of energy use such as peak cut response.	Company citizen	Medium	Energy saving amount GHG reduction amount
	・For stable operation in industrial estates and the like, we introduce a system that collectively receives power and perform voltage control, and aim to stabilize the voltage in the main power.	company		
7. Enhancement of energy conservation promotion system	・In order to promote efficient use of energy, we will examine and evaluate energy use situation of priority energy use agencies and support improvement of usage efficiency.	Company, DOIT	Short	Energy saving amount GHG reduction amount
	・In order to introduce and disseminate green production methods in the industrial field, we set indicators (greening indicators) to evaluate energy conservation and environmental load reduction.			
	・Regarding energy conservation and efficient use of energy, we conduct educational activities for corporations and citizens, while building energy-saving models in each household, disseminate energy conservation.	Company citizen DOIT		

③ Public relations activities for citizens on waste sorting and energy saving

In Hai Phong City, citizens are called out to by outdoor speakers to separate garbage and save energy in the morning and evening.

In addition, the Energy Conservation Center of the Bureau of Commerce and

Industry creates and distributes brochures aimed at promoting energy conservation to households. In addition, they hold elaborately planned contests, in which they compete with knowledge on energy conservation and efficient energy saving methods, together with electric power companies, schools, etc., every year.

Figure 1.3-6 Brochure of promoting energy saving at home

A. 2011 年度の電気の節約・有効的利用のコンテスト

「2011 年の節約的・効果的な電気利用」コンテスト開催に関するハイフォン市給電運営指導委員会の 2011/4/9 日付 276/KH-BCD 号計画を実施し、節約的・効果的・安全な電気利用に関する人民の意識を高めるために、工商局の省エネセンターは、ハイフォン電力一人メンバー有限責任会社と LeChan 区青年団と共同して上記のコンテストを開催した。

I. 参加者

・ハイフォン市 LeChan 区の DuHangWard チーム、TraiCauWard チーム、HangKenh Ward チーム、DuHangKenhWard チーム。

・1 つのチームは 5 人のメンバーを含む。

II. 招待者

・市給電運営指導委員会、工商局、関連部局、関連区町、コンテストのスポンサー、記者

・約 350 人

III. コンテストの目的

・節約的・効果的な電気利用に関する基本知識を家庭およびコミュニティに宣伝する。

・宣伝者、協力者の宣伝能力を確認する。

・節約的・効果的な電気利用モデル・発想を紹介する。

IV. コンテストの内容

4.1. 挨拶

形式：ステージでのドラマのように、チーム全体の紹介

時間：5 分

点数：10 点

4.2. 節約的・効果的な電気利用に関する知識のコンペ

形式：各チームから 2 人の代表者が節約的・効果的な電気利用に関する１０つの質問を答える。

時間：5 分

点数：10 点

4.3. 芸コンペ

形式：各チームは、節約的・効果的な電気利用に関する内容の歌・ダンス・ドラマなどを演奏する

時間：10～20 分

点数：20 点

4.4. スピーチコンペ

形式：各チームから 1 人の代表者がチームの節約的・効果的な電気利用に関する発想について発表する

合計で最も高い点数を取ったチームは優勝。

B. 2014 年度の「グリーン世界のため」の黄金鐘鳴らしコンテスト

2014 年度ハイフォン市持続可能発展ハイフォン市人民委員会の 2014/1/16 日付 391/KH-UBND 号計画および 2014 年度事業プログラムの任務を展開するため、省エネセンターは LeChan 中学校と共同して「グリーン世界のため」のコンテストを開催する。

I. 参加者

ハイフォン市の LeChan 中学校の学生と教員

II. 招待者

工商局、教育局、区町の教育部、ハイフォン電力一人メンバー有限責任会社、その他の学校の代表者、記者

III. コンテストの目的

・省エネと環境保全意識を学校の生徒に身に着けさせる。

・節約的・効果的・安全なエネルギー利用を促進するために必要な情報・知識を生徒に提供する。

・日常生活における節約的・効果的・安全なエネルギー利用と環境保全の知識・スキルを持つ青年宣伝者を育成する。

IV. コンテストの内容

時間	内容	実施	備考
7:30~8:00 8:00~8:20	- 客歓迎 - 歌演奏	LeChan 中学校	生徒に電気省エネ宣伝パンフレットを配布
8:20~8:25	- 代表者紹介	司会者	
8:25~8:30	- 開催スピーチ	省エネセンター	
8:30~8:45	- グリーン環境の紹介	司会者	
8:45~9:35	- 黄金鐘鳴らしゲーム	LeChan 中学校の生徒	
15'	ドラマ	LeChan 中学校の生徒	
9:50~10:05	環境保全テーマのファッションショー	LeChan 中学校の生徒	
10:05~10:15	表彰	省エネセンター＆LeChan 中学校	
10:30	閉幕	司会者	

V. 資金：省エネセンターの資金

Figure 1.3-7 Energy saving contest Program overview

(2) Issues

In addition to describing the administrative issues in advancing the efforts of the previous section, the issues regarding “waste”, “energy”, and “traffic”, which are closely related to the emission of greenhouse gases, are presented below.

① Administrative Issues

(A) It takes time before the law/plan is actually implemented.

In Vietnam, ordinances incorporating new ideas of developed countries, such as the Environmental Protection Act (formulated in 1993, the first revision in 2003, the second revision in 2014 (effective on January 1st in 2015)), the Energy Saving Act (Established in 2010), and the law on waste disposal and recycling Laws which are being developed.

In addition, as mentioned above, the Green Growth Strategy (GGS) was formulated in 2012 and the GGS Action Plan was formulated in 2014, and measures necessary to promote greenhouse gas reduction and clean energy use were laid out.

Even if laws and policies are set at the national level as described above, it takes time for proper implementation at the local level in many cases. In Hai Phong City, the planning and execution of energy conservation plans by designated businesses, based on the Energy Conservation Law enacted in 2010, has just started.

(B) Hai Phong City’s Inefficient Law Operation and Plan Implementation

The system of legal management and plan implementation lack certainty for the reason that the authority of each department has not been organized yet. In addition, there may be a lack of responsibility. Particularly in the waste field, the department in charge is different depending on whether it is urban or rural and depending on the type of waste. Thus, it is difficult to accurately know the true situation regarding waste in the city and also efforts for properly managing (separation of garbage, 3R, etc.) are inefficient.

(C) There are a shortage of funds, personnel, and data for environmental conservation (such as greenhouse gas reduction).

Development that directly relates to economic development is prioritized, budget for environmental conservation such as greenhouse gas reduction is not enough, and the effectiveness of environmental conservation measures is low

(the administration is satisfied with only making plans).

Also, since there is a low budget, there is a lack of human resources and monitoring data on greenhouse gas reduction, and thus it is difficult for each city itself to estimate how much each city is emitting greenhouse gases as a whole, as well as to implement effective countermeasures on the basis of the estimate.

As described above, support from the Japanese Government and Kitakyushu City for making a system of legal operation and a plan of implementation overseen by a human resources department, as well as providing financial support, are still necessary.

② Issues in the waste field

(A) Inappropriate sorting and recycling of household waste

Waste is landfilled as is, without being sorted and recycled, so there is a concern that the landfill site will become tight. On the other hand, due to the opposition of residents, it is difficult to establish new landfill disposal sites.

There is a composting facility at the Trang Cat Landfill site, but because waste is not properly sorted, it can't produce high-quality compost, which is only used to for covering a landfill.

Figure 1-3.8 Trang Cat repository Current status of composting facility

(B) Improper treatment ofwaste produced in daily life

Incineration treatment for waste produced in daily life is still rare, and thus it is necessary to promote the reduction of waste as well as composting using incineration facilities or biogas facilities.

While a small incinerator (20t/day) developed by the Hanoi University of Technology is operating in rural areas, but because garbage collection sites are not maintained, incinerators are not properly controlled, and there is scattered garbage around the incinerators, which might be the cause of environmental pollution in the surrounding fields.

In many cases, hazardous waste is landfilled together with general waste, which can cause health problems and pollution of the environment

Figure 1.3-9 Incineration facility in Kien Thuy Province

(C) Traceability of industrial/medical/harbor waste

Regarding industrial/medical/harbor waste, it is a rule that such kinds of waste should be processed by a city designated company in a predetermined fashion. In practice, however, it is not sufficiently known to what extent waste is appropriately treated, so it is necessary to understand the actual condition and ensure traceability.

For companies that illegally dump, it is necessary to take strict measures based on government ordinances on Penalties for Violating Laws and Regulations in the Field of Environmental Protection (Decree No. 1/2006 / ND-CP)".

Figure 1.3-10 Illegal dumping

(D) Actual situation of recycling business

Although the household appliance recycling law is being improved, environmental pollution is now caused by inappropriate recycling of various waste such as inappropriately recycled home appliances in the handicraft

villages.

(E) Waste generation volume

The amount of waste generated in 2025 is expected to be more than four times the current amount. It is urgent to develop waste disposal systems and build disposal facilities.

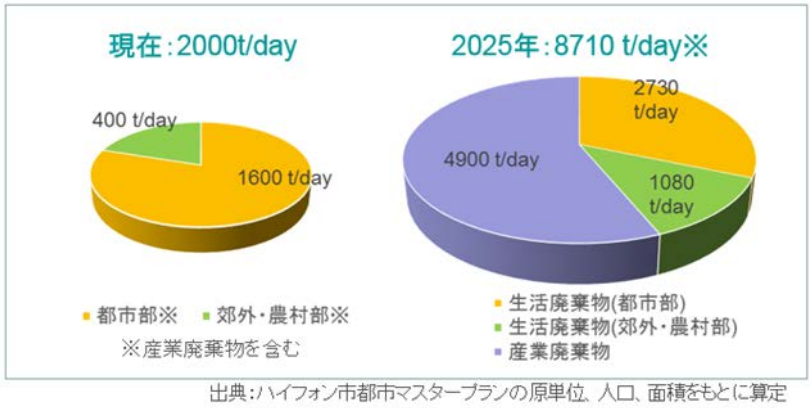


Figure 1.3-11 Amount of current and future waste generation

(F) Waste incineration capacity

The incineration capacity is overwhelmingly insufficient (now: 33.9 t / day).

Figure1.3-12 Ability of incineration facilities in Hai Phong city and others

Manager of the facility	Place	Capacity	Objects to be incinerated
URENCO	Trang Cat waste disposal field	1.6 t/day(200kg/h)※	Medical, hazardous waste
URENCO	Trang Cat waste disposal field	0.5t/day(60kg/h)※	
Kien Thuy province	Inside Haiphong City	20t/day	Municipal waste
Company A	Inside company A	10t/day	Hazardous waste
Company B	Inside Company B	1.8t/day	Medical, hazardous waste

※When operating for 8 hours

(G) Waste circumstances of Hai Phong City

In Hai Phong city (urban area), 1,600t of waste a day is created by homes and business establishments, and only 200 tons of that is brought to the compost facility in the Trang Cat disposal site. Most of the rest is landfilled at a final disposal site.

③ Issues in the energy field

(A) High dependence on fossil fuels

As the population increases, factories and service facilities are being remarkably developed, which creates a concern that in the future that large amounts of energy will be consumed, and an issue that GHG emissions will increase. Hai Phong City has four coal-fired power plants (Pha Lai, Wong Bi, Hai Phong 1, Hai Phong2) as power supply sources, which are highly dependent on fossil fuels. A distribution of energy sources, such as the use of renewable energy, is necessary from the viewpoint of global warming prevention and energy security.

(B) Electric power problems

There is a power outage about twice a month, and a single power outage lasts for several hours to half a day. Therefore, many factories are equipped with private power generation facilities. Voltage in Hai Phong City is unstable, and electric power is in low quality, so it may hamper the operational stability and

sophistication of industry. The power transmission loss is large, and it is necessary to take action to ensure efficiency of transmission and distribution systems.

(C) Promotion of energy saving measures

Full-scale operation promotion of energy saving measures, such as the formulation and execution of energy conservation plans of specified business operators based on the Energy Conservation Act, have just started, and are necessary to promote the efficient use of energy through the means including the introduction of energy saving equipment to companies.

	
Haiphong 1 coal thermal power plant	Hospital's coal-fired boiler

Figure1.3-13 Ability of incineration facilities in Hai Phong city and others

- In factories and hospitals with steam needs, coal-fired boilers are mainly used and cause environmental pollution.
- The efficient utilization of energy, such as the utilization of waste heat, is rarely carried out.
- In office buildings and commercial facilities, energy conservation measures are not taken regarding lighting and air conditioning equipment which consume high power.
- Many companies lack funds to implement energy conservation systems.
- Although energy conservation labeling system have been established, the implementation system of energy saving performance tests of products has not yet been fully implemented.
- Comprehensive energy management is not available at factories, offices, commercial facilities, etc.

(D) Use of renewable energy

- The promotion of the use of renewable energy such as sunlight, wind power, and biomass is not in progress。

(E) Electric power consumption

・On the other hand, power consumption has increased greatly, and it is expected that the trend will be stronger in the future.

・Figure 1.3-14 shows a comparison of the energy consumption per GDP (in 2013) for Hai Phong City and Japan as a whole. Since Hai Phong City has lower energy efficiency than Japan, it is important to promote efficient energy use.

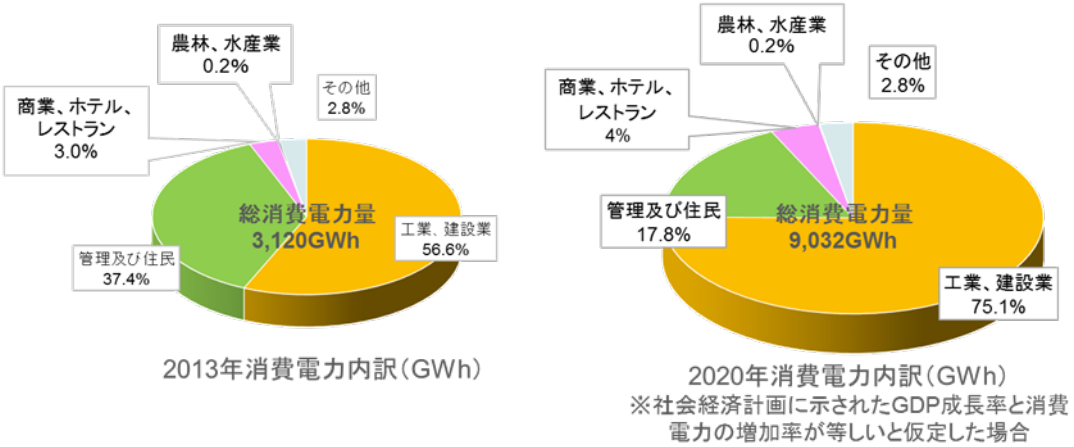


Figure 1.3-14 Breakdown of current and future power consumption

Figure1.3-15 Energy consumption per GDP (2013)

	kWh	GDP(USD)	kWh/GDP
ハイフォン市	31.2×10^8	2.73×10^{9}※1	1.14
日本	$9{,}236 \times 10^{8}$※2	$4{,}902 \times 10^{9}$	0.19

日本のエネルギー効率は6倍

※1 2010年 1USD＝21,000VNDで換算、※2 2012年度

④ Issues in transportation

(ア) (A) A development plan for highways, ports, airports, and railways

Figure1.3-16 Development plan of highway, port, airport and railway (external traffic)

(B) Elimination of traffic congestion

Although Hai Phong City has functioned as just a gateway in northern Vietnam, the traffic volume of cars will increase, after construction of the Lach Huyen Port as a deep-water port, due to the economic ripple effect of the port. That will cause a concern for further traffic congestion and environmental deterioration.

The national highway, No. 5, which is the main road to Hanoi, passes through the urban district, but the city is crowded, and therefore rapid construction of the Hanoi - Haiphong expressway is urgently needed. The railroad connecting Hanoi with Hai Phong and the city's roads intersect in 12 places, which is a cause of traffic congestion.

	
Traffic jam on arterial road	Congestion of National Highway No. 5[2]

図表 1.3-17 Traffic situation of Hai Phong City

(C) Modal shift to mass transit

Regarding the logistics from the Lach Huyen Port, in order to change from truck transport to inland water transport utilizing railway and feeder ships, the transport infrastructure for mass transit, such as the extension of the railroad to the Lach Huyen Port, must be developed as quickly as possible.

The Cat Bi International Airport, is promoting internationalization through ways such as improving new runways is necessary to attract not only passengers but also international cargo flights, aiming for land, sea and air transportation bases.

[2] http://anhp.vn/an-toan-giao-thong/

(D) Maintenance and development of public buses

Today, citizen's public bus utilization rate remains at 1% (Hai Phong city's goal: 30%), and therefore increasing the convenience and comfort of public buses will increase the number of users of public buses. It is necessary to reduce the amount of cars and motorbikes to suppress the occurrence of traffic congestion in urban areas. In order to improve the convenience of the public bus, it is important to secure punctuality and to arrange a bus stop in a convenient place. For now, there are many ports and factories on the right bank (on the south side) of the Cam River, and each company has its own shuttle bus. It is inefficient commuter traffic.

	
Bus used in Haiphong city	Electric motorcycle

Figure .3-18 Transportation network in Hai Phong city

(E) Promotion of gas exhaust regulation and low carbon type vehicles

It is necessary to promote the regulation of exhaust gas of motorbike and automobiles and the diffusion of low-carbon vehicles (hybrids, electric vehicles, electric motorbikes, etc.) in order to eliminate air pollution, as well as upgrade current exhaust gas standards Euro II to Euro IV.。

(F) Town planning and transport policy

The viewpoint of enlightenment activities to promote the transfer from automobiles and motorbikes to public buses, and mobility management such as the distribution of timetables and route maps of public buses, installation of lanes dedicated to buses, the introduction of IC cards, etc., are lacking in traffic policy.

It is necessary to consider traffic policies, in integration with town planning, to increase the use of public buses in the future with the introduction of mass transit agencies, such as monorail and subway systems, and make commercial facilities and apartments built mainly around stations.

1.4 Cooperative relationship between Hai Phong city and Kitakyushu city

(1) Overview

Kitakyushu city signed a friendship and cooperation agreement with Hai Phong city in 2009, and the two cities began exchanges. After that, Kitakyushu city continued to exchange and cooperate with Hai Phong city in various fields such as the water supply field and civic cultural exchanges. The Sister city Agreement between Kitakyushu city and Hai Phong city was established in April 2014, when the friendship and cooperation agreement reached a deadline of five years.

In addition, in 2014 Kitakyushu city supported Hai Phong city to establish the "Hai Phong city Green Growth Promotion Plan," which revealed a concrete action plan to promote the green growth of Hai Phong city, by taking advantage of the experience of overcoming environmental pollution in Kitakyushu city utilizing environmental technology and know-how. In the following year, 2015, Kitakyushu city also focused on discovering and realizing a pilot project regarding the Hai Phong city Green Growth Promotion Plan.

Figure1.4-1　Mutual visit contents of Kitakyushu city - Hai Phong city

Term	Mutual visit contents
April, 2009	Mayor Kitahashi visited Hai Phong City and signed a "friendship cooperation agreement" (Contents of Friendship and Cooperation Agreement) Training acceptance of Hai Phong city staff Distribution of Vietnamese business information centering on Haiphong City Dispatch of economic mission team International cooperation such as environment · water supply and sewerage
September,2009	Hai Phong Municipal People's Committee Du Chun · Toi Vice Chairman visited Kitakyushu City
May, 2010	Mayor Kitahashi · President of Sasaki city council representative visited Hai Phong city (Hai Phong city liberation 55th anniversary commemorative ceremony participation)
July, 2010	Hashimoto deputy mayor led an economic mission team to visit Hai Phong city (holding an economic exchange seminar)
August, 2010	Hai Phong Municipal People's Council Chairman Nguyen Bang Tsuang visits Kitakyushu City (holding an economic exchange seminar)
Nobemver,2010	Deputy Mayor Shiga led Kitakyushu Overseas Water Business Promotion Council to visit Hai Phong City (Hai Phong city water supply exhibition participation) Citizen Orchestra held concert at Hai Phong Opera House
October,2011	Hai Phong Municipal People's Committee Vice Chairman Dan Zuc Hiep visited Kitakyushu City (100th Anniversary Event of the Kitakyushu Water Supply)
May,2013	Deputy Mayor Umemoto visited Hai Phong City, City Federation Hita Hayasaki Ai Kai "Hibiki" performed in Hai Phong City (Vietnam Tourism Year · Hong Hong Festival Opening Ceremony)
April, 2014	Chairman of the Hai Phong People's Committee Zhon Ain Dien (Mayor) visited Kitakyushu City and signed a "sister city agreement"
September,2014	Secretary General Secretary Gwen van Tyne of Haiphong visits Kitakyushu
April, 2015	Deputy Mayor of Haiphong City Du Chun · Toi visited Kitakyushu City
May, 2015	A visit team representing Mayor Kitabashi and Chairman of Tomachi City Council visited Hai Phong City (participate in the ceremony for the 60th anniversary of Hai Phong Liberation)

Figure1.4-2　Hai Phong Green Growth Plan

(2) Technical cooperation in the water field of Kitakyushu city

Kitakyushu city is now engaged in disseminate Upward Flow Bio Contact Filtration (U-BCF) (which Kitakyushu city owns the patent ownership of), which is effective for improving the safety of tap water quality and can work with a low operating cost, mainly in Hai Phong city. Joint enterprises, including the member companies of the Kitakyushu Municipal Water Business Promotion Council, are commissioned from JICA to conduct a preliminary investigation (July 2014 - March 2015) for the Plan to improve the Anzuon Water Purification Plant.

Based on the findings of this investigation, Kitakyushu city will equip U-BCF for the main water purification plant in the Hai Phong, Anzuon Water Purification Plant (Designed Daily Volume 100,000 m 3) by FY 2017 with JICA"s grant aid.

With the full-fledged U-BCF of the Anzuon Water Purification Plant as a showcase, Hai Phong Water Corporation and Kitakyushu city collaborate to promote the spread of U-BCF not only in Hai Phong city but also throughout Vietnam.

Figure 1.4-3 Cooperation history of Kitakyushu city water service

Chapter 2: Purpose and Implementation Structure of Project Formation Potential Study

Chapter 2 Contents

2.1 Outline of the Project

All countries participate in the 21st Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21) held in Paris, France in December, 2015, and the Paris Agreement, a legal framework for equitable and effective climate change after 2020, was adopted.

In the Paris agreement, the temperature rise of the earth is kept sufficiently lower than 2 ° C compared to before the industrial revolution, furthermore, it was stated that pursuing efforts to keep it below 1.5 ° C, promotion of efforts towards decarbonization is required. At COP 21 decided to recognize the actions of non-state actors including cities and decided to welcome the efforts of all non-governmental organizations (such as the city and other local governments) and was decided to invite the scale up.

Also in the "Declaration of Marrakesh Action for Climate and Sustainable Development" adopted at COP 22nd held in Morocco / Marrakech in November 2016, the climate is warming at an unprecedented rate, so urgent It was emphasized that there is an obligation to respond and it was recognized that global actions including not only the government but local governments, as well as economic transformation, are active opportunities for further prosperity and sustainable development.

Cities are the site of activities to support the development of socioeconomic, many people live. About 50% of the world's population live in cities with less than 2% of the total area of the world, the proportion is expected to increase to 70% by 2050. It is estimated that more than 70% of the world's CO2 emissions are emitted from cities as of 2006, the city plays a significant role in mitigating climate change, steadily implementing climate change countermeasures in peripheral urban areas, reducing greenhouse gas emissions is important for achieving the goals of the Paris Convention.

Based on the above points, in this project, under the linkage between Kitakyushu City and Hai Phong City, a sister city relationship with Kitakyushu City with experience and know-how on the formation of a low-carbon society, green growth and the realization of a low-carbon

society aimed at Hai Phong City. We also conduct survey activities aimed at the formation of projects that lead to JCM credit acquisition for low-carbon projects such as realization of the Vietnamese version of Eco-Town which also contributes to the acquisition of JCM credits. In addition, in addition to follow-up activities of Kitakyushu City and Hai Phong City to realize green growth, we carried out survey activities aiming at creating low-carbon projects leading to JCM credits from the follow-up activities.

2.2 Target Field and Applied Technology

(1) Target Field

Based on the results of the survey in FY2017, the following two activities were taken as main activities.

① Municipal solid waste generation business through mixed firing of raw waste converted waste and municipal waste through the realization of Vietnamese version of Eco-Town

After waste recycling process in the industrial park, we will improve stability and profitability by converting waste materials that are difficult to recycle to raw fuels, co-firing with municipal solid waste, etc., to realize feasibility of waste power generation business consider.

Figure 2.2-1 Waste Disposal Site

② Creation activities of low-carbon projects through follow-up activities

Hai Phong City is implementing 15 pilot projects as a core activity within the Green Growth Promotion Plan created under the cooperation of Kitakyushu City. The activities include cement factory waste heat recovery power generation, biomass

power generation, solar power generation, EV bus, etc. In this fiscal year, we will consider the acquisition of JCM credits through introduction of waste heat recovery power generation system to the new cement factory among them

Figure 2.2-2 Image of Cement Plant (Preheater and rotary kiln)

(2) Applied Technology

The technology to be applied in this survey project was selected from the survey results at Haiphong conducted in FY2017. The technology selected as an introduction candidate is summarized in Figure 2.2-3

Figure2.2-3 Target facilities and Technology applied

Category	Target facility	Technology applied
Activity 1	Municipal solid waste waste power generation project by the co-firing of raw waste converted waste and municipal waste through the realization of the Vietnamese version of Eco-Town	Waste heat recovery power generation system at cement factory
Activity 2	Creation of low-carbon projects through follow-up activities	Waste heat recovery power generation system at cement factory

2.3 Implementation Organization

The survey implementation organization of this project is shown below.

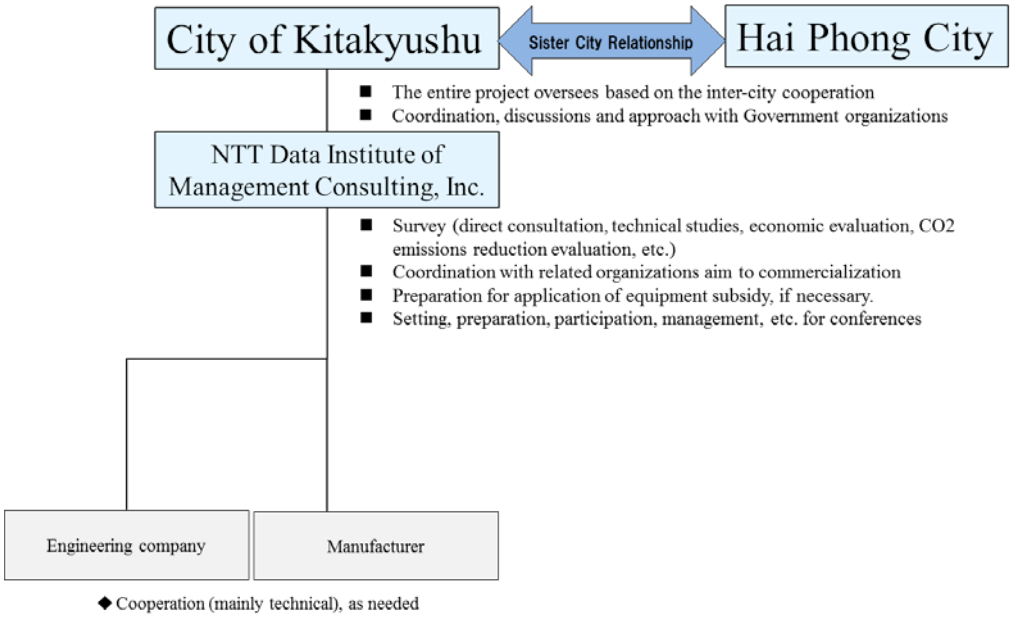


Figure2.3-1 Implementation Organization

In this survey project, we will conduct a feasibility study of JCM equipment auxiliary project under inter-city collaboration between Kitakyushu city with know-how of low-carbon society formation and Hai Phong city in Vietnam, which is in a partnership to realize a low-carbon society.

Kitakyushu City and Hai Phong City have appointed coordination based on inter-city collaboration, and coordinated, collaborated and introduced with related administrative organizations such as related departments of Hai Phong city and relevant ministries and agencies in Vietnam.

NTT Data Institute of Management Consulting, Inc. conducts direct consultation with the survey subjects for each activity, technical examination, economic consideration examination, assessment of CO 2 emission reduction, etc., and proposals and hearings etc. to the survey

subjects. If necessary, the company will also conduct consultation of detailed examination of technology with some of various manufacturers, and support for JCM equipment financing project application, etc.

2.4 Survey Plan and Schedule

(1) Survey Plan

The survey in this project was conducted in the following 4 steps

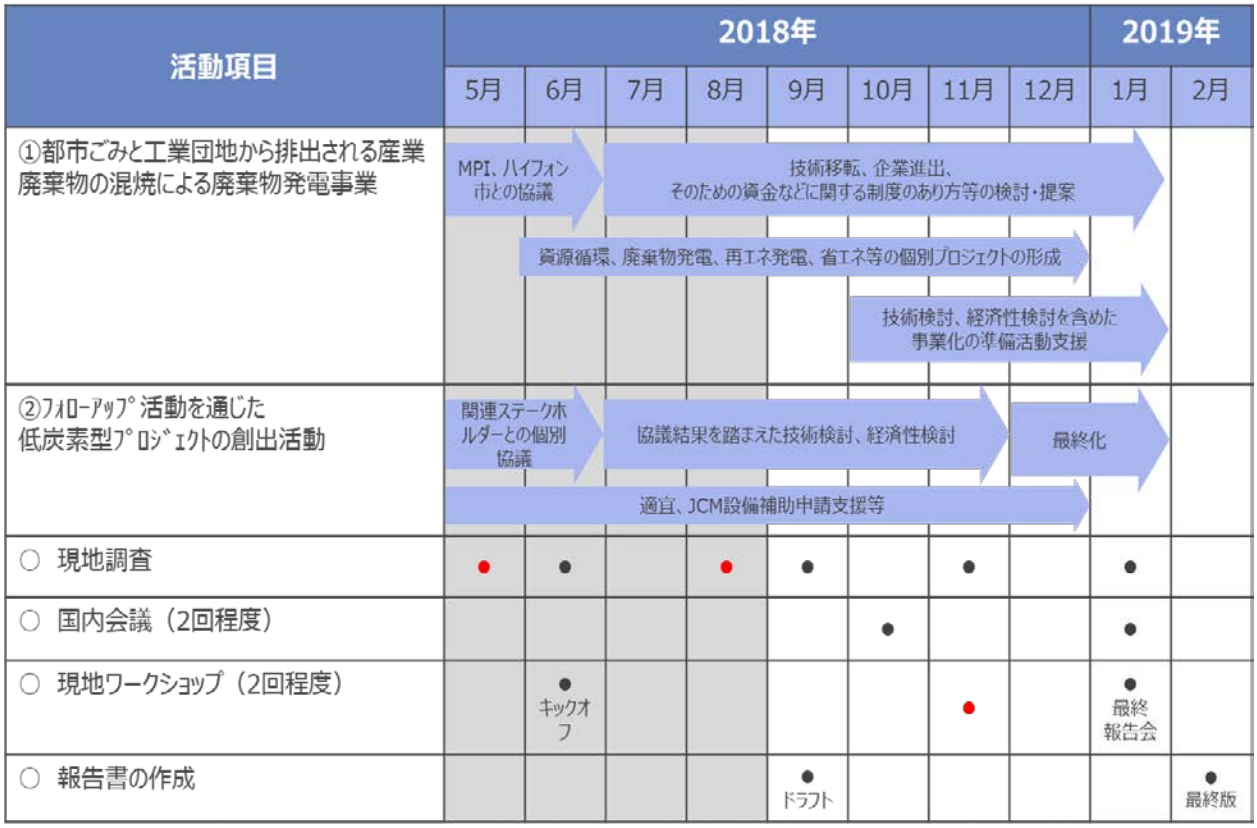
Figure2.4-1 Survey Step

1) We searched candidates companies, enterprises or organization, by introduction of Water Supply Authority utilizing sister city relationship between City of Kitakyushu and Hai Phong City, introduction of candidates from the companies who related in last year, and direct appointments by independent survey. etc. We focused on candidates who may have high possibility of CO2 emission reduction.
2) The current diagnosis was conducted to extract the tasks and needs faced by each target facility through direct hearing by utilizing the visits etc. during the field survey
3) In examining countermeasures, we examined the energy conservation measures, the introduction of energy conservation facilities, economic consideration, CO 2 emission reduction effect, etc. considered to be feasible based on the hearing results of 2). Partly, with real cooperation from experts on photovoltaic panel construction, we conducted a realistic study.
4) In the proposal and discussion, the results of the examination with the staff in charge of each facility were shared, and further hearing of opinions and issues, and how to proceed in the future were examined.

(2) Schedule

The implementation schedule of this survey project is as shown in Figure 2.4-2.

Figure2.4-2 Survey Schedule .



Chapter 3 Results of Project Formation Potential Study

Chapter 3 Contents

3.1 Summary of Field Survey

In this section, we will describe the visit schedule of the first to sixth field surveys, and summarize the main agenda and activity contents.

The detailed discussion at each visiting destination, the contents of the activities, results based on the activities, etc. are summarized in each of the activities in 3.2 (Activity 1: Creation of low-carbon projects through realization of Vietnamese version eco-town etc.) and 3.3 (Activity 2: Creation of low-carbon projects through follow-up activities).

3. 1. 1 The First Field Survey

Date： 1-May to 3-May, 2018

The place where we visited：

- ✓ Bach Dang Cement Company

Summary：

- ✓ Discussion for JCM equipment auxiliary project application for waste heat recovery power generation

3. 1. 2 The Second Field Survey

Date： 19-June to 24-June, 2018

The place where we visited：

- ✓ Vietnamese Ministry of Planning and Investment
- ✓ Bridgestone Tire Manufacturing Vietnam Limited Liability Company
- ✓ Hai Phong City Environment Bureau Sea-island Management Bureau
- ✓ Hai Phong City Foreign Affairs Bureau
- ✓ Hai Phong City Economic Zone Authority
- ✓ DEEP C
- ✓ VICEM Cement Headquarter
- ✓ Bach Dang Cement Company, Hai Phong Factory
- ✓ QUOC HUNG

Summary：

- ✓ Visited the Hai Phong City Economic Zone Authority on the introduction of Ministry of Construction and Investment (MPI)

in Vietnam

- ✓ Interviews to enterprises located in industrial parks promised to hold workshops and questionnaires to realize Vietnam Eco Town
- ✓ To exchange opinions with Bridgestone and two cement factories about the information for JCM equipment assistance project

3. 1. 3 The Third Field Survey

Date： 14-Aug. to 16- Aug., 2018

The place where we visited：

- ✓ Bach Dang Cement Company

Summary：

- ✓ equipment auxiliary project for waste heat recovery power generation project Conference and application preparation materials preparation for secondary public offering proposal

3. 1. 4 The Fourth Field Survey

Date： 4-Sep. to 7-Sep., 2018

The place where we visited：

- ✓ Related offices of Hai Phong City
- ✓ VINFAST
- ✓ Nishi-Nippon Railroad Co., Ltd. in VSIP Industrial Park
- ✓ EEP-C
- ✓ VICEM Hai Phong Factory
- ✓ Kappa Cement
- ✓ Vietnamese Ministry of Planning and Investment

Summary：

- ✓ Meeting on the workshop scheduled to be held in Hai Phong. Continue interviews related to industrial waste generated within the housing complex and conduct questionnaire
- ✓ Discussion on waste heat recovery power generation project using cement company and JCM equipment subsidy.
- ✓ Consult with private companies on JCM project candidate
- ✓ Discussion with MPI about a workshop in Hai Phone City

(sponsorship, theme etc.)

3. 1. 5 The Fifth Field Survey

Date： 5-Nov. to 9-Nov., 2018

The place where we visited：

- ✓ Attended the Eco-Industrial Park workshop in Hai Phong city
- ✓ Nam Cau Kien Industrial Park
- ✓ Attended Expert Group Meeting for Eco-Industrial Park in Vietnam

Summary：

- ✓ Participated in the Eco-Industrial Park Workshop organized by Hai Phong City and HEZA. Presentation on Eco Park by Kitakyushu city, Presentation on JCM equipment assistance project by NTT Data Institute of Management Consulting, Inc.
- ✓ Survey of JCM Potential in Nam Cau Kien Industrial Park
- ✓ Participated at the 2nd Expert Group Meeting for Eco-Industrial Park in Vietnam co-organized by UNIDO and MPI held in Ho Chi Minh, at the request of MPI. Presentation on Eco-Industrial Park by Kitakyushu city

3. 1. 6 The Sixth Field Survey

Date： 6-Jan. to 12-Jan., 2019

The place where we visited：

- ✓ Hai Phong City Foreign Affairs Bureau
- ✓ HEZA
- ✓ Nam Cau Kien Industrial Park
- ✓ Vietnam-Italy Steel JSC
- ✓ DEEP-C
- ✓ Pullman Hotel
- ✓ Attended Japan Environment Week
- ✓ Vietnamese Ministry of Planning and Investment

Summary：

- ✓ Confirmation of activity report of this fiscal year and participation in Japan Environment Week for Hai Phong City Foreign Affairs Bureau, HEZA

- ✓ Holding JCM equipment assistance seminar in Nam Cau Kien Industrial Park
- ✓ Consultation on JCM equipment assistance with Vietnam-Italy Steel
- ✓ Discussion on waste generation project with DEEP-C
- ✓ Discussion on introduction of high efficiency air conditioning system using JCM facility assistance with Pullman Hotel
- ✓ MPI and Kitakyushu City - MOU discussion on promoting model project of Eco-Industrial Park based on sister city relations of Hai Phong City
- ✓ Join the Japan Environment Week. Kitakyushu city, Hai Phong city, Nam Cau Kien Industrial Park announced as a person related to this project.

3.2 Activity 1: Activities to create low-carbon projects through realization of Vietnamese version of Eco-Town

3. 2. 1 Investigation on the business potential of waste power generation business

Under the support of UNIDO, the Vietnam Ministry of Planning and Investment (MPI) has selected several model regions in Vietnam and is developing activities to realize the Vietnamese version of Eco-Town. MPI is paying attention to the Dinh Vu Industrial Park in Hai Phong city as a candidate for the next model area. The Dinh Vu Industrial Park is putting efforts into ecological conversion of industrial parks to improve the value of industrial parks, such as plans to set up wind power generation in the port area of the same complex. The Dinh Vu Industrial Park is putting efforts into ecological conversion of industrial parks to improve the value of industrial parks, such as plans to set up wind power generation in the port area of the same complex. In addition, he is interested in becoming a model of the Vietnamese version of Eco-Town, and has already started talks with MPI.

Meanwhile, MPI has shown a high interest in the eco-town in Japan, especially focusing on the Kitakyushu city that has been established as an eco-town, and the efforts that Kitakyushu City has been implementing for the realization of eco-town.

On the other hand, Kitakyushu city has a good relationship with the Dinh Vu Industrial Park as it collaborates with Hai Phong City, which is a sister city partner, in support of various activities toward realizing green growth of the city. Dinh Vu Industrial Park also sent Kitakyushu City LOI requesting cooperation to realize the Vietnamese version eco-town promoted by MPI.

Utilizing these business environments, this project realizes resource recycling through the promotion of regional recycling of various waste generated from industrial parks, and the resulting waste that is difficult to recycle is used for waste power generation, etc., Furthermore, by aiming at introducing renewable energy towards low carbonization of the entire industrial park and proposing energy conservation to enterprises in the premises, we are aiming for

composition of low carbonization project leading to JCM credits. Especially, the Dinh Vu Industrial Park utilizes the location condition that it is adjacent to the final disposal site of municipal solid waste. In the past survey, we investigated the possibility of waste power generation project by mixed fire of municipal solid waste and industrial waste, It has been confirmed that business profitability improves when objects exceed a certain amount.

This fiscal year, as a model project of the Vietnamese version of Eco-Town, assuming that internal recycling was established, the conversion of waste to raw materials and co-firing with municipal solid waste will lead to further improvement of business profitability , And discussed with DEEP-C, a local operator. The image of the project is shown below.

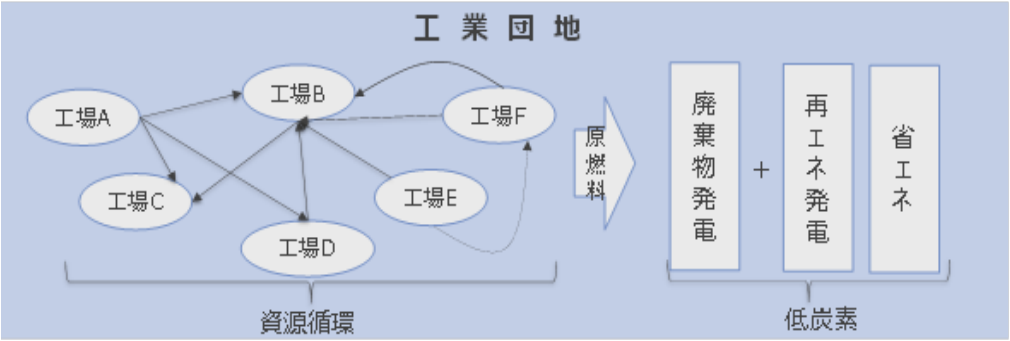


Figure 3.2.1-1 Image of co-fired business of industrial waste fuel fuelization and municipal solid waste

As technology for converting waste into raw fuels intended for introduction in this project, Amita's solid / powder industrial waste is recycled into cement and fuel. The outline of this technology is shown below.

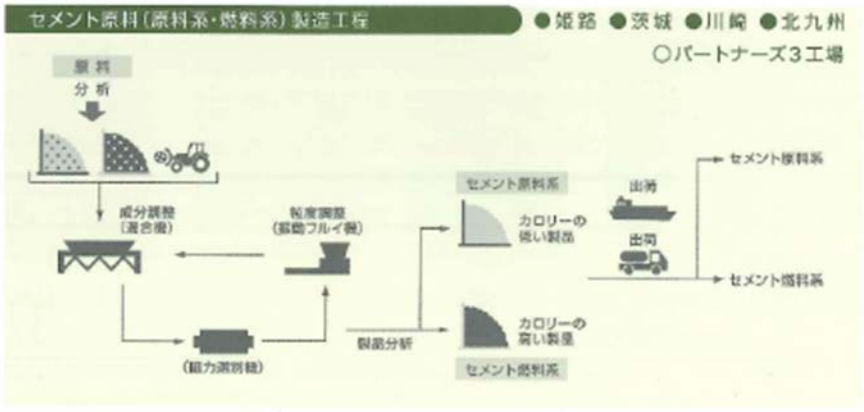


Figure 3.2.1-2 Technology for recycling waste fuel

This technology is to produce cement raw fuel from industrial waste discharged from various industries such as sludge, waste plastics, soot and dust and other solid and powder type industrial waste. For large ones and hard ones, they are processed into those that can be used by cutting with a crusher or crusher. Regarding the waste to be accepted, we check the contained ingredients and properties beforehand to prevent contamination of foreign matter, and also consideration for safety. For products that come out as outputs, those with low calories are used as substitutes for clay which is cement raw material, those with high calories are used as a substitute for coal as fuel, and its burning crust can also be used as cement raw material .

As a facility for mixing raw fuel and municipal solid waste produced by such a process, it is assumed that a waste power generating facility having a stoker type incinerator is used.

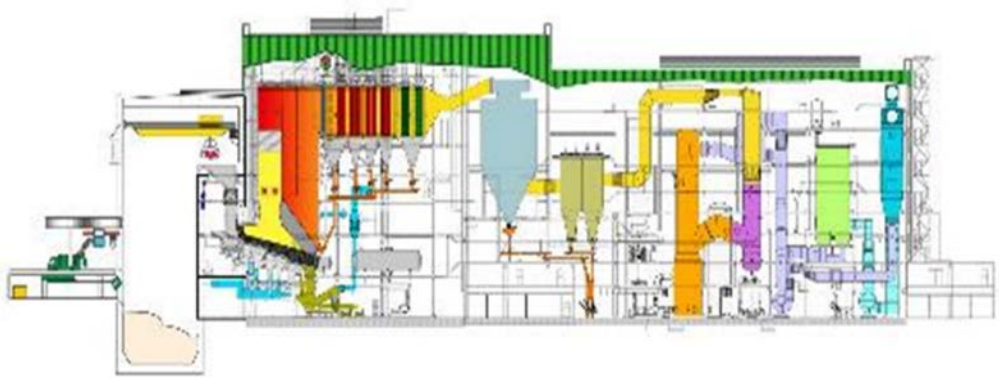


Figure 3.2.1-3 Waste power generation facility with stoker incinerator

As a framework for implementing this project as a low carbon project utilizing JCM equipment assistance, the following is assumed.

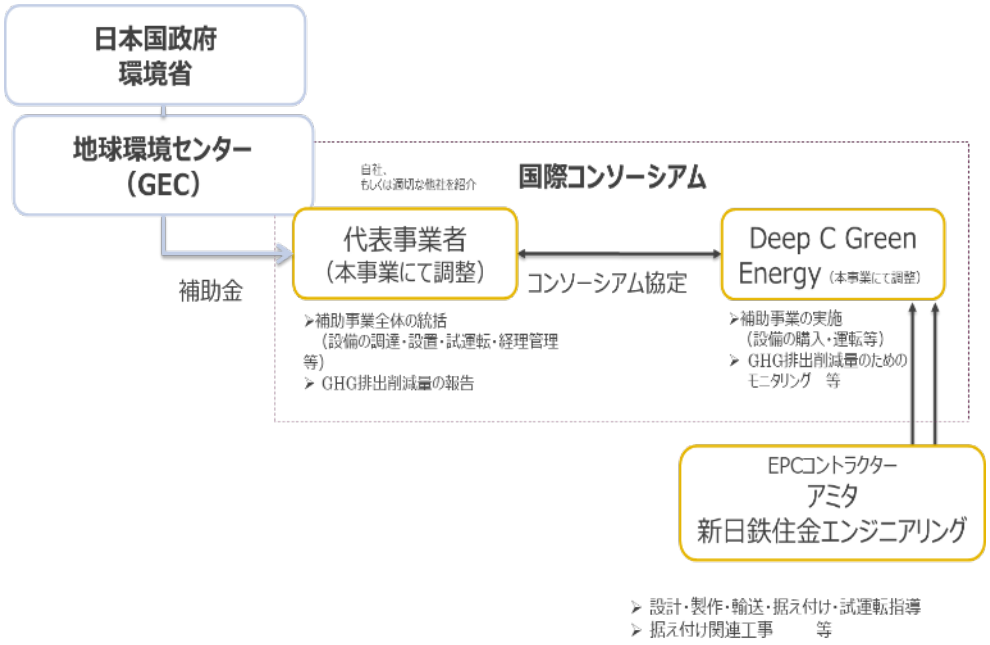


Figure 3.2.1-4 Implementation framework of low-carbon type project through realization of Vietnam version Eco-town

As a subject for which investigation is necessary to realize this project,

- Vietnamese Ministry of Planning and Investment (MPI) grasps the Vietnamese version of Eco-Town

- Confirmation of renewable energy investment plan of Dinh Vu Industrial Park and possibility of JCM conversion based on this plan
- Confirmation of municipal waste and industrial waste to be treated, aiming for resource recycling, examination of business model
- Possibility of utilization of subsidy system such as JCM
- Detailed examination using the subsidy system of JCM etc.

In order to solve these problems, we examine related parties such as departments concerned in Haiphong City, DEEP - C Company which is a management company of Dinh Vu Industrial Park. The results are summarized below.

No.	調査で解決したい課題	獲得目標	達成した成果
1	ベトナム計画投資省（MPI)の考えるベトナム版エコタウンの把握	Dinh Vu工業団地を対象としたベトナム版エコタウン計画の状況確認	ベトナム版エコタウンにあたる"Eco Industrial Park"を規定するDecree 82が公表され、その内容と対応について、Dinh Vu工業団地、HEZAと協議
2	Dinh Vu工業団地の再生エネルギー投資計画の確認及び同計画を踏まえたJCM化の可能性検討	Dinh Vu工業団地内の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動	再エネ導入事業は進展。DEEP-C GEと東電PGが、JVを設立。進行中。
3	資源の循環利用を目指した、処理対象となる都市ごみと産業廃棄物の確認及びビジネスモデルの検討	2の結果を経て、資源循環を利用したセメント原燃料製造や、産業廃棄物を都市ごみと混焼することによる収益性の向上を目指し、新たなるビジネスモデルの検討	入居企業の産廃の種類、量を把握。産廃引き取り費用のレンジの把握、DEEP-Cとハイフォン市の協議により、都市ごみの引き取り費用のレンジが明らかになりつつある。
4	JCM等の補助制度の活用可能性の検討	１～３の調査を踏まえ、事業性を高めるため、JCM設備補助等のイニシャルコスト削減可能性を検討する。	JCM設備補助制度をDEEP-Cに説明。事業実施スキーム、採用設備について議論。継続中。
5	JCM等の補助制度を活用の場合、詳細検討	各企業への意思・価格ヒアリングなど実施し、実現可能性を高める	JCM設備補助制度をDEEP-Cに説明。事業実施スキーム、採用設備について議論。継続中。

Figure 3.2.1-5 Issues and consideration for creating low-carbon project

The president of DEEP - C, an operating company of the Dinh Vu Industrial Park, was replaced in May 2018. Although initially planned to be implemented independently by DEEP - C Green Energy Company (subsidiary of DEEP - C) shown in Figure 3.2.1 - 4, according to the policy of the new president, know - how on waste generation or

waste management It was decided that the JV will carry out the project with the business partner having the JV.

Regarding the renewable energy business in the industrial park managed by DEEP - C company including Dinh Vu industrial park, they have established a joint venture with Tokyo Electric Power Grid, and as it is working well, as a joint venture with companies with know - how Implementing improves the stability and reliability as a project. We have selected that business model and are currently looking for business partners for waste power generation business.

We interviewed 90 companies in the industrial park under the control of DEEP-C on the receipt of waste by DEEP-C. At the present stage, about eight companies have responded that they accept acceptance by DEEP - C. They are saying that it is around 18 US dollars / m 3 about the take-up price at that time. Regarding co-firing with municipal solid waste, there are two stories: incineration of municipal solid waste accumulated in the final disposal site adjacent to Dinh Vu Industrial Park and incineration of municipal solid waste every day. About the acceptance fee, Hai Phong The city and DEEP - C are continuing consultations. Currently, although it is talking in the range of 10 US dollars per ton to 30 US dollars, it is clear whether the target of the expenses is the existing stacked garbage, the daily receipt daily, or both.

The business model of the waste power generation project that DEEP - C company currently expects is shown below.

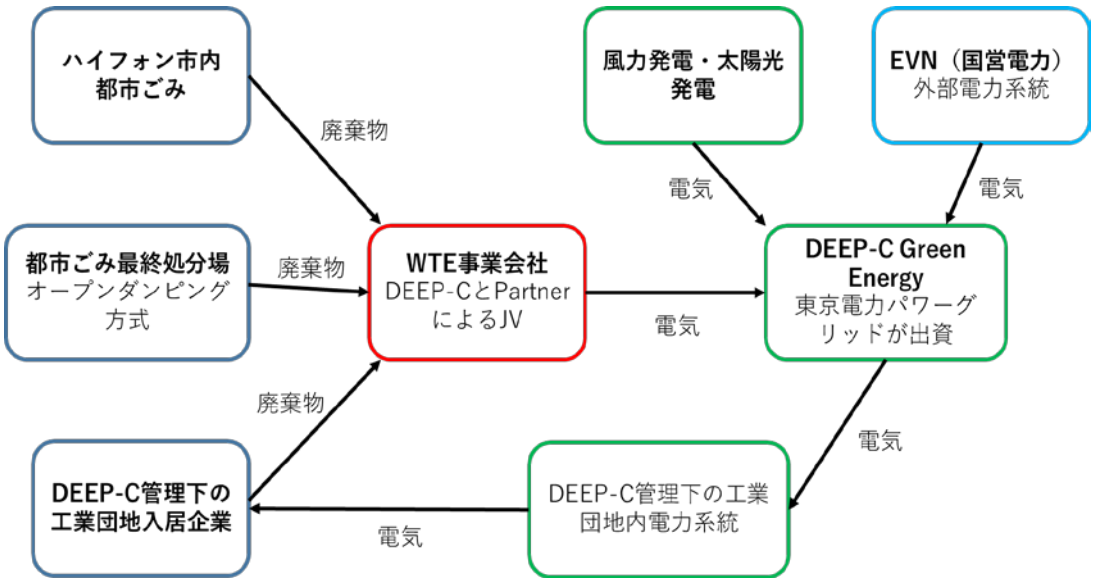


Figure 3.2.1 – 6 DEEP-C assumed waste power generation business model

DEEP - C Green Energy has a business to supply electricity purchased from external systems to companies in an industrial park managed by DEEP - C in addition to renewable energy by wind power and solar power generation. Regarding the waste power generation business, they are establishing as an independent entity and thinking that DEEP - C Green Energy will purchase electricity to generate and sell it to tenant companies in the region. Regarding waste power generation facilities, they are considering a power generation facility with a stoker incinerator, and although it shows high interest in Japan made from the point of reliability, we have not made any concrete selection yet. Regarding facilities, it is a policy to consider with business partners. Also, it shows high interest in that JCM equipment assistance can be utilized when introducing Japanese made.

In order to establish the business model as described above, DEEP - C is looking for a business partner for waste generation and continues negotiations with Hai Phong city etc. for accepting waste.

3.2.2 Presentation activities in Vietnam

This year, participation in two events related to the Vietnamese version of Eco-Town, seminars for industrial parks to spread understanding of JCM equipment subsidy system, Japan / Vietnam Environment Week held in Hanoi City and many events Participated in the announcement.

On Tuesday, November 6, 2018, a workshop on Eco-Industrial Park hosted by Hai Phong City and HEZA was held. Kitakyushu city has also cooperated with this workshop from the planning stage, and the Vietnamese Ministry of Planning and Investment (MPI), which is in charge of regulations concerning Eco-Industrial Park, has also been realized. On that day, the TV station of Haiphong came to relay, and after the end, interviews with each presenter are also done. The main announcements are summarized below.

	Organization	Contents
1	MPI	Explanation about Eco-Industrial Park's basic policy (Decree 82)
2	Kitakyushu city	Presented the history and activities until Kitakyushu city became Eco-Town
3	DEEP-C (Industrial park management company)	Introduction of the company and activities aimed at Eco-Industrial Park and announcement of questions about Decree 82
4	Nam Cau Kien Industrial Park	Introduction of the Nam Cau Kien industrial Park and activities aimed at Eco-Industrial Park
5	NTT Data Institute of Management Consulting, Inc.	Introduction of JCM subsidy system

Figure 3.2.2-1 Workshop of Eco-Industrial Park in Hai Phong City

	
Venue	Presentation by Kitakyushu city

Figure 3.2.2-2 Workshop

The 2nd Eco-Industrial Park (EIP) Expert Meeting sponsored by MPI and UNIDO on November 8 and 9, 2018 was held in Ho Chi Minh City. At the request of MPI, I participated in the meeting and made presentations by Kitakyushu city and participated in workshop.

In October 2014, MPI and UNIDO launched "Implementation of Eco - Industrial Park initiative for sustainable industrial zones in Vietnam". The objective of this project is to convert the existing industrial parks into Eco-Industrial Parks in cooperation with companies, local residents, and related organizations with the aim of reducing environmental impact and production cost. We also demonstrate clean and low carbon technologies that minimize greenhouse gases, residual organic waste (POPs), and water pollution on the ground. The total budget is US $ 45 million, and we have been carrying out model projects in Ninbin, Da Nang and Can Tho provinces. The plenary session is the second meeting to report the results. The topics spoken at the plenary session are as follows.

- Current status and future trend of Eco-Industrial Park in Vietnam
- Decree 82
- The role of the private sector in industrial development
- Planning and management of Eco-Industrial Park

- Industry symbiosis
- Resource efficiency: Water, waste and drainage management at Eco-Industrial Park
- Energy management at Eco-Industrial Park
- Capacity Building for Eco-Industrial Park

Although there was an announcement about the business of Ninh Binh Province and Da Nang which model business is preceding, there is an announcement about business of Danang, but rather than business of the entire industrial park such as recycling activities of individual companies and water treatment business, It seemed to be a strong shade such as efforts.

MPI sees Kitakyushu City as a successful case of Eco-Industrial Park, and has been requesting a lecture based on a request to share experiences also in industrial parks in Vietnam. Presentations by Kitakyushu City attracted a great deal of attention by attendees' interests, how they accomplished, cooperation with citizens, administrative responses, struggling points and so on.

Presentations by administrative organizations including MPI were mostly based on paragraph 82, but explanation of the part related to the jurisdiction of their own ministries and agencies, concrete standards etc. to be recognized as Eco-Industrial Parks etc. There was nothing concerning. Among the workshops on the second day, comments were required that concrete guidance was necessary.

As a feature of EIP Expert Meeting, we have adopted question and answer by chat system, basically asking questions only by chat system. The accepted question was displayed on the screen from time to time, and the speaker answered it in the form of answer.

	
Seminar	Workshop

Figure 3.2.2-3 EIP Expert Meeting

Participated in the Ministry of the Environment and the Vietnam Environment Week Japan on 10th and 11th January 2019. The program of the two days is as follows. On January 10th "Environmental Infrastructure Technology Seminar" and "Business Matching", on January 11 "Workshop for appropriate mitigation action", "International cooperation workshop for pollution prevention", " Four Joint Event Credit Scheme (JCM) Workshop "and" Low Carbon City Scenario "were held. Kitakyushu City, Hai Phong City, and Nam Cau Kien Industrial Park announced the activities undertaken based on the sister city tie-up between Kitakyushu City and Hai Phong City in a report on City-to-City Collaboration Projects.

	
Opening	Presentation

Figure 3.2.2-4 Vietnam - Japan Environment Week

On January 7, 2019, we held a seminar on JCM equipment subsidy system at Nam Cau Kien Industrial Park. This is aimed at having companies in the same industrial park know the JCM equipment subsidy system and consider using the system. This is aimed at having companies in the same industrial park know the JCM equipment subsidy system and consider using the system. At the plenary meeting, 14 people from companies showing high interest in JCM equipment assistance, who moved to Nam Cau Kien Industrial Park such as Veitnam-Italy Steel and Vietnam-Japan Steel, and 5 from Nam Cau Kien Industrial Park The name was participating. In addition, according to the intention of President of Nam Cau Kien Industrial Park, he hopes that other industrial parks share the experience and activities of Kitakyushu City, so that the environment that is the subordinate to the public relations department of Ministry of Natural Resources and Environment (Vietnam) MONRE Deputy director of Public Relations Center and two other people participated.

In addition, he thinks that the JCM project is a fairly new mechanism in Vietnam, and he thinks that public relations activities are important. Furthermore, in order to receive JCM equipment supplementation from the Japanese government, Vietnamese companies think that it will not proceed unless they promote understanding of the Vietnamese side, such as having to prepare funds for the first time, so publicity is important for that, It was that they invited MONRE's Environment Public Relations Center.

The Environment Public Relations Center of MONRE is a new organization dedicated to public relations established under MONRE in 2017, as it is important to raise awareness of the people's environmental protection in environmental conservation projects. The Deputy Director of the center highly evaluated the eco-town in Kitakyushu City, supporting Bakunin City, which is highly interested in Eco-town of Bakunin Province, Government of Bakunin Province interested in smart city, plastic back use And promoting the use of eco bags to stop the project, Kitakyushu was cited as a request to

Kitakyushu City.

	
Seminar	Meeting with the president and MONRE

Figure 3.2.2-5 JCM seminar at Nam Cau Kien Industrial Park

3.2.3 Nam Cau Kien Industrial Park

The Nam Cau Kien Industrial Park is located in the northern part of Hai Phong city, in the area with many industrial parks such as NOMURA Industrial Park, VSIP Industrial Park, Dinh Vu Industrial Park etc. Total investment: 2300 Billion VND, industrial park with total area of 263 ha is there. Development work is divided into the first stage: 108 ha and the second stage 155 ha, the first phase has already been completed, and the occupancy rate is 100%. The second phase 155 ha is still under development. Currently there are 34 enterprises in use, including companies such as recycled steelmaking (using electric furnace), equipment / machinery, new materials, chemicals and foods.

Figure 3.2.3-1 Nam Cau Kien Industrial Park

Figure 3.2.3-2 Location of Nam Cau Kien Industrial Park

The President of Nam Cau Kien Industrial Park is actively working on environmental measures and aggressively responds to the green area coverage provision (25% of industrial park area greening land) which MPI's Public Restriction on Eco-Industrial Park Decree 82 deems difficult to deal with. They are trying to purchase additional lands for the surroundings, and are promoting greening.

	
Nam Cau Kien Industrial Park Green area 1	Nam Cau Kien Industrial Park Green area 2

Figure 3.2.3-3 Green area under maintenance of Nam Cau Kien Industrial Park

This positive attitude is highly appreciated by Hai Phong City and HEZA, and it is recommended as the first candidate of Eco-Industrial Park.

3.2.4 Energy conservation project in recycled steel making business

Vietnam - Italy Steel (VIS), which accepts scrap iron in the Nam Cau Kien Industrial Park and manufactures steel products, is a Vietnamese company with about 70% ownership by KYOEI STEEL LTD., a Japanese company.

In recent years, KYOEI STEEL LTD. Has also focused on overseas business, and also has four operating companies including VIS in Vietnam.

Figure 3.2.4-1 Operating company of KYOEI STEEL LTD in Vietnam

Head office of VIS is located in Hunyen province near Hanoi city, is a steel company with a capital of 738.3 billion VND and sales 6,105.1 billion VND (FY 2017). In the project, they melt scrap iron received in an electric furnace (arc furnace), manufacture and sell steel bars and wire rods for reinforcing bars. The factory of VIS is divided into two

parts, the Hai Phong factory and Hung Yen factory. The former is in charge of the upper process of steel making and the latter is in charge of the lower step.

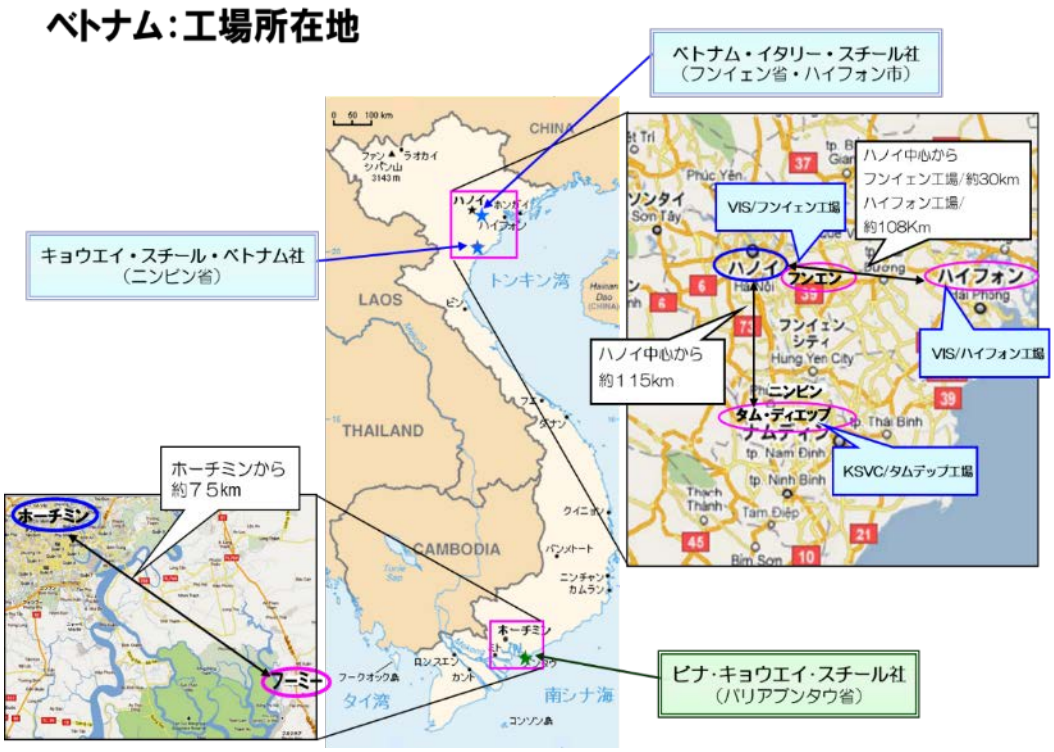


Figure 3.2.4-2 Location of VIS Hai Phong Factory and Hung Yen Factory

The summary of each factory is summarized below.

Hai Phong Factory (Steel Factory)	
Site area	164,582 m2
Factory building area	14,837 m2
Production capacity	400,000 t/year
ビレットサイズ Billet size	120mm square・130mm square・150mm square・200mm square、length : 6 m・12m
Electric furnace	60 t (Arc furnace)
Outside refining	60 t

furnace	
Continuous casting facility	4 strands
Hun yen factory (rolling mill)	
Factory site area	77,742 m2
Factory building area	13,398 m2
Production capacity	250,000 t/year
Product and size	Bar steel for reinforcing bars 10 to 40 mm, wire 6.0 ・8.0 mm
Heating furnace	50 t
Continuous rolling equipment	1 line

Figure 3.2.4-3 Outline of 2 factories of VIS

The production capacities of the Hai Phong Factory and Huy Yen Plant are 400,000 tons / year and 250,000 tons / year, respectively, but the production volume of FY 2017 is 452,369 tons, 301,201 tons, respectively, indicating that the demand for iron products is high.

VIS became a subsidiary of KYOEI STEEL LTD. in May 2018, but in order to improve cost competitiveness, various energy saving proposals including modernization of facilities are being studied. As a conceivable energy saving plan, there are the following.

	Energy saving plan	Main objective of implementation
1	Introduction of regenerative burner (Hung Yen factory)	Reduction of fuel consumption per unit of heating furnace
2	Introduction of multifunction burner (Hai Phong Factory)	Improvement of electric furnace productivity, reduction of electric power consumption for electric furnace
3	Introduction of DOC burner (Hai Phong	Ladle preheating Reduction of fuel consumption per unit

	Factory)	
4	New process is added to the Hai Phong plant	Expansion of volume and production volume of steel bars and other steel materials
5	Fuel conversion (Hung Yen factory is the main, Hai Phong factory can be considered)	Reduction of fuel consumption of heating furnace (Huy Yen factory), reduction of fuel consumption of main fuel and ladle and tundish preheating at introduction of electric furnace multi-functional burner (Hai Phong Factory)
6	Introduction of LED lighting (Hung Yen factory is the main, Hai Phong factory can be considered)	Reduction of general power consumption unit
7	Introduction of high efficiency fans and high efficiency pumps	Reduction of general power consumption unit

Figure 3.2.4-4 VIS's energy conservation plan

Although it is an energy conservation measure that can be implemented at the VIS company that is engaged in the steel making business using the arc type electric furnace, it is still in the examination stage and will continue to study for implementation including the application of JCM .

3.2.5 Introduction of highly efficient ventilating air-conditioning equipment in hotels

At present, construction of five-star hotel Pullman Hai Phong Hotel is progressing in Haiphong city. The hotel is supposed to be built at 12th Tran Phu street in the city center of Hai Phong City. In addition to the hotel building with 1 basement level, 32 floors above ground and 320 rooms, plus an international number of 1200-1,500 seats A conference center is scheduled to be established. Total investment amount is 1.6 trillion billion VND aiming for business opening in 2020.

Investors of the hotel business are Nhat Ha Co., Ltd. chosen by bidding. Nhat Ha operates three hotels in Ho Chi Minh City and has over 20 years experience in hotel business.

Figure 3.2.5-1 Image of Pullman Hai Phong Hotel

Foundation work has already begun at Pullman · Hai Phong · Hotel, but for ventilation air-conditioning equipment, they have not yet selected facilities. Nhat Ha is working on energy conservation with high consciousness, such as introducing a system that lights up only when there are people, by installing a light sensor as a LED, sensor for human detection, highly efficient ventilation. They also plan to introduce air-conditioning equipment. Although it is well understood the high performance and high reliability of Japanese products, it was

also a recognition that the price is high. As a result, they are very interested in the JCM equipment subsidy system, explained the system and asked questions and answers, and by using the JCM system it has been shown that they would like to introduce high quality Japanese ventilation air conditioning system.

Ventilation to large-scale hotel As the proposal of high-efficiency technology of air conditioning system, the following can be considered.

	Energy saving technology	Technical overview	Remarks
1	Energy conservation automatic operation EMS introduction	Remotely operate BMS and automatically perform energy saving operation every time	Air conditioner temperature setting Heat source equipment optimum operation Chilled water temperature setting
2	Update to INV turbo chiller	Changed water cooled chiller to inverter type turbo chiller	
3	Introduction of serial operation system of cooling towers	Reduction of cooling water temperature by series operation system of cooling towers	Reduction of freezer power
4	Introduction of secondary pump system	Reduction of cold water pump electric power by terminal feed water differential pressure control	
5	Introduction and operation of total	Reduce air-conditioning energy by	Optimum operation of

	heat exchanger	introducing total heat exchanger to external controllers	outside air cooling and heat exchange operation

Figure 3.2.5-2 Ventilation to Pullman ･Hai Phong ･Hotel Proposal for energy saving for air conditioning system

Although the energy conservation schemes 2 to 5 shown above are related to the introduction of facilities, a considerable energy saving effect can be obtained by using only these introduction measures, but a management system that optimally operates all of these systems on a time basis 1 is an energy saving automatic operation EMS system

Figure 3.2.5-3 Screen of energy saving automatic operation EMS system

This system can control a large number of parameters in time unit by AI and achieve thorough energy saving operation.

Nhat Ha, the owner company of Pullman · Hai Phong · hotel, has already received the drawing of the hotel and is preparing for the application for JCM equipment assistance in FY2019.

3.2.6 Promotion of Eco-Industrial Park by MPI and Kitakyushu City - Support of Hai Phong City Collaboration Project

At the Ministry of Planning and Investment of Vietnam (MPI), under the support of UNIDO, they have selected several model regions in Vietnam and are implementing activities aimed at realizing the Vietnamese version of Eco-Town, one of which is Vietnamese version It issued Decree 82 which specifies the Eco-Industrial Park which can be said as an eco-town.

Figure 3.2.6-1 Image of Eco-Industrial Park

MPI is currently searching for an industrial park to be a target of this Eco-Industrial Park model project, and one of its candidates is the Dinh Vu Industrial Park of Hai Phong City. And Nam Cau Kien Industrial Park which visited this year and opened JCM seminar etc. is also one of the candidates recommended by Hai Phong city and HEZA.

Meanwhile, MPI highly evaluates Kitakyushu City which is established as an eco-town, and also supports the activities jointly carried out by Hai Phong City that is sister city-affiliated with Kitakyushu City.

MPI hopes to succeed as a model project from the desire to spread activities similar to Kitakyushu City - Hai Phong City collaborative projects to many industrial cities in Vietnam. As MPI it was decided to issue MOU expressing support for those activities. Future Kitakyushu City - Hai Phong City collaboration project aims not only for the realization of the Grey Growth Plan of Hai Phong City, but also

for the establishment of the Eco-Industrial Park, under the support of the MPI which is also the central government institution while continuing activities, we will continue to establish a model project

3.2.7 Summary

Creating low-carbon projects through the realization of the Vietnamese version of Eco-Town, etc., we are implementing many excellent environmentally friendly projects in the implementation of the Green Growth Promotion Plan based on sister city collaboration between Kitakyushu City and Hai Phong City ing. Among these activities, projects that are candidates for many JCM projects have been found. In this fiscal year, we conducted a study aimed at assisting JCM facilities on 'waste generation project by converting industrial waste into raw fuel and co-municipal solid waste.'

In the industrial waste power generation business by converting waste into raw fuel and co-combustion of municipal solid waste, an industrial park management company that is a business operator will change the business company from standalone implementation to implementation by JV with business partner decided. As a result, it was decided to search for business partner candidates. Also, in this fiscal year's survey, the range of acceptance costs of industrial waste, treatment cost of municipal waste, etc. has been known. In the future, we will continue negotiations with part-time enterprises in the industrial park and Hai Phong city concerning finding partners and waste receiving costs, and will prepare for project implementation and application for JCM project.

As a newly discovered low-carbon project in this fiscal year's survey, we have been working on improving the steel production line at iron companies with arc type electric furnaces and the development of high efficiency air conditioning systems at large hotels scheduled to be located in the center of Hai Phong city There was introduction. For iron and steel companies with electric furnaces, we are planning to study JICM project aiming at future JCM project. Regarding high-efficiency air conditioning of hotels, we are preparing to prepare for JCM equipment assistance application in FY2019.

Also, the industrial park, Nam Cau Kien Industry, which was able to make a good relationship in this year's survey, aims to become the first candidate for the Eco-Industrial Park concept promoted by Ministry of Planning and Investment (MPI) of Vietnam, I am engaged in business. Hai Phong Municipality and HEZA also evaluate the activity of the complex and support it as the first candidate. Although the company with the electric furnace is a tenant company in the same industrial park, the president of the operating company of the Industrial Park is also interested in the JCM equipment subsidy system, and this fiscal year we held a JCM seminar, we introduced JCM equipment subsidy system. We expect that there is a high possibility that new low-carbon projects will be found in the future.

The Vietnam Investment Coordinating Agency (MPI) highly appreciates the activity as an Eco-Town in Kitakyushu City and evaluates past activities based on the sister city tie-up between Kitakyushu City and Hai Phong City. And, in the collaboration project between Kitakyushu City and Hai Phong City, a model project of Eco-Industrial Park is created and it is hoped that it will spread all over Vietnam, and publicly support the cooperation project I decided to issue MOU indicating that. It is scheduled to be published during this fiscal year.

As mentioned above, the collaborative project between Kitakyushu City and Hai Phong City is highly evaluated not only by industrial parks and enterprises in Hai Phong city but also by the Vietnamese government, supported by many local stakeholders, While responding to the growth plan and the Eco-Industrial Park initiative promoted by MPI, it is expected that many new low-carbon projects will be discovered.

3.3 Activity 2: Low carbon project through follow-up activities

3.3.1 Overview of the survey

Based on the Hai Phong City Green Growth Promotion Plan prepared for the support of Kitakyushu City, Hai Phong City has been implementing activities aimed at realizing green growth so far. Hai Phong City Green Growth Promotion Plan is a master plan-like plan

to balance Hai Phong City's environment and economy, and it is shown that it is active mainly on 15 pilot projects, and Hai Phong City, they are making efforts to steadily implement these activities.

Among these activities are the introduction of EV bus which uses low carbon type electric power such as waste heat recovery power generation of cement factory, biomass power generation, photovoltaic power generation etc. In this fiscal year, we decided to work on a project composition aiming at acquiring JCM credits for waste heat recovery power generation at cement plants.

Regarding the waste heat recovery power generation project of the cement factory, we have been studying two business models. One is to apply a business model of BOT (Build-Operate-Transfer) type targeting Hai Phong Co., a state-owned cement company VICEM, and the other is a private cement company Bach Dang Cement. It is an equipment sales model targeted by a general EPC contract. The status of consultation of each project at the start of this project is shown below.

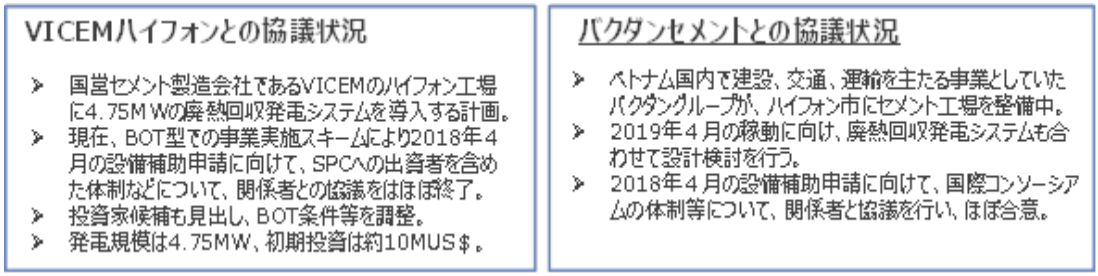


Figure 3.3.1-1 JCM examination status introduction of waste heat recovery power generation equipment

In this fiscal year, we applied for JCM equipment auxiliary project for Bach Dang Cement's waste heat recovery power generation installation project. The tasks necessary for that purpose are shown in the Figure below.

No.	調査で解決したい課題	獲得目標	担当	相手方
1	エンジニアリング会社等と連携した技術検討	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	NDK	Shanghai CONCH Kawasaki
2	1の結果を踏まえた経済性評価	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	NDK	Bach Dang Cement
3	2の検討結果を踏まえたCO2排出削減量評価	設備導入によるCO２排出削減効果の試算を行う	NDK	-
4	評価結果を踏まえた意思決定の支援	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	NDK	Bach Dang Cement
5	発注・契約方式の確認	設備導入の契約に当たり、発注方法、契約方式を確認	NDK	Bach Dang Cement
6	継続支援	JCM設備補助の二次公募へ申請	NDK	Bach Dang Cement

Figure 3.3.1-2 Waste Heat Recovery at the Cement Plant Introduction of Power Generation Equipment Project, Issues for JCM Application

Describe JCM facility subsidy application for project to introduce waste heat recovery power generation facility to Bach Dang cement company.

3.3.2 Technology to introduce

In this activity, the technology mainly assumed to be introduced is a waste heat recovery power generation system introduced at the cement plant.

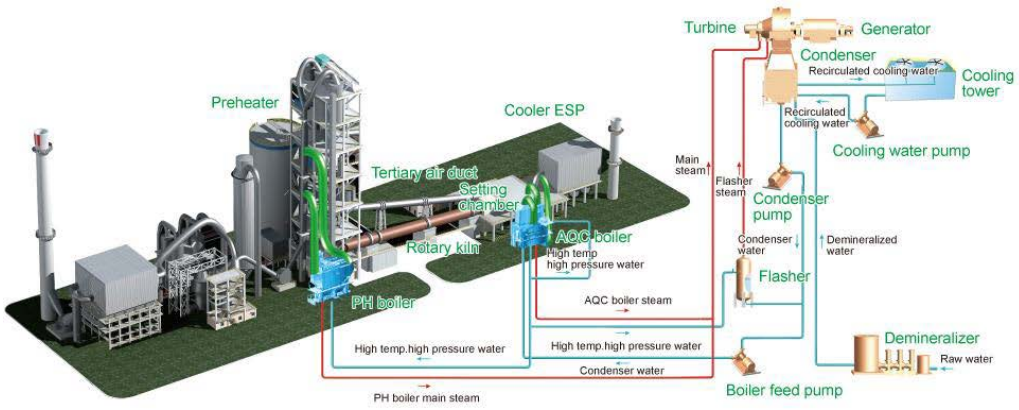


Figure 3.3.2-1 Waste heat recovery system

The waste heat recovery power generation system is said to have over 240 installations in the world

It is possible to reduce the amount of electricity used from grid electric power by recovering the heat that has not been used and thrown away and generating electricity. As a result, it is possible to reduce the amount of CO 2 discharged through the system power.

As a JCM equipment auxiliary project, we have the following three installations.

① 2013 Indonesia: Introduction of waste heat recovery power generation system to cement plant (JFE Engineering)
② 2016 Thai: Introduction of waste heat recovery power generation system to cement plant (NTT Data Institute of Management Consulting, Inc.)
③ 2018 Myanmar: Introduction of waste heat recovery power generation system to cement plant (global engineering)

The equipment to be introduced in this project is in charge of Shanghai Conch Kawasaki Engineering, Inc., a subsidiary of

Kawasaki Heavy Industries and the CONCH Group of China, a subsidiary of ANHUI CONCH KAWASAKI, which designs, manufactures and constructs (EPC).

3.3.3 Introduction of waste heat recovery power generation facility JCM project outline

The system for implementing waste heat recovery power generation facilities at Bach Dang Cement Company using the JCM equipment subsidiary system is shown below.

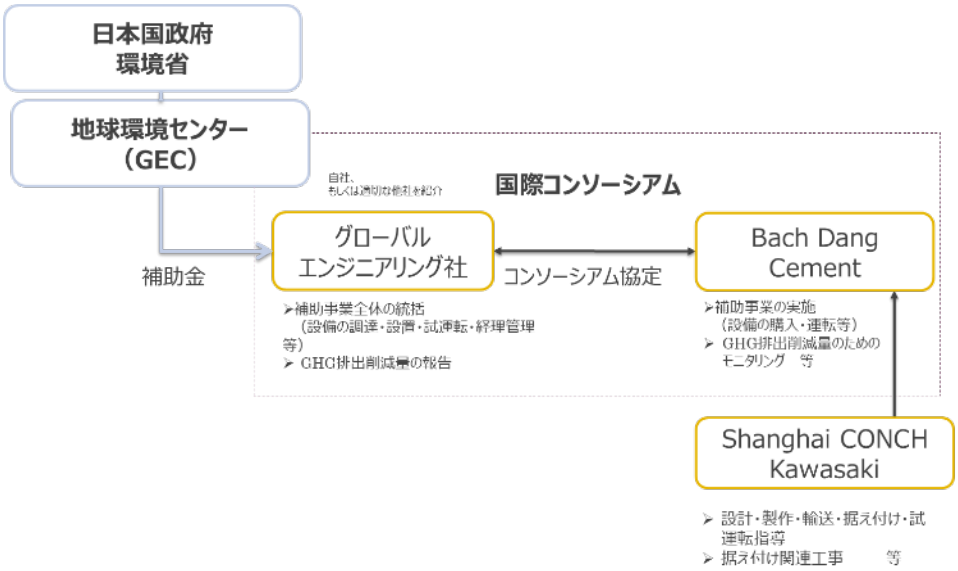


Figure 3.3.3-1 Cement factory waste heat recovery power generation facility introduction JCM project implementation structure

Global engineering company, the representative company, was founded in 1991 with its own power generation sales and maintenance business as the core. In recent years, under the tightening of the supply and demand of electric power, they are promoting energy saving (reduction of power consumption) on the demand side through efforts of demand response, which is regarded as an important position of electric power system reform. In 2012, it is adopted as business, synergy and proposal which is the first domestic response effort in Japan from Tokyo Electric Power Co., Inc. · Nuclear Damage

Assistance Organization. Later, in 2012, they will conclude a power-saving aggregator contract with Kyushu Electric Power Company, conclude a contract with Kansai Electric Power Company and BEMS aggregator contract in 2013, adopt the Ministry of Economy, Trade and Industry incentive DR subsidy project in 2015, build a virtual power plant publicly offered by Ministry of Economy, Trade and Industry 2016. It has been adopted as subsidies for project cost, etc. and has extensive experience and knowledge on society's low carbonization. In the future, we have plans to actively engage in low-carbonization projects at home and abroad, making full use of knowledge on realizing the low-carbon society that we have cultivated up to now.

The joint venture company Bach Dang Cement Joint Stock Company is a cement company owned by Phu Minh Son Group (PMS), a major conglomerate in Vietnam. Founded in 2007, Bakudan Cement was initially engaged in the trading of cement and cement raw materials, but in 2016 gained permission to build a cement manufacturing plant in Thuy Minh village from Hai Phong City, the production capacity of Nissan 3,500 tons. They plan to introduce a waste heat recovery power generation facility to the plant.

Reduction of CO2 emissions by the waste heat recovery power generation project at the cement plant is achieved by substituting a part of the electricity purchased from the grid by the same cement factory by the electricity supplied by the waste heat recovery power generation. A specific CO2 emission reduction amount is calculated by the following formula.

○**Ery = Rey – Pey**
Ery : プロジェクト期間yにおけるCO2排出削減量[tCO_2/y]
REy: リファレンス排出量 [tCO_2/y]
PEy: プロジェクト排出量 [tCO_2/y]
○**REy = EGy * EFgrid**
EGy: 購入系統電力を代替する廃熱回収システムによる正味発電量
EFgrid: プロジェクトにより代替されるタイの系統電源のCO2 排出係数
EGyの決定
EGy=EGGEN – EGAUX
EGGEN: 廃熱回収システムによる総発電量
EGAUX: 廃熱回収システムによる電力消費量
EGAUXの決定
EGAUX=EGCAP * 24 * 365
EGCAP: 電力を消費する廃熱回収システムの機器の定格容量最大値の合計
○**PEy= 0**

The installed capacity of the waste heat recovery power generation facility planned to be introduced in the project is 6,000 kW, and based on the information on the operation plan etc. of the cement plant, the CO 2 emission reduction by this project calculated based on this calculation formula The amount is 18,820 t - CO2e per year, which can be said to be a project that can acquire considerably large reductions among JCM equipment subsidized projects.

In applying for this project to JCM equipment subsidies, issues such as technical examination for introducing facilities in the plant, evaluation of economic efficiency, evaluation of CO2 emission reduction amount, decision making by related organizations, agreement on ordering / contract method, etc. Although there was a common goal of JCM equipment subsidy application, all parties agreed upon through serious consultation by stakeholders. We summarize these activities.

No.	調査で解決したい課題	獲得目標	達成した成果
1	エンジニアリング会社等と連携した技術検討	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	Shanghai Conch Kawasaki Engineering (SCKE)社と連携して実施。
2	1の結果を踏まえた経済性評価	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	経済性評価を実施し、Bach Dang Cementと協議。合意を得る。
3	2の検討結果を踏まえたCO2排出削減量評価	設備導入によるCO２排出削減効果の試算を行う	SCKE社提供の仕様等及びBach Dang Cement提供のプラント運転計画に基づき、CO2排出削減量を算定。
4	評価結果を踏まえた意思決定の支援	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	Bach Dang Cementが、JCM設備補助応募を希望したため、代表事業者を紹介。応募準備を開始。
5	発注・契約方式の確認	設備導入の契約に当たり、発注方法、契約方式を確認	国際コンソーシアム協定書など各種契約等がスムーズに締結されるよう支援を実施。
6	継続支援	JCM設備補助の二次公募へ申請	関連する資料をそろえ、応募書類を完成させ、二次公募へ応募。

Figure 3.3.3-2 Issues and Responses in Application for JCM Facility Supplement

As described above, we solved all the problems and applied for the secondary recruitment of JCM equipment for 2018. However, it became unacceptable as a result. As a reason for not adopting, there may be a shortage of materials etc. concerning fund procurement.

Bach Dang Cement Company is still hoping to introduce waste heat recovery power generation equipment utilizing the JCM equipment subsidy system, and is considering reapplying while continuing advice such as necessary document preparation etc.

Chapter 4: Attending Workshop

Chapter 4 Table of Contents

4.1 City-to-City Collaboration Project Workshop

(1) Overview

"City to City Collaboration Project Workshop" was organized by the Ministry of the Environment, and was held in Yokohama City and City of Kitakyushu, inviting people from collaborated cities with the City of Kitakyushu.

(2) Place and Date

City of Kitakyushu: Mon. October 22 to Tue. October 23, 2018
Yokohama City: Thur. October 25 to Fri. October 26, 2018

(3) Agenda and Minutes

The minutes of the workshop are shown in attached from next pages.

（Memo 1）

Seminar on City-to-City Collaboration and Site Visit in City of Kitakyushu
Minutes of Meeting

Monday, October 22nd - Tuesday, October 23rd
At Kitakyushu, Fukuoka
Attendees : Atsushi Ajiro, Hiroshi Masuda

Before the City-to-City Collaboration Project workshop organized by the Ministry of the Environment, scheduled at Yokohama on October 25 and 26, 2018, we invited the guests, who are in collaboration with the city of Kitakyushu, to the workshop in City of Kitakyushu and site visits were conducted to introduce the city's and its enterprises' countermeasures against global warming and efforts towards a low-carbon society. NTT Data Institute of Management Consulting, Inc., which engages in collaborative projects with each city this fiscal year, also participate in the tour, so the visit reports are as follows.

■Itinerary and Invited Participants

City	Name	Company	10/21（日）	10/22（月）	10/23（火）
Chiang Mai	Ms.Pakawan Sangsree パカワン　サンシリー	Chiang Mai Provincial		《Site Visit》 (1)Kitakyushu Eco-Town Center. (2)Kogasaki Incineration Facility	《Site Visit》 Usa Biogas Power Plant / Price Management of Japan Co., Ltd.
	Mr. Thanin Wanasuthanon タニン	EA Corp.			
Davao	Ms. Marliza Gallo	Davao City Environment and Natural Resources Office Davao City, Government	Arrived at Fukuoka		
	Mr. Lakandiwa Saliman Orcullo				
Hai Phong	Ms.Nguyen Minh Trang グエン　ミン　チャン	Hai Phong Department of Foreign Affairs			
	Mr.Phung Duc Anh フン　ドゥック　アイン				
Mandalay	Mr. Khaing Myint キン　ミン	Mandalay City Development Committee (MCDC)			
	Mr. Nyi Nyi ニ　ニ				
Phnom Penh	Mr. Nuon Samnavuth ヌオン　サムナブット	Waste Management and Environment Division, Phnom Penh Capital Hall			
	Ms. Kun Malin クン　マーリン				

■Visit report

Monday, October 22, 2018

1. 13:00-14:30 Kitakyushu Eco-Town Center

At the Eco-Town Center in Hibikinada area in Wakamatsu-ku, staff members explained to us the history of Kitakyushu, Hibikinada Industrial Park, and City of Kitakyushu Eco-Town Project.

In the city of Kitakyushu's environmental industry reconstruction strategy, they are collaborating with industry, academia and academia to comprehensively develop from education and basic research to technology and empirical research, and to commercialization.

After explanation at the Eco-Town Center, we went to a recycling factory of "Recycle Tech Co., Ltd." to recycle OA equipment. It decomposes the copying machine and separates it into gold, silver, lead, aluminum, copper, iron, plastic, etc., achieving a recycling rate of 99% in total. We took a tour of the urban mine and the actual factory situation (Photography in the factory is not allowed).

Eco-town Center's presentation

OA equipment recycling factory tour

2. 15:30-16:30 Kogasaki Incineration Facility

Kogasaki Incineration Facility has garbage disposal capacity of 810 tons per day. In addition facility explanation by DVD, explanation by model, and facility tour was conducted.

The volume is reduced by one twentieth by incineration of garbage. The incinerator is completely burning at a TAKUMA stalker furnace at 800 degrees. Although it also has facilities for gas engines, they currently do not operate because the price of city gas is high, they are only conducting power generation by steam turbine. The power generation scale is 17,200 kW, electricity is sold to Kitakyushu Power Co., Ltd.

	
Kogasaki Incineration Facility explanation	Model of stalker furnace

■Visit report

Tuesday, October 23, 2018

3. 10:20-12:00 Usa Biogas Power Plant / Price Management of Japan Co., Ltd.

We visited Usa Biogas Power Station where Mirai-Power Corporation, one of a comprehensive energy company is operating. The power station has been running since July 2018. This facility is a biogas power generation facility utilizing *shochu* (Japanese distilled spirit) residues and business waste in the surrounding area, and Japan Price Management Corporation is conducting EPC cooperation. In general, *shochu* gas is unsuitable for solubilization, but solubilization is carried out with original technologist.

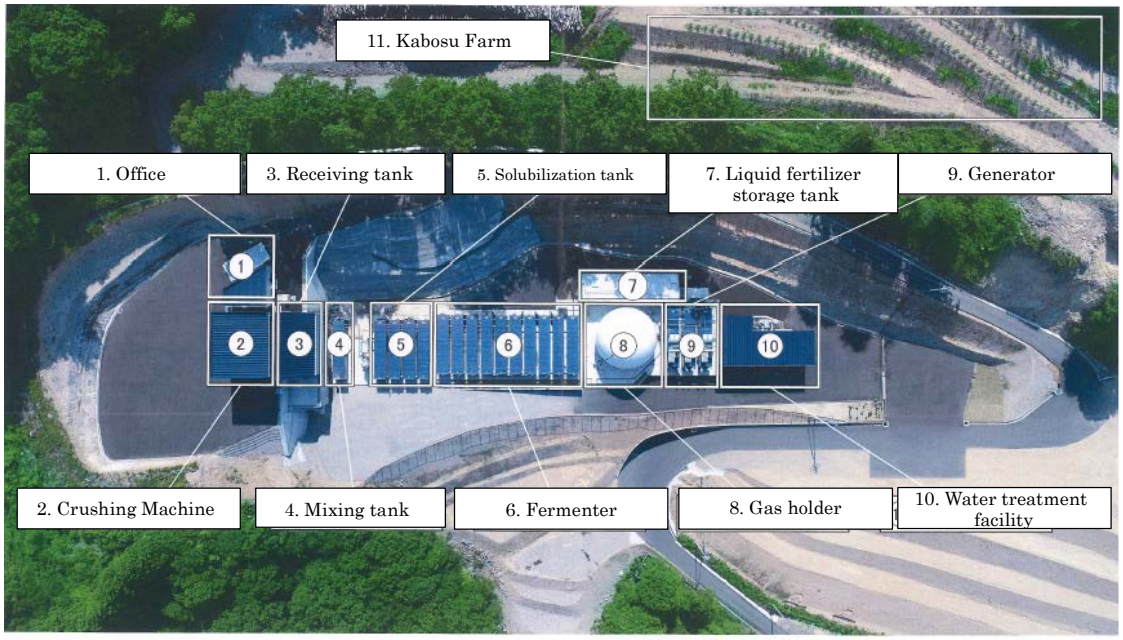
Equipment outline

・Total project cost: About one billion yen
・Constructed on the site of an oranges farm, its site area is about 8,000 square meters.
・Output：600 kW (200kW×3 units)

(As of October 23, 2018, 2 units already installed)

・Except for electric power used in the site, all Electricity is sell to Kyushu Electric Power Co., Inc. by FIT.
・Annual sales target is 120 million yen.
・The digestive juice after fermentation will be utilized as liquid fertilizer at *Kabosu* (a type of citrus fruit) Farm run by affiliates of the company.
・Construction work began in November 2017. March to August is the plant installation and trial operation period. Construction completion was July 27.

Power sale has begun since October 2018.



Outline of plant equipment

End of Minutes

(Memo 2)

Seminar on City-to-City Collaboration and Site Visit in Yokohama City

Minutes of Meeting

Thursday, October 25th - Friday, October 26th

At Annex Hall, PACIFICO Yokohama

Attendees : Atsushi Ajiro, Hiroshi Masuda

We participated in the City to City Collaboration Project Workshop organized by the Ministry of the Environment in Yokohama on October 25 and 26. On the morning of the 25th, an open seminar was held, a private seminar in the afternoon. A site visit in Yokohama was held on 26th.

■Thursday, Morning of October 25, Open Seminar

Program:

Time	Contents
09:00	Registration
09:30	**Opening Remarks** Mr. Satoru Morishita, Director General, Global Environment Bureau, MOEJ
09:35	**Overview of the C2C Collaboration for Low-Carbon Society and Financial Supports** 1. City-to-city Collaboration for Low-carbon Society and JCM Model Projects (20 min) Mr. Ryuzo Sugimoto, Director, International Cooperation and Sustainable Infrastructure Office, MOEJ 2. Support for Overseas Development of Infrastructure Systems (10min) Mr. Yuichiro Masuda, Director International Affairs Office, City Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT) 3. Support for Transportation and Urban Development Projects (10 min) Mr. Tsuyoshi Kurokawa, Deputy Managing Director, Project Department, Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development Q&A (10 min) 4. Initiatives for City-to-City Collaboration in Yokohama City to realize a low-carbon society (10 minutes) Mr. Masakazu Okuno, Director for Development Cooperation, International Affairs Bureau, City of Yokohama
10:35	Break (20 min)
10:55	**Case Study of "C2C Collaboration for Low-Carbon Society in FY2018"** 1. Collaboration with Ayeyarwady Region and Sagain Region (Myanmar) (10 min) Mr. Naoki Kato, Manager, Environment Division, Environment Department, Fukushima City / Mr. Koji Kojima, Research Director, Environment and Energy Division, Mitsubishi Research Institute Inc. 2. Collaboration with Semarang City and Bali City (Indonesia) (10 min) Mr. Masayuki Wakabayashi, Assistant Manager, Environmental Policy Division, Environmental Department, Toyama City 3. Collaboration with Jakarta (Indonesia) and Yangon City (Myanmar) (10 min) Mr. Takahiro Fukahori, Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City 4. Collaboration with Batam City (Indonesia) and the Port Authority of Thailand (10 min) Ms. Yasuaki Nakamura, Deputy Director for Development Cooperation, International Affairs Bureau, City of Yokohama 5. Collaboration with Quezon City (Philippines) and Ho Chi Minh City (Viet Nam) (10 min) Mr. Toshikazu Nakaaki, Assistant Manager for International Cooperation, Environment Bureau, Osaka City Government 6. Collaboration with Chiang Mai Province (Thailand), Hai Phong City (Viet Nam), MandalayCity (Myanmar), Davao City (Philippines) and Phnom Penh City (Cambodia) (20 min) Mr. Hiroshi Yasutake, Deputy Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu Q&A (20 min)
12:25	**Closing Remarks** Mr. Nobutoshi Miyoshi, Managing Director, Institute for Global Environmental Strategies (IGES)

- 09:30 Greeting Remarks: Mr. Satoru Morishita, Director General, Global Environment Bureau, MOEJ
  - ✧ 70% of CO2 emissions are generated from urban areas.
  - ✧ The projects are promoting collaboration between cities and private companies.
  - ✧ Also at COP 21, the importance of role played by cities was reaffirmed.

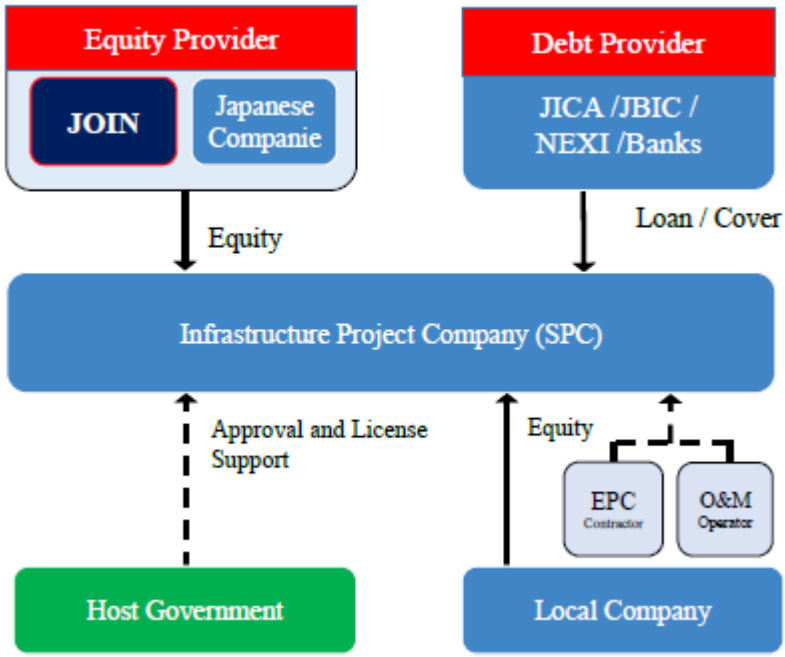
- 09:35 Overview of the C2C Collaboration for Low-Carbon Society and Financial Supports.
  - ➢ City-to-City Collaboration Low-Carbon Society and JCM Model Projects (Mr. Ryuzo Sugimoto, Director, International Cooperation and Sustainable Infrastructure Office, MOEJ)
    - ✧ To realize low-carbon business, collaboration and international cooperation is important.
    - ✧ In cooperation with low-carbon infrastructure, we are concentrating on the fields of "waste generation", "energy conservation / reenergine", "septic tank", "water and air pollution control".
    - ✧ For top sales, Japan Environment Week was held in Myanmar in January 2018. Next seminar will be held in Vietnam in 2019.
    - ✧ The importance of cities is recognized as a non-government actor about the role of the city, and focus is shifted from the national level adjustment to the urban level implementation in concrete progress of things.
    - ✧ Until now, it has been implemented in 27 cities in 10 Asian countries as City –to- City Collaboration Project.
    - ✧ There was explanation about JCM scheme and JCM financing programme.
  - ➢ Support for overseas Development of Infrastructure Systems (10 minutes) (Mr. Yuichiro Masuda, Director International Affairs Office, City Bureau, Ministry of Land, Infrastructure, Transport and Tourism (MLIT))
    - ✧ Infrastructure tasks and initiatives for each phase, in the high growth period, stable long term and maturity period are explained.
    - ✧ We are developing overseas in the form of international cooperation on the know-how that Japan has experienced.
    - ✧ In Japan, urban development centering on public transportation and stations has been done. It was development that improved the value of the whole area by performing function sharing etc. TOD (Transit Oriented Development).
    - ✧ We are implementing international cooperation called J-CODE.

- ✧ It is a characteristic of Japan that is trying to develop problem-oriented smart city development.

➢ Support for Transportation and Urban Development Projects (10 minutes)

(Mr. Tsuyoshi Kurokawa, Deputy Managing Director, Project Department, Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development)

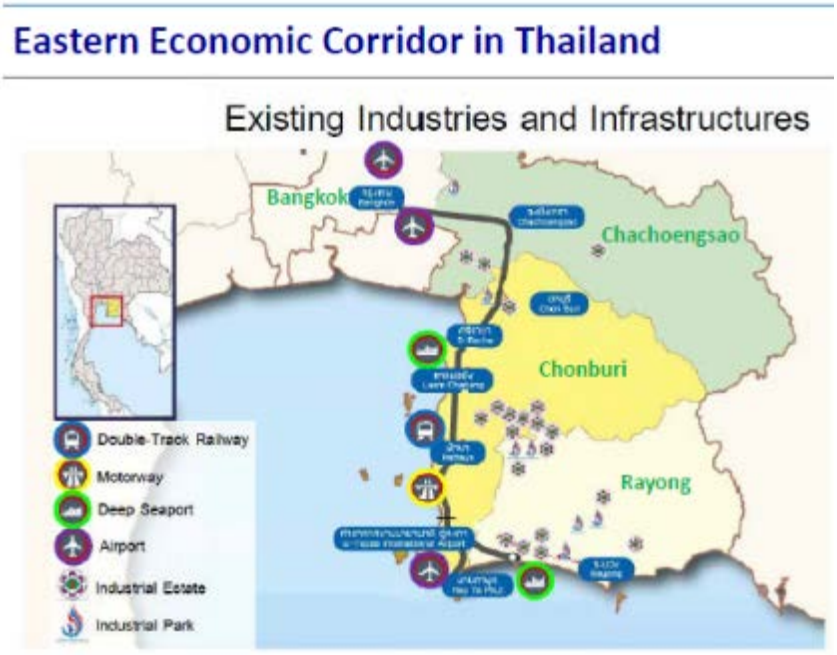
- ✧ Introduction of support for urban development support of JOIN.
- ✧ JOIN（Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development） was established in October 2014, is the "first" and "only" Public-private funds in Japan, specialized in overseas infrastructure investment. We are investing in developing countries and emerging countries without distinction.
- ✧ Funds with an investment capacity of approximately 1.3 billion US dollars (126.8 billion yen) as the annual budget of the Japanese government.
- ✧ Business fields are as follows: 1. "Transportation Project", 2. "Urban Development Project", 3. "Project to Support Transportation and Urban Development Project".
- ✧ The project organization chart is as follows;



➢ Initiatives for City-to-City Collaboration in Yokohama City to realize a low-carbon society (10 minutes)

(Mr. Masakazu Okuno, Director for Development Cooperation, International Affairs Bureau, City of Yokohama)

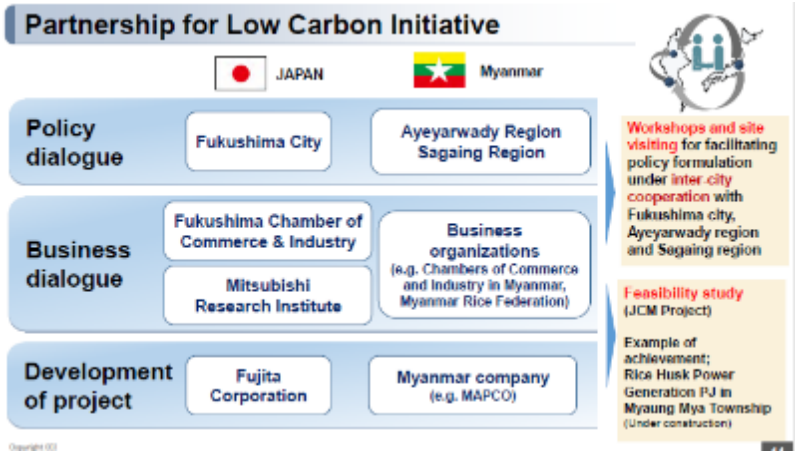
- ✧ We have provided master plan development support in Cebu, Da Nang, Bangkok, Batam. Among them, Batam is carrying out using the JCM scheme.
- ✧ The efforts of Da Nang city, Y-PORT project, JCM case cases etc. are introduced
- ✧ We create civic cooperative offices, working on Y-PORT projects with citizen collaboration.
- ✧ The development plan of the support project in Bangkok is shown below. We would like to advance business with B2B.



- 11:00 Introduction of adopted case of "FY2018 City-to-City Collaboration Programme for Low-Carbon Society"
  - ➢ Collaboration with Ayeyarwadi Region and Sagaing Region (Myanmar) (10 minutes)

    （Mr. Naoki Kato, Manager, Environment Division, Environment Department, Fukushima City / Mr. Koji Kojima, Research Director, Environment and Energy Division、Mitsubishi Research Institute Inc.）
    - ✧ Explanation of collaboration project between Fukushima City and Ayeyarwadi Region and Sagaing Region
    - ✧ The city-to-city collaboration between Fukushima City and Ayeyarwadi Region is the fourth year. In the meantime, we have been able to achieve some results.
    - ✧ Firstly, it is educational activities through environmental education. We exchanged video letters between Fukushima City and elementary school students in Myanmar. Secondly, it is promoting sorting work at the waste disposal site to reduce waste in Pathein city.

- ✧ We carried out to paying courtesy to the Minister for Agriculture and Livestock and approach to Ms. Aung San Suu Kyi last fiscal year
- ✧ It is characterized by being active in three layers of examination of JCM project, business review, and policy review.

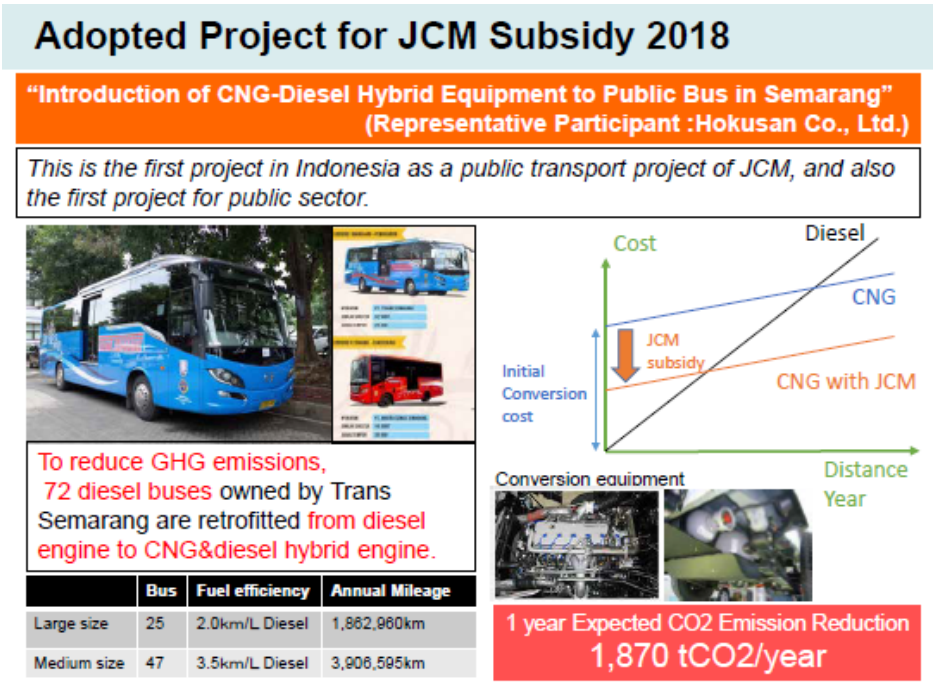


- ✧ We are focusing on biomass power generation (rice residue power generation) as an industrial park development. Utilizing the characteristics of Fukushima City and Ayeyarwadi Region, we are considering business composition. We are planning to make heat from rice residue and supply the heat to industrial parks and local communities.

➢ Collaboration with Semarang City and Bali City (Indonesia) (10 minutes)

(Mr. Masayuki Wakabayashi, Assistant Manager, Environmental Policy Division, Environmental Department, Toyama City)

- ✧ Introduction of Toyama city. In addition to environmental efforts, it has been selected as a SDGs model city. The two city characteristics are compact city policy and renewable energize policy.
- ✧ In Tabanan City, Bali, small-hydropower generation is used, and in Indonesia, hybrid power generation that combines small hydraulic power and sunlight is performed. Also, in Bali, we are working on energy conservation of tourism facilities such as hotels and restaurants, and low carbonization of public transportation such as diesel and gas.
- ✧ Introduced of JCM project in the transportation field to be advanced in Semarang city. The outline is as follows;



- Collaboration with Jakarta (Indonesia) and Yangon City (Myanmar)

  (Mr. Takahiro Fukahori, Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City)

  - Introduction of Kawasaki city. It is an industrial area and is trying to transfer technology and know-how that we have been working on to cope with environmental problems to overseas.
  - Having a slogan called "Win-win relationship" and "Equal partnership", we are implementing city-to-city collaboration.
  - Introduction of city-to-city collaboration project with Yangon and Jakarta. In Yangon, targeting markets where large amounts of organic waste are generated, with the aim of utilizing Hitachi Zosen's methane fermentation technology, we have set up enterprises in Kawasaki City as EPC contractors and make projects. We are collaborating with local Dagon Group in Myanmar.

- Collaboration with Batam City (Indonesia) and the Port Authority of Thailand (10 minutes)

  (Ms. Yasuaki Nakamura, Deputy Director for Development Cooperation, International Affairs Bureau, City of Yokohama)

  - Introduction of examples of Batam and Bangkok from among cooperative projects with cities in Cebu, Da Nang, Bangkok, Batam.
  - In Batam, we are focusing on green industry and green building. In addition to JCM FS, METI's water business and garbage business etc. are also combined in a wide range.

- ✧ This fiscal year we are doing FS of optimization in industrial park.
- ✧ We are making a system to decide whether CASBEE in Yokohama can be introduced to Batam or whether it can be expanded horizontally.

➢ Collaboration with Quezon City (Philippines) and Ho Chi Minh City (Vietnam) (10 minutes)

(Mr. Toshikazu Nakaaki, Assistant Manager for International Cooperation, Environment Bureau, Osaka City Government)

- ✧ Introduction of city-to-city collaboration case with Quezon City and Ho Chi Minh City.
- ✧ About city-to-city collaboration with Quezon City, we have an MOU for the following four purposes:
  - Making a reference system
  - Sharing of expertise
  - Creation of public-private partnership projects
  - Capacity building
- ✧ In Quezon City project, we are considering energy conservation at factory, introduction of photovoltaic power generation equipment, improvement of garbage trucks, etc.
- ✧ In Ho Chi Minh City project, Osaka City is cooperating with the planning and promotion of a global warming countermeasure implementation plan. We are considering not only plans for mitigation measures but also adaptation measures such as weather forecasting. We also are considering introducing JCM project as an introduction of energy-saving pumps.

➢ Collaboration with Chiang Mai Province (Thailand), Hai Phong City (Vietnam), Mandalay City (Myanmar), Davao City (Philippines), Phnom Penh City (Cambodia) (20 minutes)

(Mr. Hiroshi Yasutake, Deputy Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu)

- ✧ Explanation for each city is conducted.
- ✧ Phnom Penh (Cambodia): Sister city from 2016. As a pilot project supporting Phnom Penh city climate change plan formulation, this fiscal year, we are considering for the field of transportation, green production, and environmental conservation.
- ✧ Mandalay (Myanmar): We have been collaborating since 2012. Focus on waste management and energy fields. In the energy field, we will tackle the reduction of carbon at large facilities and the reduction of carbon at primary industry.
- ✧ Davao (Philippines): 2017 Environmental sister city concluded. We are assisting in formulation of climate change action plan and implementation of mitigation measures. We are also considering the field of waste power generation business.

- ✧ Chiang Mai (Thailand): Horizontal expansion of eco industrial town. Cooperating with Thai Industrial Estate Authority, we are considering low carbonization in new industrial parks.
- ✧ Hai Phong (Vietnam): 2014 sister city concluded. Formulation of Green Growth Promotion Plan and demonstration of EV bus etc. in the past. This fiscal year, support for environmentally-friendly industrial parks has started.

- 12:25 Closing remarks: Mr. Nobutoshi Miyoshi, Managing Director, Institute for Global Environmental Strategies (IGES)
  - ✧ He thanked for the supporters of the seminar, the speakers. Today's information are extremely important in implementing concrete measures in future city-to-city collaboration. IGES plays a platform function of cooperation between cities, and for further promotion, it is necessary to further disseminate information on support such as funding from planning to implementation.
  - ✧ We would like them to consider the examination toward the realization of further low carbonization project.

■Thursday, afternoon of October 25, Private Seminar

Program:

Time	Contents
13:30	Open venue
14:00	Opening Remarks Mr. Ryuzo Sugimoto, Director, International Cooperation and Sustainable Infrastructure Office, MOEJ
14:05	**Reports by Participants from Asian Cities** 1) Phnom Penh City (5 min) Mr. Samnavuth Nuon, Deputy Director, Waste Management and Environment Division, Phnom Penh Capital Hall 2) Jakarta (5 min) Ms. Emi Pelita Fitratunnisa, Head of Environment and Cleansing Management Division, Environment Agency, Jakarta Capital City Government 3) Batam City (5 min) Mr. Rudy Satriawansyah, Department of Environment, Batam City Government 4) Semarang City (5 min) Mr. Ade Bhakti Ariawan, Head of Trans Semarang Public Service Agency, Trans Semarang Public Service Agency 5) Bali City (5 min) Mrs. Luh Ayu Aryani, Acting Head of Environment Agency, Bali Province 6) Ayeyarwady Region (5 min) Mr. Naing Lin Maung, Regional Director, Ayeyarwady Regional Government 7) Sagaing Region (5 min) Mr. Thit Htoo Myint, Director, Sagaing Division City Development Committee 8) Yangon City (5 min) Mr. Zaw Nyunt, Deputy Head of Department, Production Department, Yangon City Development Cornrnittee (YCDC)) 9) Mandalay City (5 min) Mr. Khaing Myint, Committee Member, Mandalay City Development Committee (MCDC) Q&A (5 min)
14:55	Break (15 min)
15:10	10) Quezon City (5 min) Ms. Trissha Belle S Gollayan, Environmental Management Specialist D, Environmental Protection and Waste Management Department. Quezon City, Local Government 11) Davao City (5 min) Mr. Lakandiwa Saliman Orcullo, Head of Information Education Campaign, Davao City Environment and Natural Resources Office Davao City, Government 12) Port Authority of Thailand (5 min) Mrs. Mayuree Deeroop, Scientist, Corporate Strategy Department, Port Authority of Thailand 13) Chiang Mai Province (5 分)(Ms. Pakawan Sangaree, Environmentalist Professional Level, Office for Natural Resource & Environment, Chiang Mai Provincial Office 14) Hai Phong City (5 min) Mr. Duc Anh Phung, Specialist, Hai Phong Department of Foreign Affairs 15) Ho Chi Minh City (5 min) Ms. Au Ngoc Lien, Official, Division of Solid waste management, Ho Chi Minh City, Natural Resources and Environment Department Q&A (5 min)
15:45	Break (15 min)
16:00	**Points to be Noted and Points of Adoption of Financial Supports** 1) JCM Model Project (10 min) Mr. Osamu Bannai, Manager, Financing Programme Group, Tokyo office, Global Environment Center (GEC) 2) Support for Transportation and Urban Development Projects (10 min) Mr. Tsuyoshi Kurokawa, Deputy Managing Director, Project Department, Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development 3) Funds Available for Promoting C2C Collaboration (5 min) Mr. Kohei Hibino, Programme Manager, Kitakyushu Urban Centre, IGES Q&A (30 min)
16:55	**Closing Remarks** Ms. Mahoyo Yamamoto, Researcher, International Cooperation and Sustainable Infrastructure Office, MOEJ
17:45	Reception

- 14:00 Opening remarks from the organizer
  (Mr. Ryuzo Sugimoto, Director, International Cooperation and Sustainable Infrastructure Office, MOEJ)

- Reports by Participants from Asian Cities.
  - Phnom Penh City (5 minutes)

    (Mr. Samnavuth Nuon, Deputy Director, Waste Management and Environment Division, Phnom Penh Capital Hall)
    - ✧ Eight Areas for Low Carbon Society; Implementation of Master Plan, Eco-City Development, Urban Transport Improvement, Flood Control, Greater Water Supply, Waste Management, Climate Change Action Plan, Green City Strategic Plan 2018-2030.
    - ✧ We have created a Climate Change Action Plan. We are also visiting the mayor to the City of Kitakyushu. In addition, we are working with City of Kitakyushu on waste landfill facilities and water supply improvement project.
    - ✧ We are expecting citizen's awareness about waste management in the BKK 3 area as a result of city-to-city collaboration.
    - ✧ We have a sister city relationship with China, Thailand, Korea and Australia and are working towards building a green city.

  - Jakarta (5 minutes)

    (Ms. Erni Pelita Fitratunnisa, Head of Environment and Cleansing Management Division, Environment Agency, Jakarta Capital City Government)
    - ✧ We are collaborating with Kawasaki City toward the achievement of SDGs and are conducting a feasibility study on solid waste management.
    - ✧ We are also spreading renewable energy through water power generation.
    - ✧ While involving multiple stakeholders, capacity building of citizens will be carried out and efforts toward low carbonization will be carried out.

  - Batam City (5 minutes)

    (Mr. Rudy Satriawansyah, Department of Environment, Batam City Government)
    - ✧ In 2015, Batam City and Yokohama City concluded a LOI towards the development of a sustainable city. City to city collaboration has six pillars; Green planning, Green water, Green buildings, Green transportation, Green waste and Green industry.
    - ✧ We promote energy conservation such as airports, large buildings, stations, offices, etc.

  - Semarang City (5 minutes)

    (Mr. Ade Bhakti Ariawan, Head of Trans Semarang Public Service Agency, Trans Semarang Public Service Agency)

- ✧ In 2017, we exchanged LOI with Toyama City with cooperation focusing on renewable energy and transportation. In addition, we hold business matching and conferences and deepen mutual cooperation.
- ✧ As a medium-term plan, we set goals for traffic and environmental indicators in 2016-2021.
- ✧ We procure CNG tram bus using 5.3 billion rupiah budget.
- ✧ Based on city to city collaboration, we would like to promote collaboration of B2B utilizing urban public corporation in the future.
- ✧ We will also invest in the process of industrial waste disposal. There is one company that handles industrial waste, but the processing capacity is insufficient.
- ✧ We also conduct research on science and technology towards sustainability in cooperation with the University of Toyama.

➢ Bali City (5 minutes)

(Mrs. Luh Ayu Aryani, Acting Head of Environment Agency, Bali Province)

- ✧ Indonesia aims to reduce CO2 emissions by 26% by 2020.
- ✧ Enacted environmental protection and management law in 2009.
- ✧ There are seven priority issues in Bali. Poverty and employment, education and health, development of agriculture, sustainable development of culture, infrastructure development and environmental protection, public service, peace and fulfillment of the public sector.
- ✧ In the fuel sector of the energy sector, we plan to reduce 38.97 million tons of CO2 emission by 2020 (gasoline and diesel).

➢ Ayeyarwady Region (5 minutes)

(Mr. Naing Lin Maung, Regional Director, Ayeyarwady Regional Government)

- ✧ Under the cooperation with Fukushima City, we are promoting efforts towards low carbonization. The field is water treatment industry, reduce carbon emissions and long-term use of the energy.
- ✧ Ayeyarwady is a large countryside area, and the electrification rate is also low.
- ✧ Unger Construction of 1.8 MW Gross Rice Husk Fired BTG Power Plant Project. We will continue to cooperate with Fukushima City.

➢ Sagaing Region (5 miniutes)

(Mr. Thit Htoo Myint, Director, Sagaing Division City Development Committee)

- ✧ Monywa (one of industrial zones in Segaing region) generates 130 tons of solid waste every day. Currently, we transport it by truck, and discard it to three places. There is no recycling activity at Monywa TDC (Township Development Committees).
- ✧ In the future, we would like to promote waste generation and composting, and to reduce waste utilizing advanced technology.

- ✧ 10 MW / day of electricity is required in the Monywa area, and we believe that sufficient power can be supplied to the area if we can generate electricity utilizing rich husks in the area.

- Yangon City (5 minutes)

  (Mr. Zaw Nyunt, Deputy Head of Department, Production Department, Yangon City Development Committee (YCDC))

  - ✧ We are promoting under city to city collaboration with Kawasaki city.
  - ✧ Utilizing the JCM scheme, we have installed a waste power plant. Of the initial of 16 million USD, 8 million USD is covered with equipment subsidies. It has a processing capacity of 60 tons / day.
  - ✧ In the future, we are considering implementing waste fueling project. For example, utilizing recycling waste tires by heat recycling or material recycling.

- Mandalay City (5 minutes)

  (Mr. Khaing Myint, Committee Member, Mandalay City Development Committee (MCDC)).

  - ✧ Collaborate with Japan to develop waste management strategy and action plan.
  - ✧ 2017 - 2030 is formulated as a short-term, medium-term, long-term plan.
  - ✧ Mandalay's waste action plan for FY2018 budget formation is approved by the province and many budgets are devoted to improvement of landfill disposal site, introduction of sorting machines and treatment of hazardous waste.

- Quezon City (5 minutes)

  (Ms. Trissha Belle S Gollayan, Environmental Management Specialist D, Environmental Protection and Waste Management Department. Quezon City, Local Government)

  - ✧ Quezon and Osaka signed an MOU in April 2018 and will carry out cooperative activities for three years.
  - ✧ The cooperation areas are climate change mitigation, renewable energy and energy conservation, wastewater management, water supply, solid waste management, and environmental conservation.
  - ✧ As a next step, we are planning to formulate JCM guidelines in the Philippines, implement capacity building, set goals and prioritize them.

- Davao City (5 minutes)

  (Mr. Lakandiwa Saliman Orcullo, Head of Information Education Campaign, Davao City Environment and Natural Resources Office Davao City, Government)

  - ✧ We are working on the issue of solid waste as top priority.

- ✧ In cooperation with the City of Kitakyushu, we are investigating the possibility of Waste to Energy.
- ✧ We are also cooperating with JICA's grassroots Project. We are working on proper separation of municipalities in barangays (local government equivalent to wards in Japan), reduction of waste.

➢ Port Authority of Thailand (5 minutes)

(Mrs. Mayuree Deeroop, Scientist, Corporate Strategy Department, Port Authority of Thailand)

- ✧ Regarding Green Port Development, we are developing with cooperation with the City of Yokohama.
- ✧ We are proceeding in cooperation with multiple stakeholders, including introducing solar power generation and energy saving equipment at ports and surrounding areas.
- ✧ Scheduled to update MOU between Thai port and City of Yokohama.
- ✧ We would like to consider modal shift from road to port。
- ✧ We would like to reduce energy consumption at ports.
- ✧ We are struggling to involve Thai public enterprises in JCM projects. In particular, there are difficulties in the process and approval until agreement is reached, and there is concern about schedule delay.
- ✧ We would like to deepen our understanding of the JCM system of relevant parties and to advance smoothly.

➢ Chiang Mai Province (5 minutes)

(Ms. Pakawan Sangsree, Environmentalist Professional Level, Office for Natural Resource & Environment, Chiang Mai Provincial Office)

- ✧ We would like to thank the concerned parties and collaborators
- ✧ Chiang Mai is in the northern part, the second largest city after Bangkok. It is a prefecture with a scale of 190,000 people.
- ✧ Cooperation between Kitakyushu and Chiang Mai has been ongoing since 2000.
- ✧ In FY 2017 and FY 2018, city-to-city collaboration projects are carrying out and focus on waste and conduct inspections.
- ✧ As part of Thailand 4.0, Chiang Mai has been selected as a smart city development area. We would like to consider the concept of smart city.
- ✧ We are considering Chiang Mai University as a priority area of Smart City.
- ✧ 3Rs promotion among to residents is conducted.

➢ Hai Phong City (5 minutes)

(Mr. Duc Anh Phung, Specialist, Hai Phong Department of Foreign Affairs)

- ✧ Hai Phong and Kitakyushu signed a sister city agreement in 2014.
- ✧ Kitakyushu has been supported Hai Phong to develop 15 projects in “Hai Phong City Green Growth Promotion Plan”.
- ✧ We have implemented projects so far including introducing solar power generation, high efficiency air conditioning, and EV bus.

- ✧ This fiscal year, we are focusing on Eco Industrial Park and are considering to proceed. We consider that companies that are conscious of resource utilization and clean production come into the Eco Industrial Park.
- ✧ We want to develop the concept of Eco Industrial Park to other industrial parks.

➢ Ho Chi Minh City (5 minutes)

(Ms. Au Ngoc Lien, Official, Division of Solid waste management, Ho Chi Minh City, Natural Resources and Environment Department)

- ✧ We have developed a climate change action plan from 2017 to 2020.
- ✧ We are planning multiple projects to reduce CO2 emissions.
- ✧ For public transport, we would like to consider environmentally friendly, metro, BRT, bus etc.
- ✧ The problem facing is separation at the time of discharging garbage. There is a sorting guidance of Ho Chi Minh City, but because of lack of penalties regulations and not being publicized about guidance, citizens do not necessarily properly sort out.
- ✧ We also plan to sequentially implement licenses to collectors.

➢ Q&A)

- ✧ Q) Regarding Semarang City Public Transportation Bus which is JCM Project, what made you struggle to advance as a public project?
- ✧ A) We promoted the project with the third sector as a joint venture. The point that became an issue at the time of procedure is the amount of money changes. Although it is assumed that the subsidy rate at JCM is 50%, because the amount changes due to bidding, it was difficult to adjust the budget for Semarang city.

● 16:00 Points to be noted and points of adoption of financial supports

➢ JCM Model projects (10 minutes)

(Mr. Osamu Bannai, Manager, Financing Programme Group, Tokyo office, Global Environment Centre Foundation (GEC))

- ✧ There are 130 projects adopted in 17 countries.
- ✧ Introduction of low-carbon technology to the JCM signing country and reduction of CO2 will be subject.
- ✧ Japanese companies need to propose as representatives of international consortium.
- ✧ As an international consortium, it is necessary to include the representative company in Japan, equipment holders in the country, users as members as a joint venture.
- ✧ The International Consortium is obliged to report the reduction amount of CO2 for the period of legal equipment life in Japan, and it is necessary to pay attention to the fact that the international consortium will be obligated to return the subsidy if the delivery provision is violated.

- ✧ Cooperation in methodology development, project registration and credit issuance are also necessary.
- ✧ Points of adoption at the time of appraisal.
  - Certainty of performance: evaluate by taking account of management situation, actual results, business plan, licensing / approval situation, economic efficiency, business nature, appropriateness of fund planning etc.
  - For investment recovery years, subsidies are available and over 3 years are eligible for subsidization.
  - Cost-effectiveness needs to satisfy 4000 yen / ton CO2.
  - However, for sunlight in Mongolia and Thailand, 3000 yen / ton CO 2.
  - Is there a possibility of introducing introduction technology and a strategy for private enterprises to autonomously spread?
  - Is the CO2 reduction calculation method and monitoring appropriate?
- ✧ Projects with high project certainty from the perspective of project planning, structure, financing, licensing, schedule, etc. are easier to adopt, and will proceed well after adoption.

➢ Support for transportation and urban development projects (10 minutes)

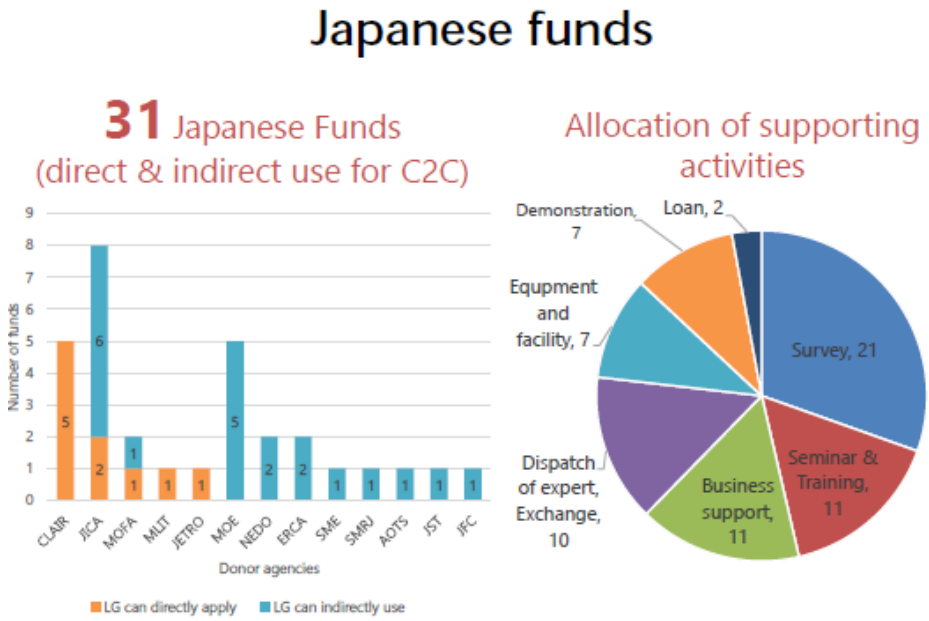
(Mr. Tsuyoshi Kurokawa, Deputy Managing Director, Project Department, Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development)

- ✧ JOIN（Japan Overseas Infrastructure Investment Corporation for Transport & Urban Development）was established in October 2014, is the "first" and "only" Public-private funds in Japan, specialized in overseas infrastructure investment.
- ✧ JOIN is a public-private joint-stock enterprise and invests in overseas urban development projects. As an annual budget of the Japanese government, it has an investment capacity of approximately 1.3 billion US dollars (126.8 billion yen).
- ✧ We are hoping to promote better development in cooperation with the scheme of the Ministry of the Environment and participate in this seminar.
- ✧ We can participate not only in new projects but also in continuing projects.
- ✧ It is a major principle that Japanese companies invest in projects that are developed overseas. Participation by local companies and cooperation of local government agencies are also important.
- ✧ In addition to JOIN's review, JOIN's decision will require permission from the Japanese government.
- ✧ It will be judged on three evaluation axes: "policy significance", "private business entity's initiative" and "sustainability".
- ✧ Have 13 achievements. Many projects in ASEAN countries.
- ✧ There are also projects cooperating with JCM projects in Jakarta, Indonesia. Since it is investment, not subsidy, it is not considered as a double subsidy.

- Funds available for promoting C2C Collaboration (5 minutes)

  (Mr. Kohei Hibino, Programme Manager, Kitakyushu Urban Centre, IGES)

  - Refer to the distribution brochure (for Japanese local government officials). An electronic version will also be released soon.
  - There are funds that can be utilized by related ministries and agencies. See the figure below. Funds in the execution phase such as loans and demonstration tend to be less, but we would like to consider utilization according to purpose and phase.



- 16:55 Closing remarks

  (Ms. Mahoyo Yamamoto, Researcher, International Cooperation and Sustainable Infrastructure Office, MOEJ)

  - I believe that mutual communication is taking place closely, such as collaboration, needs of private enterprises, low carbon technology of Japanese companies, etc., leading to materialization.
  - I would like to engage in collaboration between cities as a trigger to project from the whole concept and mid- to long-term perspective, not from the standpoint of the project alone or a single fiscal year.

■**Friday, morning of October 26, Site visit**

Program:

<table>
<tr><th>Time</th><th colspan="4">Contents</th></tr>
<tr><td>08:30</td><td colspan="4">Departure from the Washington Hotel Participants go to the venue on foot. IGES staffs accompany.</td></tr>
<tr><td>09:00</td><td colspan="4">Overview of Yokohama City Action Plan for Global Warming Countermeasures
[Climate Change Policy Headquarters, City of Yokohama]
(Including Q&A session) Venue: TKP Garden City PREMIUM minatomirai</td></tr>
<tr><td rowspan="4">10:00</td><td colspan="4">Site visit Participants join one of the following groups. Buses are arranged for travelling.</td></tr>
<tr><td colspan="2">Group 1:
Hydrogen technology demonstration</td><td colspan="2">Group 2:
Green buildings</td></tr>
<tr><td>10:00</td><td>Regional Cooperation and Low-carbon Hydrogen Technology Demonstration Project
A tour of the "Hama Wing"
[Climate Change Policy Headquarters]
(Including traveling time)</td><td>10:00</td><td>Overview of the Building Energy Management System (BEMS) Project in the Yokohama City University Hospital and the Minami Ward Office Building
[Climate Change Policy Headquarters]
(Including Q&A session)
Venue: TKP Garden City PREMIUM minatomirai</td></tr>
<tr><td>10:30</td><td>BEMS Project
A tour of the Minami Ward Office building
[Housing and Architecture Bureau & Minami Ward Office, City of Yokohama]
(Including traveling time)</td></tr>
<tr><td>12:30</td><td colspan="4">Arrival at the Yokohama Sakuragicho Washington Hotel</td></tr>
</table>

- Overview of Yokohama City Action Plan for Global Warming Countermeasures
  - City of Yokohama Climate Change Measures

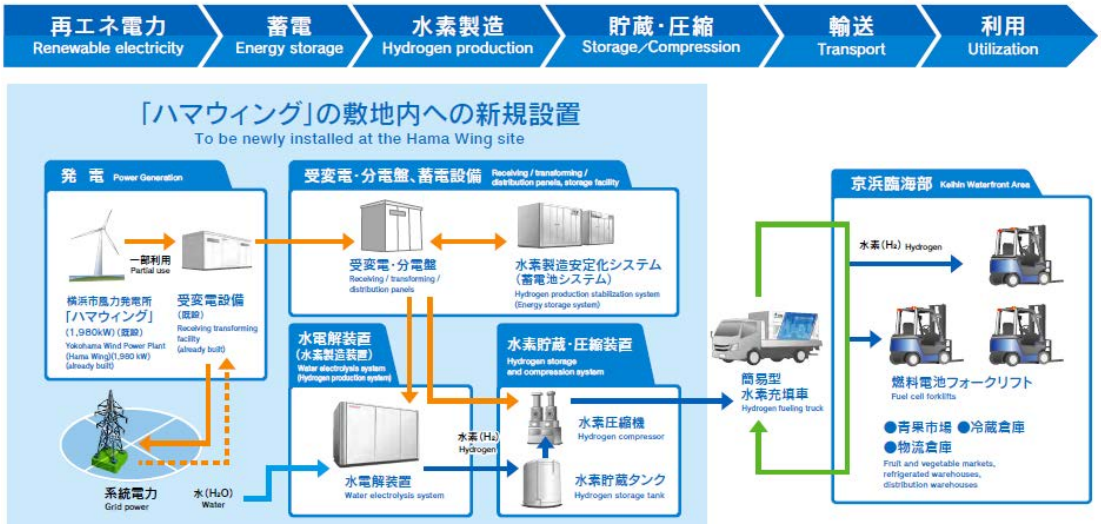
    (Mr. Suzuki, Climate Change Policy Headquarters, City of Yokohama)
    - ✧ Explain the outline and history of the City of Yokohama.
    - ✧ In Yokohama, the population rapidly increased during the period of high growth, causing problems of environmental destruction, garbage problem, road traffic, water resource problems, shortage of public land. Under such circumstances, in cooperation with citizens and business operators, we have implemented and resolved various projects.
    - ✧ As climate change, in the past 100 years rose by about 1.8 degrees. Yokohama's GHG emissions in 2016 are 18.84 million tons-CO2. As Yokohama has a population of about 3.73 million (second largest city in Japan), emissions from the household sector account for 24% compared to the whole country.
    - ✧ The city of Yokohama has set "Zero Carbon Yokohama" as a goal of countermeasures against global warming, and the three C "Choice – Creation - Collaboration" which is the strength of Yokohama of "Power of Choice" "Power of Creation" "Power of Collaboration" based on the basic policies set.
    - ✧ The goal is to reduce greenhouse gas emissions by more than 80% compared to 2013 by 2050.

- ✧ The city of Yokohama, the only global municipality in Japan has established the Global Warming Countermeasure Headquarters and is developing global warming countermeasures activities.
- ✧ We are also devising a financial aspect to promote the global warming project, such as by adding financial resources as a plus project to counter global warming.
- ✧ We promote it by placing "adaptation measures" in the Yokohama's climate change adaptation policy revised in 2014.
- ✧ We have five basic strategies: "Promotion of measures to protect the life and property of citizens", "Improvement of urban resilience", "Approach of adaptation perspective in the policy", "A virtuous circle of the environment and the economy by promoting adaptation measures", "Promotion of collaboration between cities in Japan and overseas"

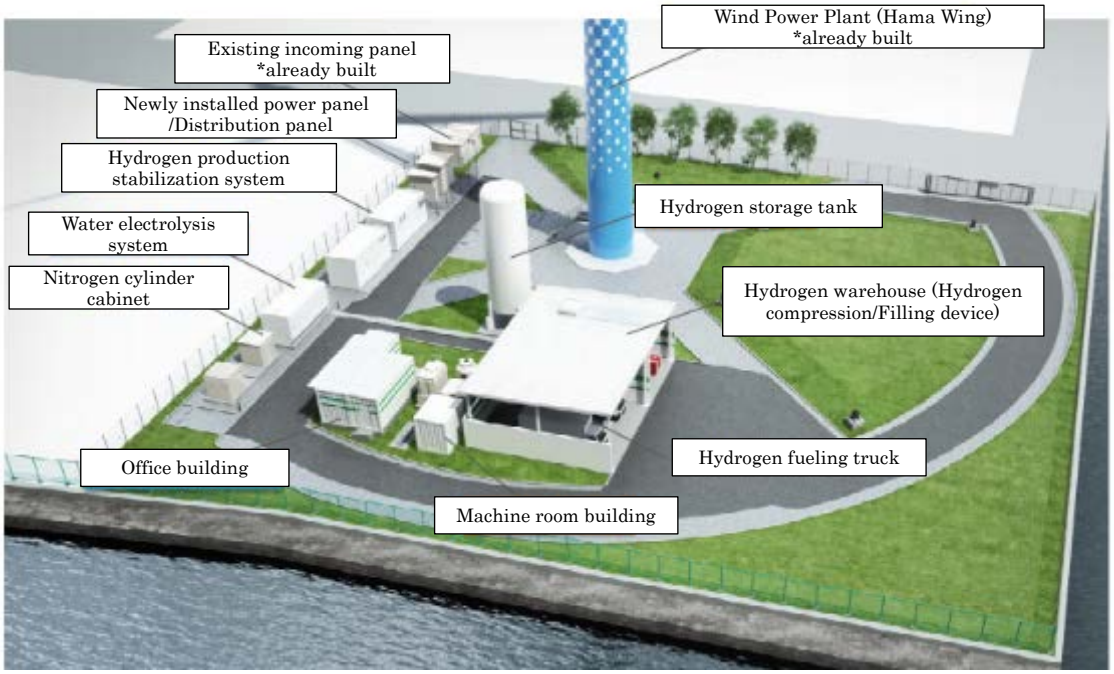
- Group 1: Hydrogen technology demonstration;

  Regional Cooperation and Low- carbon Hydrogen Technology Demonstration Project. *A tour of the "Hama Wing"* (Climate Change Policy Headquarters)

  - ➢ Overview of the project
    - ✧ In the demonstration project, a system for manufacturing, storing and compressing low-carbon hydrogen using wind power generation is installed in the Yokohama Wind Power Plant (Hama Wing) premises.
    - ✧ The hydrogen produced here was imported with a simple Hydrogen fueling truck and demonstrated Japan's first "hydrogen delivery system" to be used in fuel cell forklift introduced in Yokohama city and Kawasaki city fruit market, factory, warehouse.
    - ✧ The outline of the project is as follows. It is a trial calculation that it is possible to reduce CO2 emissions by 80% in the entire system, and this confirmation is confirmed by this demonstration.



Hama Wing Site



- Equipment outline
  - The hydrogen production stabilization system (energy storage system) is a storage system consisting of 180 used batteries (nickel metal hydride batteries) of the Toyota Prius. Electricity storage of electricity that could be generated when equipment is not working at night.
  - Water Electrolysis system: apparatus for producing hydrogen. Flexible hydrogen production that produces a large amount of hydrogen when the amount of electricity generation is large, and makes less hydrogen when it is small. Made in Toshiba.
  - Maintain the hydrogen storage tank and carry the compressed hydrogen in a Hydrogen fueling truck. This tank can store hydrogen suppliable amount of hydrogen for 12 days on 12 forklift trucks. In addition, red cards (bundled cylinders) are prepared for emergency hydrogen supply, and hydrogen which can fill 16 forklift trucks is put in a cylinder. Hydrogen packed in the curd is not generated by Hama Wing. Up to now, there has never been a shortage of hydrogen.
  - Hydrogen fueling truck: We have introduced 2 first Hydrogen fueling trucks in Japan. They are not commercially available. It is compact size that can be delivered to the factory with a small turning capacity and can store six Fuel cell forklifts. This truck itself is diesel fuel, so it is not the only carbon free in this demonstration.
  - 12 Toyota forklifts were introduced. The same fuel cells as Toyota FCV, MIRAI are introduced. Only water is discharged, it can charge in 3 minutes. Since charging is possible faster than electric, the operating efficiency has improved significantly.

- ✧ 4 users use three forklifts at a time. They are used in Yokohama City Central Wholesale Market, Kirin Brewery Yokohama Plant, Nakamura Logistics Inc., Nichirei Logistics Group's distribution center.
- ✧ The usage status and remaining hydrogen level are grasped in real time in the operation management center, and optimum delivery is enabled. Three people from the Iwatani Corporation are stationed. (Resident obligation is determined by law)
- ✧ Wind power generation has an annual power generation record of 2.1 million kWh. It corresponds to 600 households of electricity supply.

- Group 2: Green buildings: Overview of the Building Energy Management System (BEMS) Project in the Yokohama City University Hospital and the Minami Ward Office Building (Climate Change Policy Headquarters)

  A tour of the "the Minami Ward Office Building" (Housing and Architecture Bureau & Minami Ward Office, City of Yokohama).

  - ✧ It was selected "Next Generation Energy and Social Systems Demonstration Area" by METI.
  - ✧ YSCP (Yokohama Smart City Project): We have been promoting many demonstration projects in collaboration with 34 business operators.
  - ✧ One of them, "Energy collaboration between Yokohama City University Medical Center and Minami Ward Comprehensive Government Building" project was introduced.
  - ✧ Although the Minami Ward Comprehensive Government Building will be a headquarters for disaster response, it has been subject to planned blackouts after the Great East Japan Earthquake and experienced confusion. We have implemented BEMS for power multiplexing and toughening and studied energy cooperation.
  - ✧ Introduced a total of five cogeneration systems. A private line is laid between the Yokohama City University Medical Center and the south ward comprehensive government building and electric power is transmitted by specific supply.
  - ✧ The cogeneration system is optimally operated automatically from the weather forecast, outside air temperature, humidity, electricity consumption, gas consumption.
  - ✧ As an effect, there are "improvement of disaster prevention", "improvement of environmental friendliness" and "improvement of economy"
  - ✧ CO2 emission reduction amount about 2400t CO2/year
  - ✧ Initial investment: approx. 700 million yen (130 million yen from the government, 10 million yen from Kanagawa prefecture)
  - ✧ Cost reduction of approximately 68 million yen/year
  - ✧ The hospital has heat demand due to sterilization and sterilization, and the heat generated in the generation system is used in the hospital.

■Photos

	
City of Kitakyushu's presentation at Open Seminar	Presentation at Closed Seminar
	
Presentation of City of Yokohama's initiatives	Site visit of Group 2
	
Reuse battery system	Site visit of Group 1

End of Minutes

環境省　国際協力室　御中

Reference a：Material of Kick-off Meeting with MOEJ

NTT DATA
Global IT Innovator

平成30年度　低炭素社会実現のための都市間連携事業「ハイフォン市･低炭素化促進事業(ベトナム版エコタウンの実現等を通じた低炭素化事業実現可能性調査)/北九州市－ハイフォン市連携事業」キックオフミーティング用資料

2018年5月14日

NTTデータ経営研究所
社会･環境戦略コンサルティングユニット

NTT DATA

1.都市間連携の概要と本年度の目標

北九州市とハイフォン市の関係

- 北九州市とハイフォン市は2014年に姉妹都市協定を締結した。
- 同年に、北九州市の支援のもと「ハイフォン市グリーン成長推進計画」が策定された。この計画はハイフォン市人民委員会からも正式に承認されたもので、廃棄物、エネルギー、交通、カットバ島、上下水道・雨水排水、環境保全、グリーン生産の7分野を対象としている。中でも、温室効果ガスの排出と関係の深い、廃棄物、エネルギー、交通、カットバ島は主要分野として位置づけられている。

本年度の目標

ベトナム版エコタウンの実現に不可欠な、技術、技術を事業として展開する企業、企業の活動を支えるための資金、さらに企業の活動をWin-Winなものとするための制度や仕組みづくりを、包括的に支援する。

これまでの取り組み

1. 衛生陶器生産工場への高効率な省エネ設備導入による工場省エネ化事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**1,400tCO$_2$/年**
   - 事業体制
     - 代表事業者：TOTO
     - 共同事業者：TOTOベトナム
     - EPC企業：日本碍子(日本ｶﾞｲｼ)

2. ショッピングモールにおける太陽光発電の導入
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込 **274CO$_2$/年**
   - 事業体制
     - 代表事業者：イオンリテール
     - 共同事業者：イオンベトナム
     - EPC企業：ネクストエナジー

3. ホテルへの高効率インバータエアコンの導入事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**826tCO$_2$/年**
   - 事業体制
     - 代表事業者：NTTデータ経営研究所
     - 共同事業者：Peace Real Estate Investment Company Limited

4. GEC途上国イノベーション事業（2015年度に採択）
   - 事業体制
     - 代表事業者：ソフトエナジーコントロールズ
     - 共同事業者：NTTデータ経営研究所、Quoc Hung Company Limited

2.想定しているプロジェクト概要

本事業では、ベトナム国ハイフォン市と北九州市の協力関係のもと、２つのタイプのプロジェクトに関して調査を実施する。

想定事業	①ベトナム版エコタウンの実現等を通じた低炭素型プロジェクトの創出活動	②ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
プロジェクト内容	低炭素社会形成に関する経験・ノウハウ等を有する北九州市指導のもと、ハイフォン市の目指すグリーン成長と低炭素社会の実現にも資するベトナム版エコタウンの実現等を通じた低炭素型事業を対象に、JCMクレジット獲得を目指す。	セメント工場からの廃熱回収発電のフォローアップをメインとし、バイオマス発電、太陽光発電等の低炭素型電力を利用するEVバス等の低炭素型交通等の活動なども含める。ｽﾃｰｸﾎﾙﾀﾞｰとの協議、調整を実施。また、経済性評価、事業性評価を行う。
導入技術	廃棄物発電システム、太陽光発電システム	廃熱回収発電システム
実施スキーム	シート7、シート12　参照	
想定している契約方式事業形式	随意契約を想定	
補助金見込額、費用対効果	調査結果を踏まえ検討	
要調整事項	JCM設備投資事業可能性検討	JCM設備投資事業申請

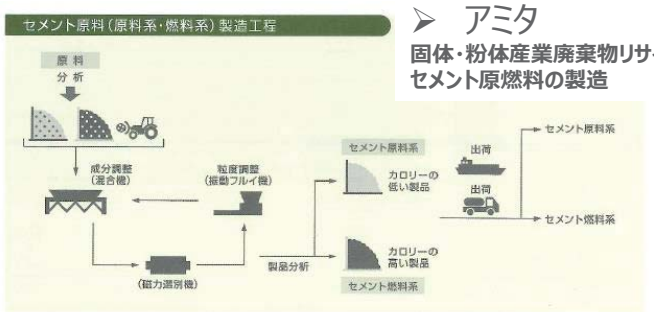
2-1.
ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ベトナム計画投資省（MPI)においては、UNIDOの支援のもと、ベトナム国内で複数のモデル地域を選定し、ベトナム版エコタウンの実現にむけた活動を展開している。次のモデル地域としてハイフォン市内に存在するDinh Vu工業団地が選定される見込みである。
- Dinh Vu工業団地では、工業団地の価値向上に向けて団地が位置する港湾エリアの風況のよい地域に風力発電を設置するなど、団地のエコ化を強力に推進している。団地のエコ化推進の点から、自らの団地をベトナム版エコタウンのモデルとすることにも積極的で、既にMPIと具体的な協議に入っている。
- 一方、MPIは、北九州市がエコタウン実現のために行ってきた取組みを積極的にベトナム版エコタウンの実現に取り入れたいとの意向を示している。
- 工業団地から発生する各種廃棄物の域内リサイクルの推進を通じた資源循環を実現し、その結果リサイクル利用が困難な廃棄物については熱処理（廃棄物発電など）、さらには工業団地全体の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動を通じて、JCMクレジット獲得に至る低炭素化プロジェクトの組成を目指す。

導入を想定している技術

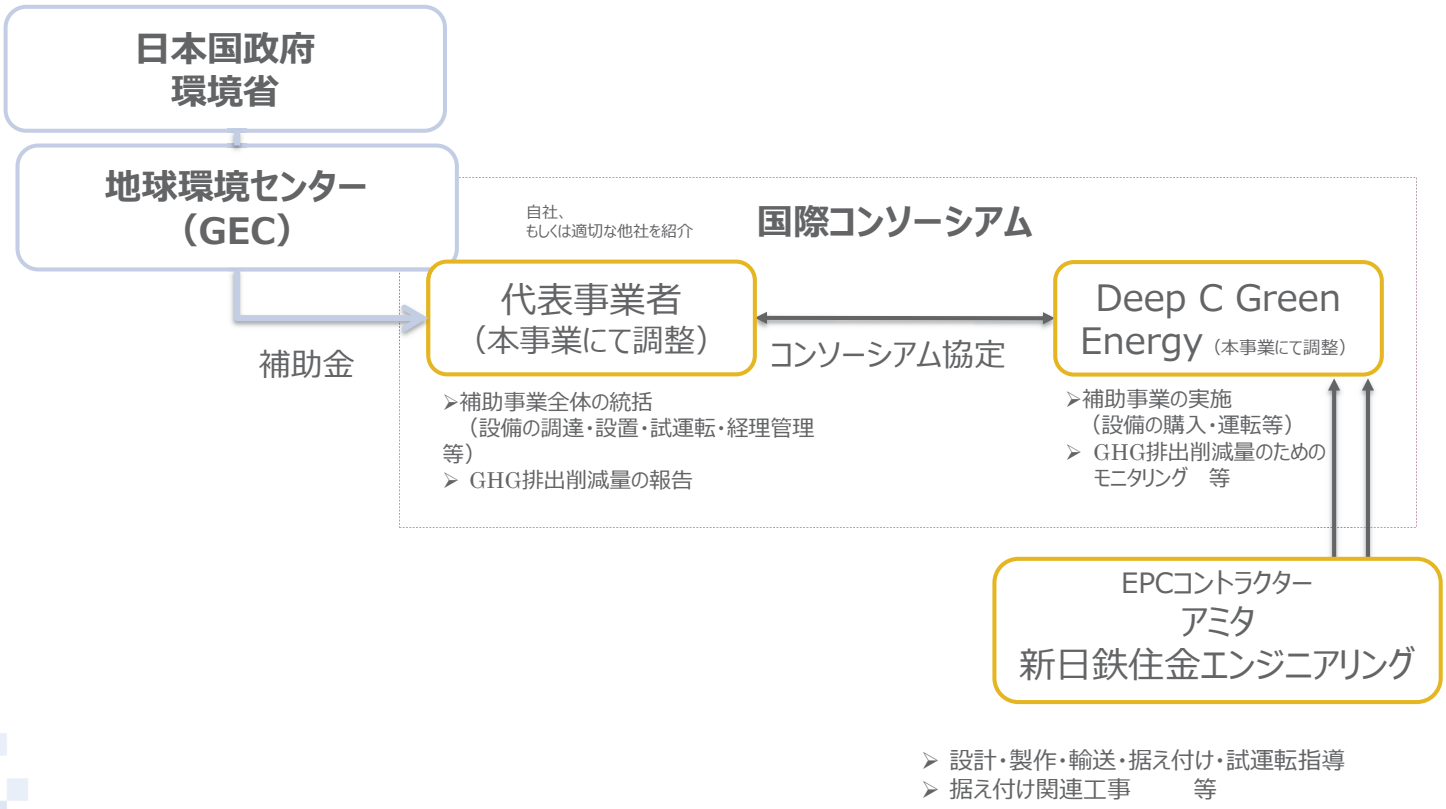


➢ アミタ
固体・粉体産業廃棄物リサイクル
セメント原燃料の製造

✓ 循環資源製造所の東南アジアへの展開実績あり

【インプット】
様々な産業から排出される汚泥、廃プラスチック・ばいじん・燃え殻などの固体・粉体系の産業廃棄物から、セメント原燃料を製造
【分析】
受入予定の産業廃棄物について、事前に含有成分や性状などを調べ異物等の混入分析
【配合検討】
分析結果から受入可能と判断した産業廃棄物について、ユーザー規格に合わせた成分調整の配合表を作成
【破砕・粉砕】
大きなものや固いものは破砕機や粉砕機で裁断
【調合】
配合表に基づいて様々な産業廃棄物を調合
【アウトプット：セメント原燃料】
セメント原燃料として出荷
カロリーの少ないものはセメント原料である粘土の代替に、
カロリーを多く含んでいるものは燃料として石炭の代替として使用さ、
燃え殻はセメント原料として利用

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
想定している事業実施スキーム等



2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	ベトナム計画投資省（MPI)の考えるベトナム版エコタウンの把握	Dinh Vu工業団地を対象としたベトナム版エコタウン計画の状況確認	北九州市 NDK	MPI Dinh Vu工業団地他
2	Dinh Vu工業団地の再生エネルギー投資計画の確認及び同計画を踏まえたJCM化の可能性検討	Dinh Vu工業団地内の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動	北九州市 NDK	Deep C Green Energy
3	資源の循環利用を目指した、処理対象となる都市ごみと産業廃棄物の確認及びビジネスモデルの検討	2の結果を経て、資源循環を利用したセメント原燃料製造や、産業廃棄物を都市ごみと混焼することによる収益性の向上を目指し、新たなるビジネスモデルの検討	NDK NSENGI AMITA	ハイフォン市 MPI Dinh Vu工業団地他
4	JCM等の補助制度の活用可能性の検討	１～３の調査を踏まえ、事業性を高めるため、JCM設備補助等のイニシャルコスト削減可能性を検討する。	NDK	NSENGI AMITA Dinh Vu工業団地他
5	JCM等の補助制度を活用の場合、詳細検討	各企業への意思・価格ヒアリングなど実施し、実現可能性を高める	NDK	NSENGI AMITA Dinh Vu工業団地他

2-1. ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃棄物発電は、従来、埋立処分されていた廃棄物からエネルギーを回収するもので、系統電力の消費量削減を通じてCO2排出量の大幅な削減効果を期待することができる。
- 副次的効果として、埋立処分場において発生しているメタンガスの発生抑制効果も期待できる。
- リファレンス排出量としては、“廃棄物発電が行われない場合（＝単純焼却）に排出されるCO2排出量、廃棄物の焼却プロセスからのメタンと亜酸化窒素の排出及び化石燃料等を利用した電力供給により排出されるCO2排出量”を想定することができる。
- プロジェクト排出量としては、“化石資源由来の炭素を含む廃棄物の焼却によるCO2の排出”、“廃棄物の焼却プロセスからのメタンと亜酸化窒素の排出”及び“焼却処理とエネルギー回収のために消費される電力及び燃料の消費によるCO2の排出の合計値を想定することができる。

CO2排出削減量の算出パラメータ

現時点で想定しているCO2排出削減量算出用パラメータは以下のとおり。

項目	数値
廃棄物発電施設　処理能力	500t/day
発電用燃料の低位発熱量	1,500kcal/kg
年間稼働時間	7,920時間
廃棄物発電による発電量（発電端）	11,200kW
発電施設内に用いる電力量	1,530kW
系統電力の排出係数	0.5408 t -CO2/MWh

2-2.
ﾌｫﾛｰｱｯﾌﾟ活動を通じた
低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
(セメント工場の廃熱回収発電)

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ハイフォン市人民委員会から、JCM事業化のポテンシャルのあるターゲットとして紹介を受けたセメント工場（Bach Dang Cement）における排熱回収発電システムの導入事業の実現に向けたフォローアップ活動を実施する。
- Bach Dang セメントは、2019年に新しい工場の稼動を目指して準備を進めているところであり、設計段階からJCMを活用した設備導入の提案を行うことで、スムーズなJCM事業化の実現を狙う。
- 国営セメント製造会社VICEMグループのハイフォン工場に4.75MWの廃熱回収発電システムを導入する計画済み。SPCへの出資者を含めた体制などについて最終協議中。

導入を想定している技術

- Shanghai CONCH Kawasaki社製の廃熱回収発電システム

- ✓ 全世界で240件以上の導入実績を有している
- ✓ これまで利用されず捨てられていた熱を回収し発電を行うことで、系統電力からの電力利用量を削減することが可能となる。その結果、系統電力を通じて排出されていたCO2量を削減することが可能となる。

JCM事業としては2件の導入実績あり。
1. 2013年 インドネシア セメント工場への廃熱回収発電システムの導入(JFEエンジニアリング)
2. 2016-7年 タイ セメント工場への廃熱回収発電システムの導入（NTTデータ経営研究所）

NTT DATA

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
想定している事業実施スキーム等

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2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	エンジニアリング会社等と連携した技術検討	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	NDK	Shanghai CONCH Kawasaki
2	1の結果を踏まえた経済性評価	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	NDK	Bach Dang Cement
3	2の検討結果を踏まえたCO2排出削減量評価	設備導入によるCO２排出削減効果の試算を行う	NDK	-
4	評価結果を踏まえた意思決定の支援	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	NDK	Bach Dang Cement
5	発注・契約方式の確認	設備導入の契約に当たり、発注方法、契約方式を確認	NDK	Bach Dang Cement

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃熱回収発電を行った後の発電電力を系統から調達した場合のCO2排出量をリファレンス排出量とする。
- 廃熱回収発電を行った場合の発電電力は、廃熱回収発電システムそのものの消費電力を除いて、全てセメント工場において自己消費することとなり、プロジェクト排出量は0とする。
- リファレンス排出量からプロジェクト排出量を引き算して、CO2排出削減量とする。

○**Ery = Rey – Pey**
Ery : プロジェクト期間yにおけるCO2排出削減量[tCO_2/y]
REy: リファレンス排出量 [tCO_2/y]
PEy: プロジェクト排出量 [tCO_2/y]
○**REy = EGy * EFgrid**
EGy: 購入系統電力を代替する廃熱回収システムによる正味発電量
EFgrid: プロジェクトにより代替されるタイの系統電源のCO2 排出係数
EGyの決定
EGy=EGGEN – EGAUX
EGGEN: 廃熱回収システムによる総発電量
EGAUX: 廃熱回収システムによる電力消費量
EGAUXの決定
EGAUX=EGCAP * 24 * 365
EGCAP: 電力を消費する廃熱回収システムの機器の定格容量最大値の合計
○**PEy= 0**

CO2排出削減量（想定）

現時点で想定しているCO2排出削減量ならびに、投資額とのCO2削減費用対効果は以下のとおり。

年度	平29(2017)	平30(2018)	平31(2019)	平32(2020)	平33(2021)	累計	法定耐用年数	費用対効果
補助申請予定額(百万円/年)	250	250				①500	④9	
GHG削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	②94,100		①/(②/稼働年数)/④)×1,000,000(単位：円) 2,951円
エネルギー起源二酸化炭素削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	③94,100		①/(③/稼働年数)/④)×1,000,000(単位：円) 2,951円

3.年間活動スケジュール

活動項目	2018年								2019年	
	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月
①都市ごみと工業団地から排出される産業廃棄物の混焼による廃棄物発電事業	MPI、ハイフォン市との協議		技術移転、企業進出、そのための資金などに関する制度のあり方等の検討・提案							
		資源循環、廃棄物発電、再エネ発電、省エネ等の個別プロジェクトの形成								
						技術検討、経済性検討を含めた事業化の準備活動支援				
②フォローアップ活動を通じた低炭素型プロジェクトの創出活動	関連ステークホルダーとの個別協議		協議結果を踏まえた技術検討、経済性検討					最終化		
	適宜、JCM設備補助申請支援等									
○ 現地調査		●			●		●		●	
○ 国内会議（2回程度）						●			●	
○ 現地ワークショップ（2回程度）		● キックオフ							● 最終報告会	
○ 報告書の作成					● ドラフト					● 最終版

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Global IT Innovator

Reference b：Material of First Meeting with MOEJ

環境省　国際協力室　御中

平成30年度　低炭素社会実現のための都市間連携事業「ハイフォン市･低炭素化促進事業(ベトナム版エコタウンの実現等を通じた低炭素化事業実現可能性調査)/北九州市－ハイフォン市連携事業」中間報告用資料

2018年8月29日

NTTデータ経営研究所
社会･環境戦略コンサルティングユニット

1.都市間連携の概要と本年度の目標

北九州市とハイフォン市の関係

- 北九州市とハイフォン市は2014年に姉妹都市協定を締結した。
- 同年に、北九州市の支援のもと「ハイフォン市グリーン成長推進計画」が策定された。この計画はハイフォン市人民委員会からも正式に承認されたもので、廃棄物、エネルギー、交通、カットバ島、上下水道・雨水排水、環境保全、グリーン生産の7分野を対象としている。中でも、温室効果ガスの排出と関係の深い、廃棄物、エネルギー、交通、カットバ島は主要分野として位置づけられている。

本年度の目標

ベトナム版エコタウンの実現に不可欠な、技術、技術を事業として展開する企業、企業の活動を支えるための資金、さらに企業の活動をWin-Winなものとするための制度や仕組みづくりを、包括的に支援する。

これまでの取り組み

1. 衛生陶器生産工場への高効率な省エネ設備導入による工場省エネ化事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**1,400tCO$_2$/年**
   - 事業体制
     - 代表事業者：TOTO
     - 共同事業者：TOTOベトナム
     - EPC企業：日本碍子(日本ｶﾞｲｼ)

2. ショッピングモールにおける太陽光発電の導入
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込 **274CO$_2$/年**
   - 事業体制
     - 代表事業者：イオンリテール
     - 共同事業者：イオンベトナム
     - EPC企業：ネクストエナジー

3. ホテルへの高効率インバータエアコンの導入事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**826tCO$_2$/年**
   - 事業体制
     - 代表事業者：NTTデータ経営研究所
     - 共同事業者：Peace Real Estate Investment Company Limited

4. GEC途上国イノベーション事業（2015年度に採択）
   - 事業体制
     - 代表事業者：ソフトエナジーコントロールズ
     - 共同事業者：NTTデータ経営研究所、Quoc Hung Company Limited

2.想定しているプロジェクト概要

本事業では、ベトナム国ハイフォン市と北九州市の協力関係のもと、２つのタイプのプロジェクトに関して調査を実施する。

想定事業	①ベトナム版エコタウンの実現等を通じた低炭素型プロジェクトの創出活動	②ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
プロジェクト内容	低炭素社会形成に関する経験・ノウハウ等を有する北九州市指導のもと、ハイフォン市の目指すグリーン成長と低炭素社会の実現にも資するベトナム版エコタウンの実現等を通じた低炭素型事業を対象に、JCMクレジット獲得を目指す。	セメント工場からの廃熱回収発電のフォローアップをメインとし、バイオマス発電、太陽光発電等の低炭素型電力を利用するEVバス等の低炭素型交通等の活動なども含める。ｽﾃｰｸﾎﾙﾀﾞｰとの協議、調整を実施。また、経済性評価、事業性評価を行う。
導入技術	廃棄物発電システム、太陽光発電システム	廃熱回収発電システム
実施スキーム	P7、P12　参照	
想定している契約方式事業形式	随意契約を想定	
補助金見込額、費用対効果	調査結果を踏まえ検討	
要調整事項	JCM設備投資事業可能性検討	JCM設備投資事業申請

3.8月末までの活動報告

◆ 8月末までの活動として、回の現地調査を実施いたしました。各プロジェクトに関する協議内容については、次ページ以降でご報告いたします。

期間	活動内容	活動内容サマリー	訪問先等
5/1 | 5/3	第一回現地調査	✓ 現地の共同事業候補者となりうるBach Dang社と廃熱回収発電のJCM設備補助事業申請に向けて協議 (しかし、不採択通知受託済み)	✓ Bach Dang セメント
6/19 | 6/24	第二回現地調査	✓ ベトナム建設投資省の紹介で、ハイフォン市経済管理区委員会を訪問しベトナムエコタウン実現に向け、ワークショップやアンケートの開催について議論 ✓ ハイフォン市の関係各局を巡り、エコパークに関する情報を収集 ✓ コクフン社ではカッパド島のディーゼルバス規制などについてヒアリング ✓ ブリヂストンとセメント工場2社とはJCM設備補助事業に向けた情報交換	✓ ベトナム建設投資省 ✓ ブリヂストン ベトナム ハイフォン工場 ✓ ハイフォン市 天然資源環境局 ✓ ハイフォン市 外務局 ✓ ハイフォン市 経済管理区委員会(ＨＥＺＡ) ✓ DEEP C社 ✓ ビセムセメント本社 ✓ Bach Dangセメント社 ハイフォン工場 ✓ コクフン社
8/14 | 8/16	第三回現地調査	✓ Bach Dang社と設備補助二次公募申請に向け、協議 ✓ An Xuan 社とJCM設備補助事業に向けた情報交換 ✓ DEEP C社とワークショップ開催に向けた事前協議	✓ Bach Dang セメント ✓ An Xuan 社 ✓ DEEP C社

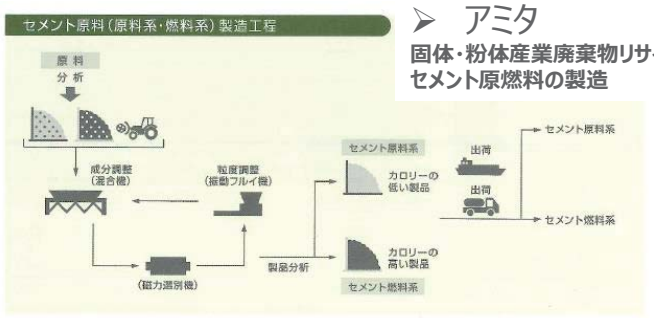
2-1.
ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動報告

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ベトナム計画投資省（MPI)においては、UNIDOの支援のもと、ベトナム国内で複数のモデル地域を選定し、ベトナム版エコタウンの実現にむけた活動を展開している。次のモデル地域としてハイフォン市内に存在するDinh Vu工業団地が選定される見込みである。
- Dinh Vu工業団地では、工業団地の価値向上に向けて団地が位置する港湾エリアの風況のよい地域に風力発電を設置するなど、団地のエコ化を強力に推進している。団地のエコ化推進の点から、自らの団地をベトナム版エコタウンのモデルとすることにも積極的で、既にMPIと具体的な協議に入っている。
- 一方、MPIは、北九州市がエコタウン実現のために行ってきた取組みを積極的にベトナム版エコタウンの実現に取り入れたいとの意向を示している。
- 工業団地から発生する各種廃棄物の域内リサイクルの推進を通じた資源循環を実現し、その結果リサイクル利用が困難な廃棄物については熱処理（廃棄物発電など）、さらには工業団地全体の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動を通じて、JCMクレジット獲得に至る低炭素化プロジェクトの組成を目指す。

導入を想定している技術



➢ アミタ

固体・粉体産業廃棄物リサイクル
セメント原燃料の製造

✓ 循環資源製造所の東南アジアへの展開実績あり

【インプット】
様々な産業から排出される汚泥、廃プラスチック・ばいじん・燃え殻などの固体・粉体系の産業廃棄物から、セメント原燃料を製造
【分析】
受入予定の産業廃棄物について、事前に含有成分や性状などを調べ異物等の混入分析
【配合検討】
分析結果から受入可能と判断した産業廃棄物について、ユーザー規格に合わせた成分調整の配合表を作成
【破砕・粉砕】
大きなものや固いものは破砕機や粉砕機で裁断
【調合】
配合表に基づいて様々な産業廃棄物を調合
【アウトプット：セメント原燃料】
セメント原燃料として出荷
カロリーの少ないものはセメント原料である粘土の代替に、
カロリーを多く含んでいるものは燃料として石炭の代替として使用さ、
燃え殻はセメント原料として利用

NTT DATA

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
低炭素型プロジェクトの創出に向けたワークショップ

ベトナム政府から発せられた議定82号

エコ工業団地

エコ工業団地(エコパークと称する)とは、経済・環境社会的な効果を向上させるために、クリーナープロダクションに参加し、資源を効果的に利用し、産業共生の取り組みの実現に向けた生産をする入居企業がある工業団地である。

エコ工業団地開発目標

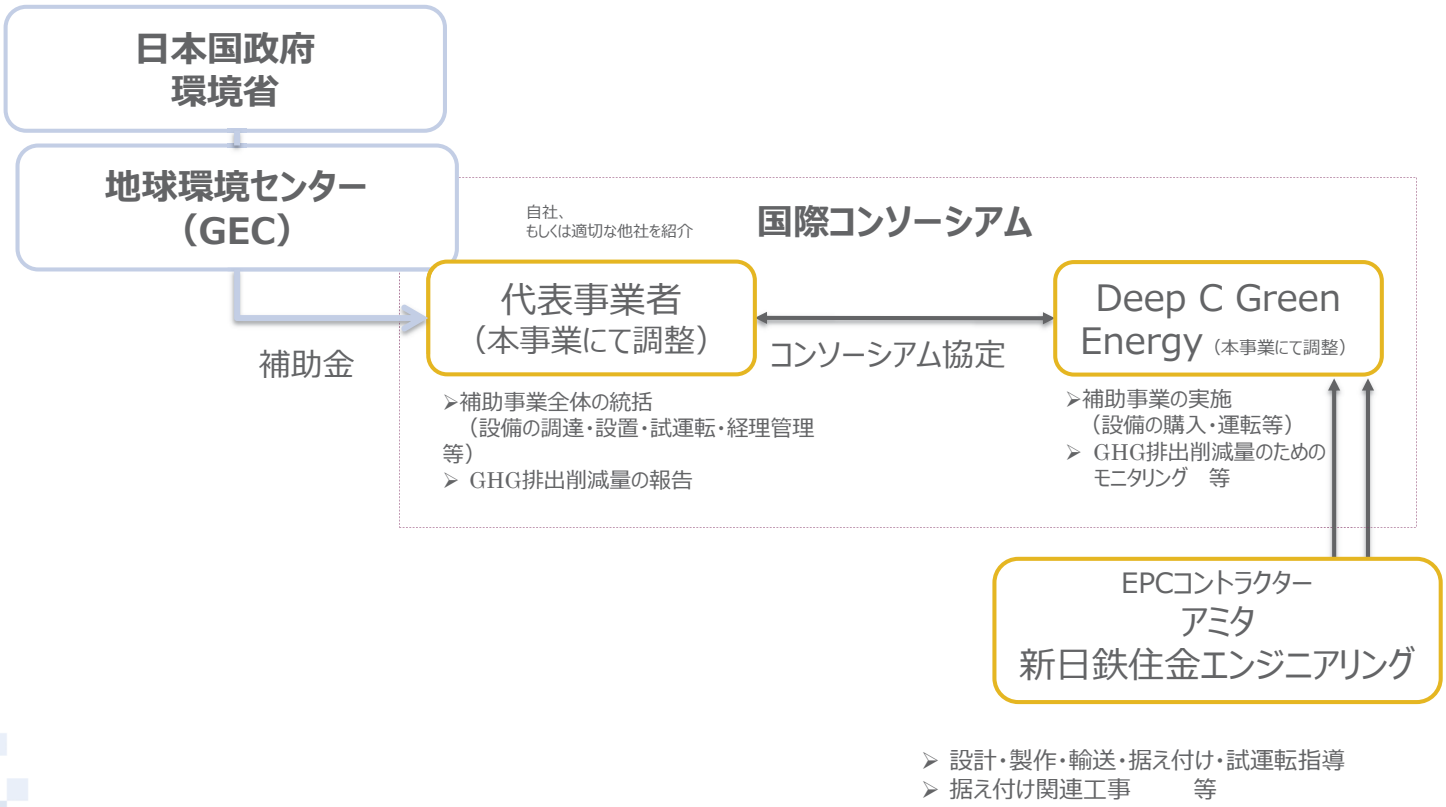
1. **クリーナープロダクション方法を適用**し、**効率的に資源を使用**し、産業共生の取り組みを構築する活動を通じて、工業団地入居企業の**経済的効果を向上**させる。
2. **汚染源や廃棄物の発生源を最小限**に抑え、**クリーン・テクノロジー**の利用を促進し、環境に優しい**クリーナープロダクション方法の導入を激励**する活動を通じて、**工業団地周辺の環境保全の効果を向上**させる。
3. 市場で競争力のある工業団地の企業共同体を形成し、工業団地の周辺居住地区の環境を保護し、**持続可能な発展の目標**を目指す。

上記の、ベトナム政府により掲げられたエコパークの定義を目標をもとに、ハイフォン市経済管理区委員会とDEEP Cとともにワークショップを開催し、北九州市のエコタウン実現のノウハウを伝授するとともに、DEEP C及び工業団地内の企業における低炭素型プロジェクトの創出を探る

第三回まで	第四回渡航にて活動予定	第五回渡航以降活動予定
ワークショップ準備 ✓ 議定82号での内容を再確認 ✓ ベトナム計画投資省やＨＥＺＡ、DEEP C社など開催側との調整	エコパーク構想に関するワークショップ開催 ✓ エコパーク構想についての説明 ✓ 北九州市でのエコタウン実現に向けて行った取り組み事例紹介 ✓ JCM設備補助PJの紹介	JCM対象となる企業やJCMに関心のある企業へ個別ヒアリング ➡ エンジニアリング会社等と連携した技術検討 ➡ 経済性評価CO2排出削減量評価後、意思決定。JCM設備補助申請へ DEEP C社 本体の再生可能エネルギー廃棄物リサイクルシステム導入への検討 ➡ 進捗状況①へ

NTT DATA

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
想定している事業実施スキーム等



2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	ベトナム計画投資省（MPI)の考えるベトナム版エコタウンの把握 実施済み	Dinh Vu工業団地を対象としたベトナム版エコタウン計画の状況確認	北九州市 NDK	MPI Dinh Vu工業団地他
2	Dinh Vu工業団地の再生エネルギー投資計画の確認及び同計画を踏まえたJCM化の可能性検討 実施中	Dinh Vu工業団地内の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動	北九州市 NDK	Deep C Green Energy
3	資源の循環利用を目指した、処理対象となる都市ごみと産業廃棄物の確認及びビジネスモデルの検討	2の結果を経て、資源循環を利用したセメント原燃料製造や、産業廃棄物を都市ごみと混焼することによる収益性の向上を目指し、新たなるビジネスモデルの検討	NDK NSENGI AMITA	ハイフォン市 MPI Dinh Vu工業団地他
4	JCM等の補助制度の活用可能性の検討	１～３の調査を踏まえ、事業性を高めるため、JCM設備補助等のイニシャルコスト削減可能性を検討する。	NDK	NSENGI AMITA Dinh Vu工業団地他
5	JCM等の補助制度を活用の場合、詳細検討	各企業への意思・価格ヒアリングなど実施し、実現可能性を高める	NDK	NSENGI AMITA Dinh Vu工業団地他

2-1. ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃棄物発電は、従来、埋立処分されていた廃棄物からエネルギーを回収するもので、系統電力の消費量削減を通じてCO2排出量の大幅な削減効果を期待することができる。
- 副次的効果として、埋立処分場において発生しているメタンガスの発生抑制効果も期待できる。
- リファレンス排出量としては、“廃棄物発電が行われない場合（＝単純焼却）に排出されるCO2排出量、廃棄物の焼却プロセスからのメタンと亜酸化窒素の排出及び化石燃料等を利用した電力供給により排出されるCO2排出量”を想定することができる。
- プロジェクト排出量としては、“化石資源由来の炭素を含む廃棄物の焼却によるCO2の排出”、“廃棄物の焼却プロセスからのメタンと亜酸化窒素の排出”及び“焼却処理とエネルギー回収のために消費される電力及び燃料の消費によるCO2の排出の合計値を想定することができる。

CO2排出削減量の算出パラメータ

現時点で想定しているCO2排出削減量算出用パラメータは以下のとおり。

項目	数値
廃棄物発電施設　処理能力	500t/day
発電用燃料の低位発熱量	1,500kcal/kg
年間稼働時間	7,920時間
廃棄物発電による発電量（発電端）	11,200kW
発電施設内に用いる電力量	1,530kW
系統電力の排出係数	0.5408 t -CO2/MWh

2-1-1. JCM設備補助申請に繋がる可能性のある案件
進捗状況①：DEEP　C

プロジェクトの概要と進捗

概要	DEEPCは、工業団地全体の低炭素化に向けた再生可能エネルギーが導入されると考えられる中で、JCMクレジット獲得に至る低炭素化プロジェクトの組成を目指す
適用技術（想定）	再生可能エネルギー 固体・粉体産業廃棄物リサイクル セメント原燃料の製造
進捗状況	DEEP　Cは、再生可能エネルギーである太陽光発電と風力発電に投資することを決定している。しかし、欧州企業の設備で行う可能性が高いため、日本の技術の優位性を説明しているところである。廃棄物発電に関しても、関心度は高く、前向きに検討をしている。 また、ベトナム政府が掲げるエコパークの定義や目的を明確化させるための協議を行たが北九州市がエコタウン実現に向け行ってきた取り組みを共有できるワークショップなどを開催するなどして、エコパーク実現に向けた活動のスタートアップ体制を整える。
今後の方針	ワークショップを開催することにより、入居企業に対しエコパーク構想に関する学びの機会を設け、JCM設備補助申請へ繋げる

ディンブー工業団地DEEPC　の概要

名称	DEEP C (ディープシー) 工業団地 英名 DEEP C Industrial Zone
所在地	ベトナム社会主義共和国 ハイフォン市
運営組織	Dinh Vu Industrial Zone Joint Stock Company (ベトナム)
設立日	1997年4月
社員数	110名
主な活動	工業団地の開発、運営、誘致

DEEP C
DINH VU INDUSTRIAL ZONE

2-2.
ﾌｫﾛｰｱｯﾌﾟ活動を通じた
低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
(セメント工場の廃熱回収発電)
報告

NTT DATA

2-2. ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動(セメント工場の廃熱回収発電)
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ハイフォン市人民委員会から、JCM事業化のポテンシャルのあるターゲットとして紹介を受けたセメント工場（Bach Dang Cement）における排熱回収発電システムの導入事業の実現に向けたフォローアップ活動を実施する。
- Bach Dang セメントは、2019年に新しい工場の稼動を目指して準備を進めているところであり、設計段階からJCMを活用した設備導入の提案を行うことで、スムーズなJCM事業化の実現を狙う。
- 国営セメント製造会社VICEMグループのハイフォン工場に4.75MWの廃熱回収発電システムを導入する計画済み。SPCへの出資者を含めた体制などについて最終協議中。

導入を想定している技術

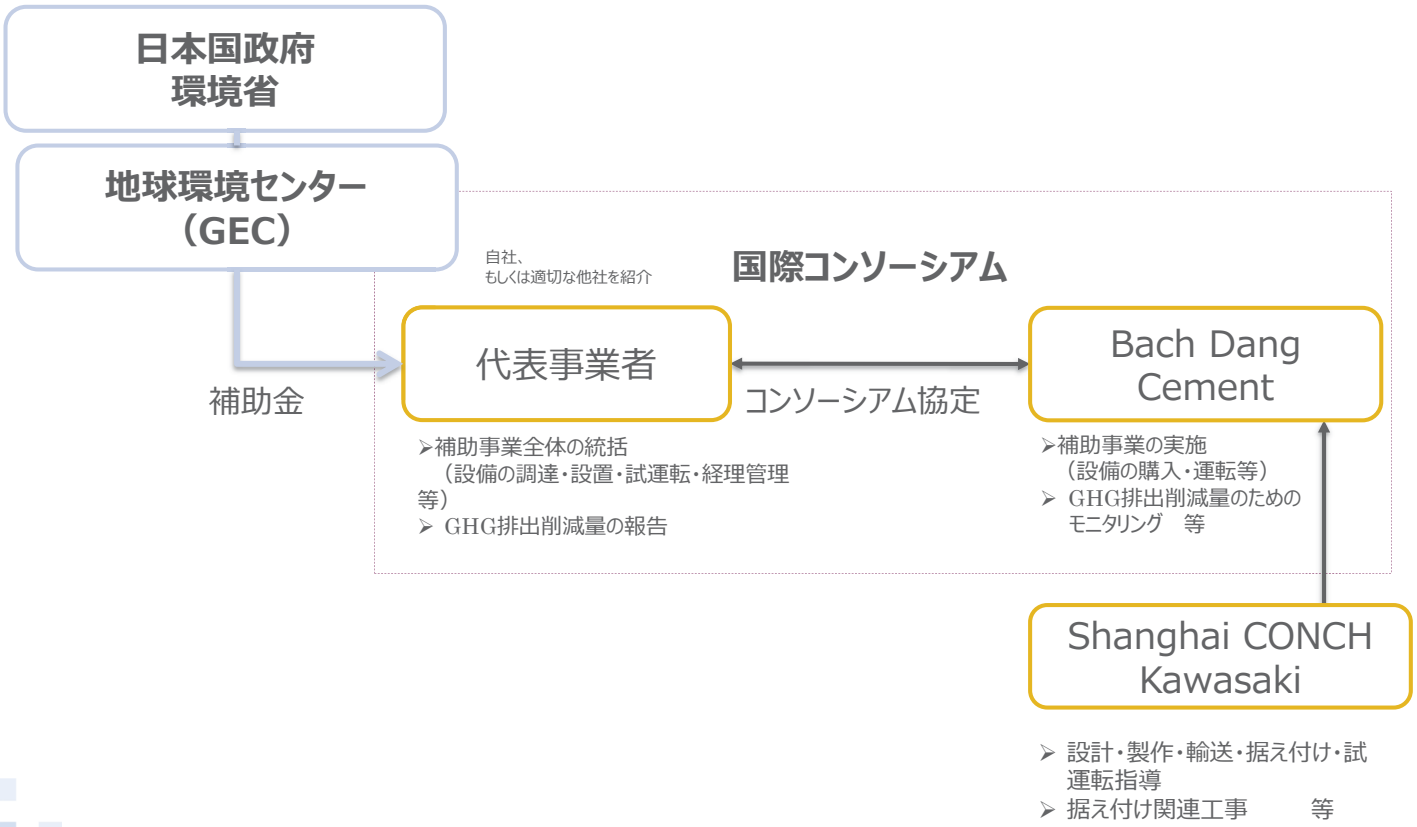
- Shanghai CONCH Kawasaki社製の廃熱回収発電システム

- ✓ 全世界で240件以上の導入実績を有している
- ✓ これまで利用されず捨てられていた熱を回収し発電を行うことで、系統電力からの電力利用量を削減することが可能となる。その結果、系統電力を通じて排出されていたCO2量を削減することが可能となる。

JCM事業としては2件の導入実績あり。
1. 2013年 インドネシア セメント工場への廃熱回収発電システムの導入(JFEエンジニアリング)
2. 2016-7年 タイ セメント工場への廃熱回収発電システムの導入（NTTデータ経営研究所）

NTT DATA

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
想定している事業実施スキーム等



2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	エンジニアリング会社等と連携した技術検討 実施済み	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	NDK	Shanghai CONCH Kawasaki
2	1の結果を踏まえた経済性評価 実施済み	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	NDK	Bach Dang Cement
3	2の検討結果を踏まえたCO2排出削減量評価 実施済み	設備導入によるCO２排出削減効果の試算を行う	NDK	-
4	評価結果を踏まえた意思決定の支援 実施済み	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	NDK	Bach Dang Cement
5	発注・契約方式の確認 実施済み	設備導入の契約に当たり、発注方法、契約方式を確認	NDK	Bach Dang Cement
6	継続支援 実施中	JCM設備補助の二次公募へ申請	NDK	Bach Dang Cement

2-2. ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動(セメント工場の廃熱回収発電) 排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃熱回収発電を行った後の発電電力を系統から調達した場合のCO2排出量をリファレンス排出量とする。
- 廃熱回収発電を行った場合の発電電力は、廃熱回収発電システムそのものの消費電力を除いて、全てセメント工場において自己消費することとなり、プロジェクト排出量は0とする。
- リファレンス排出量からプロジェクト排出量を引き算して、CO2排出削減量とする。

○**Ery = Rey – Pey**
Ery： プロジェクト期間yにおけるCO2排出削減量[tCO_2/y]
REy: リファレンス排出量 [tCO_2/y]
PEy: プロジェクト排出量 [tCO_2/y]
○**REy = EGy * EFgrid**
EGy: 購入系統電力を代替する廃熱回収システムによる正味発電量
EFgrid: プロジェクトにより代替されるタイの系統電源のCO2 排出係数
EGyの決定
EGy=EGGEN – EGAUX
EGGEN: 廃熱回収システムによる総発電量
EGAUX: 廃熱回収システムによる電力消費量
EGAUXの決定
EGAUX=EGCAP * 24 * 365
EGCAP: 電力を消費する廃熱回収システムの機器の定格容量最大値の合計
○**PEy= 0**

CO2排出削減量（想定）

現時点で想定しているCO2排出削減量ならびに、投資額とのCO2削減費用対効果は以下のとおり。

年度	平29(2017)	平30(2018)	平31(2019)	平32(2020)	平33(2021)	累計	法定耐用年数	費用対効果
補助申請予定額(百万円/年)	250	250				①500	④9	
GHG削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	②94,100		①/(②/稼働年数)/④)×1,000,000(単位：円) 2,951円
エネルギー起源二酸化炭素削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	③94,100		①/(③/稼働年数)/④)×1,000,000(単位：円) 2,951円

3-2-2. JCM設備補助申請に繋がる可能性のある案件 進捗状況①： BACH DANG CEMENT JOINT STOCK

プロジェクトの概要

概要	BACH DANG CEMENT JOINT STOCK COMPANY 社が新設予定のセメント工場からの廃熱を回収し、発電を行う ※本事業によって得られる電力は全てセメント工場において消費されるため、系統への売電は行わない
適用技術	廃熱回収発電システム セメント工場において原料の予熱を行うプリヒータ部（PH）及び高温のクリンカを急速冷却する冷却部（AQC）の2カ所に廃熱回収ボイラを設置し、両ボイラから得られる蒸気を用いて発電を行う

BACH DANG CEMENT JOINT STOCK COMPANY の概要

工場所在地	ベトナム社会主義共和国 ハイフォン市
運営組織	セメントの製造、販売
社員数	42（但し、セメント工場が生産開始後は380に増員される予定）
親会社	Phu Minh Son Group (PMS)

↑セメント工場本体完成イメージ
↓適用技術である廃熱回収システム

3.年間活動スケジュール

活動項目	2018年 5月	6月	7月	8月	9月	10月	11月	12月	2019年 1月	2月
①都市ごみと工業団地から排出される産業廃棄物の混焼による廃棄物発電事業	MPI、ハイフォン市との協議		技術移転、企業進出、そのための資金などに関する制度のあり方等の検討・提案							
		資源循環、廃棄物発電、再エネ発電、省エネ等の個別プロジェクトの形成								
						技術検討、経済性検討を含めた事業化の準備活動支援				
②フォローアップ活動を通じた低炭素型プロジェクトの創出活動	関連ステークホルダーとの個別協議		協議結果を踏まえた技術検討、経済性検討					最終化		
	適宜、JCM設備補助申請支援等									
○ 現地調査	●	●		●	●		●		●	
○ 国内会議（2回程度）						●			●	
○ 現地ワークショップ（2回程度）		● キックオフ					●		● 最終報告会	
○ 報告書の作成					● ドラフト					● 最終版

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Reference c：Material of Second Meeting with MOEJ

環境省　国際協力室　御中

NTT DATA
Global IT Innovator

平成30年度　低炭素社会実現のための都市間連携事業「ハイフォン市･低炭素化促進事業(ベトナム版エコタウンの実現等を通じた低炭素化事業実現可能性調査)/北九州市－ハイフォン市連携事業」中間報告用資料

2018年11月19日

NTTデータ経営研究所
社会･環境戦略コンサルティングユニット

NTT DATA

1.都市間連携の概要と本年度の目標

北九州市とハイフォン市の関係

- 北九州市とハイフォン市は2014年に姉妹都市協定を締結した。
- 同年に、北九州市の支援のもと「ハイフォン市グリーン成長推進計画」が策定された。この計画はハイフォン市人民委員会からも正式に承認されたもので、廃棄物、エネルギー、交通、カットバ島、上下水道・雨水排水、環境保全、グリーン生産の7分野を対象としている。中でも、温室効果ガスの排出と関係の深い、廃棄物、エネルギー、交通、カットバ島は主要分野として位置づけられている。

本年度の目標

ベトナム版エコタウンの実現に不可欠な、技術、技術を事業として展開する企業、企業の活動を支えるための資金、さらに企業の活動をWin-Winなものとするための制度や仕組みづくりを、包括的に支援する。

これまでの取り組み

1. 衛生陶器生産工場への高効率な省エネ設備導入による工場省エネ化事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**1,400tCO$_2$/年**
   - 事業体制
     - 代表事業者：TOTO
     - 共同事業者：TOTOベトナム
     - EPC企業：日本碍子(日本ｶﾞｲｼ)

2. ショッピングモールにおける太陽光発電の導入
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込 **274CO$_2$/年**
   - 事業体制
     - 代表事業者：イオンリテール
     - 共同事業者：イオンベトナム
     - EPC企業：ネクストエナジー

3. ホテルへの高効率インバータエアコンの導入事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**826tCO$_2$/年**
   - 事業体制
     - 代表事業者：NTTデータ経営研究所
     - 共同事業者：Peace Real Estate Investment Company Limited

4. GEC途上国イノベーション事業（2015年度に採択）
   - 事業体制
     - 代表事業者：ソフトエナジーコントロールズ
     - 共同事業者：NTTデータ経営研究所、Quoc Hung Company Limited

2.想定しているプロジェクト概要

本事業では、ベトナム国ハイフォン市と北九州市の協力関係のもと、２つのタイプのプロジェクトに関して調査を実施する。

想定事業	①ベトナム版エコタウンの実現等を通じた低炭素型プロジェクトの創出活動	②ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
プロジェクト内容	低炭素社会形成に関する経験・ノウハウ等を有する北九州市指導のもと、ハイフォン市の目指すグリーン成長と低炭素社会の実現にも資するベトナム版エコタウンの実現等を通じた低炭素型事業を対象に、JCMクレジット獲得を目指す。	セメント工場からの廃熱回収発電のフォローアップをメインとし、バイオマス発電、太陽光発電等の低炭素型電力を利用するEVバス等の低炭素型交通等の活動なども含める。ｽﾃｰｸﾎﾙﾀﾞｰとの協議、調整を実施。また、経済性評価、事業性評価を行う。
導入技術	廃棄物発電システム、太陽光発電システム	廃熱回収発電システム
実施スキーム	P12、P18　参照	
想定している契約方式事業形式	随意契約を想定	
補助金見込額、費用対効果	調査結果を踏まえ検討	
要調整事項	JCM設備投資事業可能性検討	JCM設備投資事業申請

3.8月末までの活動報告

◆ **8月末までの活動として、回の現地調査を実施いたしました。各プロジェクトに関する協議内容については、次ページ以降でご報告いたします。**

期間	活動内容	活動内容サマリー	訪問先等
5/1 | 5/3	第一回現地調査	✓ 現地の共同事業候補者となりうるBach Dang社と廃熱回収発電のJCM設備補助事業申請に向けて協議 (しかし、不採択通知受託済み)	✓ Bach Dang セメント
6/19 | 6/24	第二回現地調査	✓ ベトナム建設投資省の紹介で、ハイフォン市経済管理区委員会を訪問しベトナムエコタウン実現に向け、ワークショップやアンケートの開催について議論 ✓ ハイフォン市の関係各局を巡り、エコパークに関する情報を収集 ✓ コクフン社ではカッパド島のディーゼルバス規制などについてヒアリング ✓ ブリヂストンとセメント工場2社とはJCM設備補助事業に向けた情報交換	✓ ベトナム建設投資省 ✓ ブリヂストン ベトナム ハイフォン工場 ✓ ハイフォン市 天然資源環境局 ✓ ハイフォン市 外務局 ✓ ハイフォン市 経済管理区委員会(ＨＥＺＡ) ✓ DEEP C社 ✓ ビセムセメント本社 ✓ Bach Dangセメント社 ハイフォン工場 ✓ コクフン社
8/14 | 8/16	第三回現地調査	✓ Bach Dang社と設備補助二次公募申請に向け、協議 ✓ An Xuan 社とJCM設備補助事業に向けた情報交換 ✓ DEEP C社とワークショップ開催に向けた事前協議	✓ Bach Dang セメント ✓ An Xuan 社 ✓ DEEP C社

第一回進捗報告以降、これまでの調査報告

◆ 第一回目の進捗報告以降、これまでに2回の現地調査（第四回及び第五回）を実施した。

<u>第四回現地調査</u>

- 時期：9月3日（月）～9月7日（金）
- 訪問先：商務局、DONRE（環境局）、HEZA、VINFAST社、西日本鉄道、DEEP-C、外務局、VICEMハイフォン社、カッパセメント社、ベトナム計画投資省
- 主な目的：10月ないし11月に実施を予定しているエコ・インダストリアル・ワークショップに関する打ち合わせ、カットバ島でのEV実証事業に関する対応、JCM案件発掘

<u>第五回現地調査</u>

- 時期：11月5日（月）～11月9日（金）
- 訪問先：ハイフォン市、DEEP-C、Nam Cau Kien工業団地、EIPエキスパートグループミーティング（ホーチミン）
- 主な目的：ハイフォン市でのエコインダストリアルパークワークショップ参加、MPI主催のエコ・インダストリアル・パーク専門家会参加、JCM案件発掘

第四回現地調査

主な目的：
（1）エコ・インダストリアル・パーク（EIP）のワークショップ
（JCM設備補助制度の説明あり）
（2）カットバ島EV実証事業の説明
（3）JCM案件発掘

主に（1）及び（2）の目的での訪問先：
商務局、DONRE（環境局）、HEZA、DEEP-C、外務局、ベトナム計画投資省（MPI）
主に（3）の目的での訪問先：
VINFAST社、西日本鉄道、VICEMハイフォン社、カッパセメント社

成果：
- エコ・インダストリアル・パークの開催は11月初旬となった。
- MPIより、11月初旬のEIPの会議への参加要請あり（承諾）
- MPIより、来年へ向けたMOU締結の依頼あり



第五回現地調査

主な目的：
（1）ハイフォン市EIPワークショップ参加（ハイフォン市カンファレンスセンター）
（2）MPIのEIP専門家会議参加（ホーチミン市Rex Hotel）
（3）JCM案件発掘

（3）の目的での訪問先：
DEEP-C：信越マグネティック・マテリアル・ベトナム
Nam Cau Kien工業団地：VJS、VIS

成果：
- ワークショップは成功し、JCMの理解も深まった。
- MPI、UNIDO共催のEIP専門家会議は、主に欧州の関係者を始め、多くの人々が参加し、活発な議論があった。
- 信越マグネティック・マテリアル・ベトナム及びVIS社は、自社の設備更新にJCMの活用を検討することとなった。

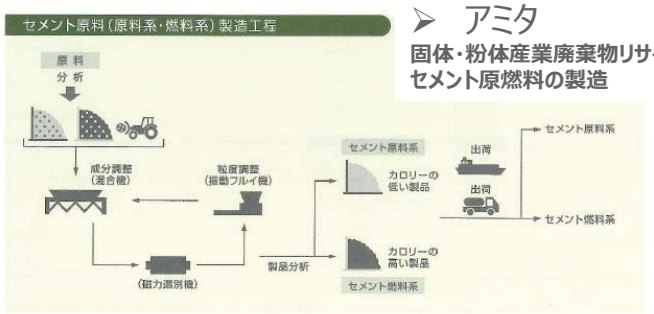

2-1.
ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動報告

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ベトナム計画投資省（MPI)においては、UNIDOの支援のもと、ベトナム国内で複数のモデル地域を選定し、ベトナム版エコタウンの実現にむけた活動を展開している。次のモデル地域としてハイフォン市内に存在するDinh Vu工業団地が選定される見込みである。
- Dinh Vu工業団地では、工業団地の価値向上に向けて団地が位置する港湾エリアの風況のよい地域に風力発電を設置するなど、団地のエコ化を強力に推進している。団地のエコ化推進の点から、自らの団地をベトナム版エコタウンのモデルとすることにも積極的で、既にMPIと具体的な協議に入っている。
- 一方、MPIは、北九州市がエコタウン実現のために行ってきた取組みを積極的にベトナム版エコタウンの実現に取り入れたいとの意向を示している。
- 工業団地から発生する各種廃棄物の域内リサイクルの推進を通じた資源循環を実現し、その結果リサイクル利用が困難な廃棄物については熱処理（廃棄物発電など）、さらには工業団地全体の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動を通じて、JCMクレジット獲得に至る低炭素化プロジェクトの組成を目指す。

導入を想定している技術



➢ アミタ

固体・粉体産業廃棄物リサイクル
セメント原燃料の製造

✓ 循環資源製造所の東南アジアへの展開実績あり

【インプット】
様々な産業から排出される汚泥、廃プラスチック・ばいじん・燃え殻などの固体・粉体系の産業廃棄物から、セメント原燃料を製造
【分析】
受入予定の産業廃棄物について、事前に含有成分や性状などを調べ異物等の混入分析
【配合検討】
分析結果から受入可能と判断した産業廃棄物について、ユーザー規格に合わせた成分調整の配合表を作成
【破砕・粉砕】
大きなものや固いものは破砕機や粉砕機で裁断
【調合】
配合表に基づいて様々な産業廃棄物を調合
【アウトプット：セメント原燃料】
セメント原燃料として出荷
カロリーの少ないものはセメント原料である粘土の代替に、
カロリーを多く含んでいるものは燃料として石炭の代替として使用さ、
燃え殻はセメント原料として利用

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
低炭素型プロジェクトの創出に向けたワークショップ

ベトナム政府から発せられた議定82号

エコ工業団地

エコ工業団地(エコパークと称する)とは、経済・環境社会的な効果を向上させるために、クリーナープロダクションに参加し、資源を効果的に利用し、産業共生の取り組みの実現に向けた生産をする入居企業がある工業団地である。

エコ工業団地開発目標

1. **クリーナープロダクション方法を適用**し、**効率的に資源を使用**し、産業共生の取り組みを構築する活動を通じて、工業団地入居企業の**経済的効果を向上**させる。
2. **汚染源や廃棄物の発生源を最小限**に抑え、**クリーン・テクノロジー**の利用を促進し、環境に優しい**クリーナープロダクション方法の導入を激励**する活動を通じて、**工業団地周辺の環境保全の効果を向上**させる。
3. 市場で競争力のある工業団地の企業共同体を形成し、工業団地の周辺居住地区の環境を保護し、**持続可能な発展の目標**を目指す。

上記の、ベトナム政府により掲げられたエコパークの定義を目標をもとに、ハイフォン市経済管理区委員会とDEEP Cとともにワークショップを開催し、北九州市のエコタウン実現のノウハウを伝授するとともに、DEEP C及び工業団地内の企業における低炭素型プロジェクトの創出を探る

第三回まで	第四回渡航にて活動予定	第五回渡航以降活動予定

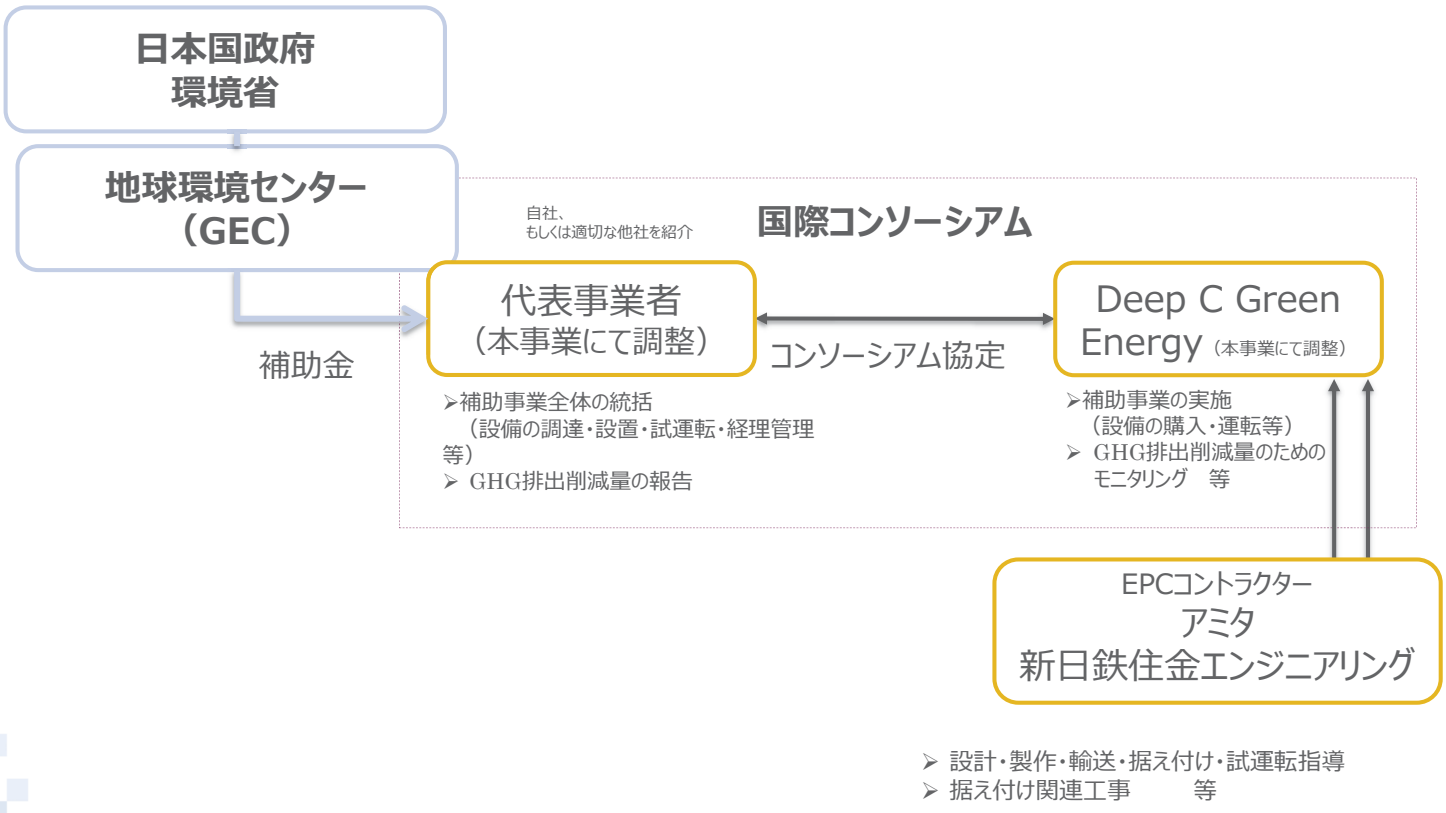
ワークショップ準備
- ✓ 議定82号での内容を再確認
- ✓ ベトナム計画投資省やＨＥＺＡ、DEEP C社など開催側との調整

エコパーク構想に関するワークショップ開催
- ✓ エコパーク構想についての説明
- ✓ 北九州市でのエコタウン実現に向けて行った取り組み事例紹介
- ✓ JCM設備補助PJの紹介

JCM対象となる企業やJCMに関心のある企業へ個別ヒアリング ➡ エンジニアリング会社等と連携した技術検討 ➡ 経済性評価CO2排出削減量評価後、意思決定。JCM設備補助申請へ

DEEP C社 本体の再生可能エネルギー廃棄物リサイクルシステム導入への検討 ➡ 進捗状況①へ

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
想定している事業実施スキーム等



2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	ベトナム計画投資省（MPI)の考えるベトナム版エコタウンの把握 実施済み	Dinh Vu工業団地を対象としたベトナム版エコタウン計画の状況確認	北九州市 NDK	MPI Dinh Vu工業団地他
2	Dinh Vu工業団地の再生エネルギー投資計画の確認及び同計画を踏まえたJCM化の可能性検討 実施中	Dinh Vu工業団地内の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動	北九州市 NDK	Deep C Green Energy
3	資源の循環利用を目指した、処理対象となる都市ごみと産業廃棄物の確認及びビジネスモデルの検討 実施中	2の結果を経て、資源循環を利用したセメント原燃料製造や、産業廃棄物を都市ごみと混焼することによる収益性の向上を目指し、新たなるビジネスモデルの検討	NDK NSENGI AMITA	ハイフォン市 MPI Dinh Vu工業団地他
4	JCM等の補助制度の活用可能性の検討	１～３の調査を踏まえ、事業性を高めるため、JCM設備補助等のイニシャルコスト削減可能性を検討する。	NDK	NSENGI AMITA Dinh Vu工業団地他
5	JCM等の補助制度を活用の場合、詳細検討	各企業への意思・価格ヒアリングなど実施し、実現可能性を高める	NDK	NSENGI AMITA Dinh Vu工業団地他

2-1. ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃棄物発電は、従来、埋立処分されていた廃棄物からエネルギーを回収するもので、系統電力の消費量削減を通じてCO2排出量の大幅な削減効果を期待することができる。
- 副次的効果として、埋立処分場において発生しているメタンガスの発生抑制効果も期待できる。
- リファレンス排出量としては、“廃棄物発電が行われない場合（＝単純焼却）に排出されるCO2排出量、廃棄物の焼却プロセスからのメタンと亜酸化窒素の排出及び化石燃料等を利用した電力供給により排出されるCO2排出量”を想定することができる。
- プロジェクト排出量としては、“化石資源由来の炭素を含む廃棄物の焼却によるCO2の排出”、“廃棄物の焼却プロセスからのメタンと亜酸化窒素の排出”及び“焼却処理とエネルギー回収のために消費される電力及び燃料の消費によるCO2の排出の合計値を想定することができる。

CO2排出削減量の算出パラメータ

現時点で想定しているCO2排出削減量算出用パラメータは以下のとおり。

項目	数値
廃棄物発電施設　処理能力	500t/day
発電用燃料の低位発熱量	1,500kcal/kg
年間稼働時間	7,920時間
廃棄物発電による発電量（発電端）	11,200kW
発電施設内に用いる電力量	1,530kW
系統電力の排出係数	0.5408 t -CO2/MWh

2-1-1. JCM設備補助申請に繋がる可能性のある案件
進捗状況①：DEEP C

プロジェクトの概要と進捗

概要	DEEPCは、工業団地全体の低炭素化に向けた再生可能エネルギーが導入されると考えられる中で、JCMクレジット獲得に至る低炭素化プロジェクトの組成を目指す
適用技術（想定）	再生可能エネルギー 固体・粉体産業廃棄物リサイクル セメント原燃料の製造
進捗状況	DEEP Cは、再生可能エネルギーである太陽光発電と風力発電に投資することを決定している。しかし、欧州企業の設備で行う可能性が高いため、日本の技術の優位性を説明しているところである。廃棄物発電に関しても、関心度は高く、前向きに検討をしている。 また、ベトナム政府が掲げるエコパークの定義や目的を明確化させるための協議を行たが北九州市がエコタウン実現に向け行ってきた取り組みを共有できるワークショップなどを開催するなどして、エコパーク実現に向けた活動のスタートアップ体制を整える。
今後の方針	ワークショップを開催することにより、入居企業に対しエコパーク構想に関する学びの機会を設け、JCM設備補助申請へ繋げる

ディンブー工業団地DEEPC の概要

名称	DEEP C (ディープシー) 工業団地 英名 DEEP C Industrial Zone
所在地	ベトナム社会主義共和国 ハイフォン市
運営組織	Dinh Vu Industrial Zone Joint Stock Company (ベトナム)
設立日	1997年4月
社員数	110名
主な活動	工業団地の開発、運営、誘致

DEEP C
DINH VU INDUSTRIAL ZONE

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2-2.
ﾌｫﾛｰｱｯﾌﾟ活動を通じた
低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
(セメント工場の廃熱回収発電)
報告

NTT DATA

2-2. ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動(セメント工場の廃熱回収発電)
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ハイフォン市人民委員会から、JCM事業化のポテンシャルのあるターゲットとして紹介を受けたセメント工場（Bach Dang Cement）における排熱回収発電システムの導入事業の実現に向けたフォローアップ活動を実施する。
- Bach Dang セメントは、2019年に新しい工場の稼動を目指して準備を進めているところであり、設計段階からJCMを活用した設備導入の提案を行うことで、スムーズなJCM事業化の実現を狙う。
- 国営セメント製造会社VICEMグループのハイフォン工場に4.75MWの廃熱回収発電システムを導入する計画済み。SPCへの出資者を含めた体制などについて最終協議中。

導入を想定している技術

- Shanghai CONCH Kawasaki社製の廃熱回収発電システム

- ✓ 全世界で240件以上の導入実績を有している
- ✓ これまで利用されず捨てられていた熱を回収し発電を行うことで、系統電力からの電力利用量を削減することが可能となる。その結果、系統電力を通じて排出されていたCO2量を削減することが可能となる。

JCM事業としては2件の導入実績あり。
1. 2013年 インドネシア セメント工場への廃熱回収発電システムの導入(JFEエンジニアリング)
2. 2016-7年 タイ セメント工場への廃熱回収発電システムの導入（NTTデータ経営研究所）

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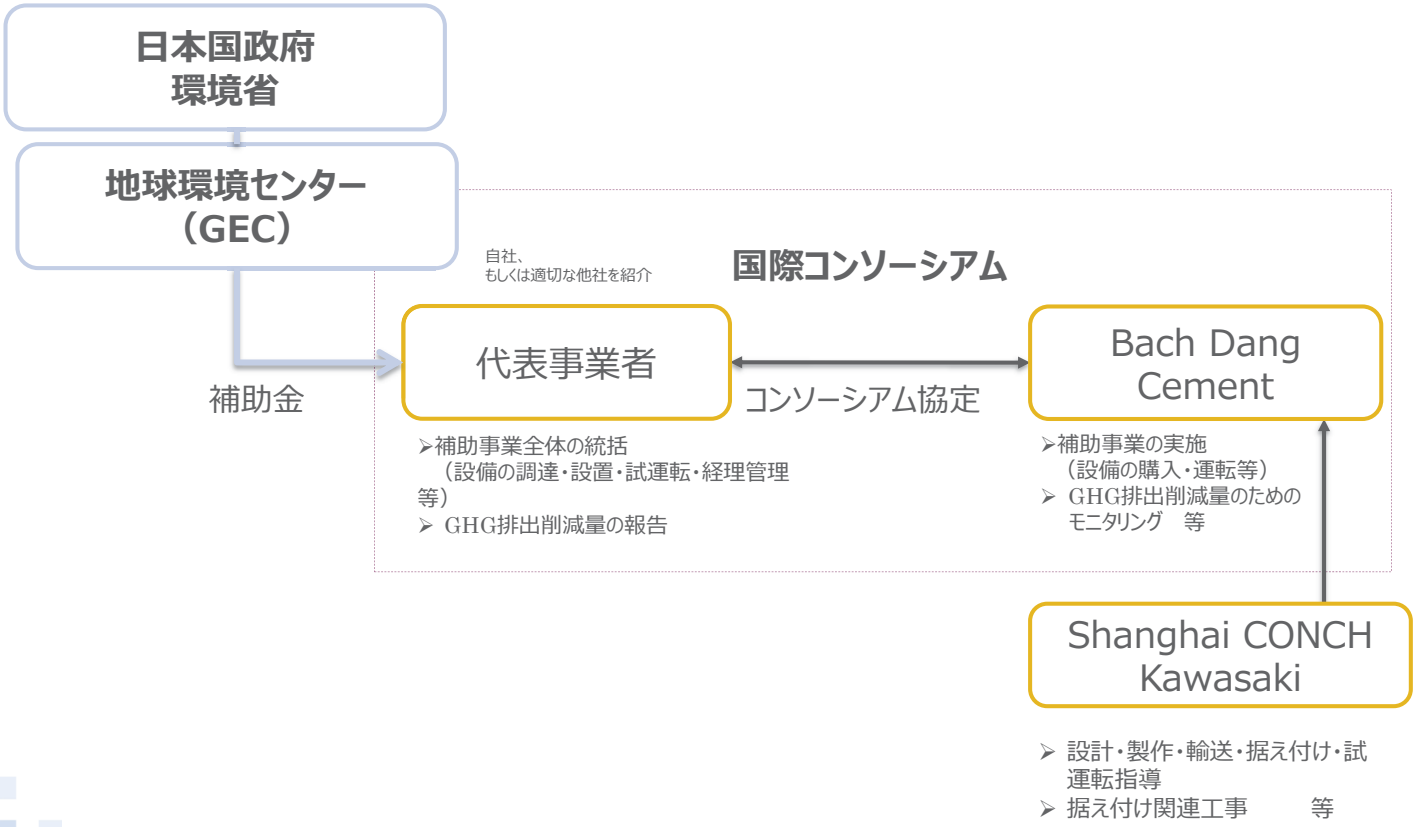
2-2. ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動(セメント工場の廃熱回収発電)
想定している事業実施スキーム等



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2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	エンジニアリング会社等と連携した技術検討 実施済み	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	NDK	Shanghai CONCH Kawasaki
2	1の結果を踏まえた経済性評価 実施済み	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	NDK	Bach Dang Cement
3	2の検討結果を踏まえたCO2排出削減量評価 実施済み	設備導入によるCO２排出削減効果の試算を行う	NDK	-
4	評価結果を踏まえた意思決定の支援 実施済み	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	NDK	Bach Dang Cement
5	発注・契約方式の確認 実施済み	設備導入の契約に当たり、発注方法、契約方式を確認	NDK	Bach Dang Cement
6	継続支援 実施済み	JCM設備補助の二次公募へ申請	NDK	Bach Dang Cement

⇒ 11月中旬、JCM二次公募不採択。Bach Dangセメント社と課題解決の検討開始

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃熱回収発電を行った後の発電電力を系統から調達した場合のCO2排出量をリファレンス排出量とする。
- 廃熱回収発電を行った場合の発電電力は、廃熱回収発電システムそのものの消費電力を除いて、全てセメント工場において自己消費することとなり、プロジェクト排出量は0とする。
- リファレンス排出量からプロジェクト排出量を引き算して、CO2排出削減量とする。

○**Ery = Rey – Pey**
Ery : プロジェクト期間yにおけるCO2排出削減量[tCO_2/y]
REy: リファレンス排出量 [tCO_2/y]
PEy: プロジェクト排出量 [tCO_2/y]
○**REy = EGy * EFgrid**
EGy: 購入系統電力を代替する廃熱回収システムによる正味発電量
EFgrid: プロジェクトにより代替されるタイの系統電源のCO2 排出係数
EGyの決定
EGy=EGGEN – EGAUX
EGGEN: 廃熱回収システムによる総発電量
EGAUX: 廃熱回収システムによる電力消費量
EGAUXの決定
EGAUX=EGCAP * 24 * 365
EGCAP: 電力を消費する廃熱回収システムの機器の定格容量最大値の合計
○**PEy= 0**

CO2排出削減量（想定）

現時点で想定しているCO2排出削減量ならびに、投資額とのCO2削減費用対効果は以下のとおり。

年度	平29(2017)	平30(2018)	平31(2019)	平32(2020)	平33(2021)	累計	法定耐用年数	費用対効果
補助申請予定額(百万円/年)	250	250				①500	④9	
GHG削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	②94,100		①/(②/稼働年数)/④)×1,000,000(単位：円) 2,951円
エネルギー起源二酸化炭素削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	③94,100		①/(③/稼働年数)/④)×1,000,000(単位：円) 2,951円

3-2-2. JCM設備補助申請に繋がる可能性のある案件 進捗状況①： BACH DANG CEMENT JOINT STOCK

プロジェクトの概要

概要	BACH DANG CEMENT JOINT STOCK COMPANY 社が新設予定のセメント工場からの廃熱を回収し、発電を行う ※本事業によって得られる電力は全てセメント工場において消費されるため、系統への売電は行わない
適用技術	廃熱回収発電システム セメント工場において原料の予熱を行うプリヒータ部（PH）及び高温のクリンカを急速冷却する冷却部（AQC）の2カ所に廃熱回収ボイラを設置し、両ボイラから得られる蒸気を用いて発電を行う

BACH DANG CEMENT JOINT STOCK COMPANY の概要

工場所在地	ベトナム社会主義共和国 ハイフォン市
運営組織	セメントの製造、販売
社員数	42（但し、セメント工場が生産開始後は380に増員される予定）
親会社	Phu Minh Son Group (PMS)

↑セメント工場本体完成イメージ
↓適用技術である廃熱回収システム

3.年間活動スケジュール

活動項目	2018年 5月	6月	7月	8月	9月	10月	11月	12月	2019年 1月	2月
①都市ごみと工業団地から排出される産業廃棄物の混焼による廃棄物発電事業	MPI、ハイフォン市との協議	→ 技術移転、企業進出、そのための資金などに関する制度のあり方等の検討・提案								
		資源循環、廃棄物発電、再エネ発電、省エネ等の個別プロジェクトの形成								
						技術検討、経済性検討を含めた事業化の準備活動支援				
②ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動	関連ステークホルダーとの個別協議	→ 協議結果を踏まえた技術検討、経済性検討						最終化		
	適宜、JCM設備補助申請支援等									
○ 現地調査	●	●		●	●		●		●	
○ 国内会議（2回程度）						●			●	
○ 現地ワークショップ（2回程度）		● キックオフ					●		● 最終報告会	
○ 報告書の作成					● ドラフト					● 最終版

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Global IT Innovator

環境省　国際協力・環境インフラ戦略室　御中

Reference d：Material of Final Meeting with MOEJ

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Global IT Innovator

平成30年度　低炭素社会実現のための都市間連携事業「ハイフォン市・低炭素化促進事業(ベトナム版エコタウンの実現等を通じた低炭素化事業実現可能性調査)/北九州市－ハイフォン市連携事業」最終報告用資料

2019年2月22日

NTTデータ経営研究所
社会・環境戦略コンサルティングユニット

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1.都市間連携の概要と本年度の目標

北九州市とハイフォン市の関係

- 北九州市とハイフォン市は2014年に姉妹都市協定を締結した。
- 同年に、北九州市の支援のもと「ハイフォン市グリーン成長推進計画」が策定された。この計画はハイフォン市人民委員会からも正式に承認されたもので、廃棄物、エネルギー、交通、カットバ島、上下水道・雨水排水、環境保全、グリーン生産の7分野を対象としている。中でも、温室効果ガスの排出と関係の深い、廃棄物、エネルギー、交通、カットバ島は主要分野として位置づけられている。

本年度の目標

ベトナム版エコタウンの実現に不可欠な、技術、技術を事業として展開する企業、企業の活動を支えるための資金、さらに企業の活動をWin-Winなものとするための制度や仕組みづくりを、包括的に支援する。

これまでの取り組み

1. 衛生陶器生産工場への高効率な省エネ設備導入による工場省エネ化事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**1,400tCO$_2$/年**
   - 事業体制
     - 代表事業者：TOTO
     - 共同事業者：TOTOベトナム
     - EPC企業：日本碍子(日本ｶﾞｲｼ)

2. ショッピングモールにおける太陽光発電の導入
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込 **274CO$_2$/年**
   - 事業体制
     - 代表事業者：イオンリテール
     - 共同事業者：イオンベトナム
     - EPC企業：ネクストエナジー

3. ホテルへの高効率インバータエアコンの導入事業
   - JCM設備補助事業（2015年度第2次公募で採択）
   - CO2排出削減見込み：**826tCO$_2$/年**
   - 事業体制
     - 代表事業者：NTTデータ経営研究所
     - 共同事業者：Peace Real Estate Investment Company Limited

4. GEC途上国イノベーション事業（2015年度に採択）
   - 事業体制
     - 代表事業者：ソフトエナジーコントロールズ
     - 共同事業者：NTTデータ経営研究所、Quoc Hung Company Limited

2.想定しているプロジェクト概要

本事業では、ベトナム国ハイフォン市と北九州市の協力関係のもと、２つのタイプのプロジェクトに関して調査を実施する。

想定事業	①ベトナム版エコタウンの実現等を通じた低炭素型プロジェクトの創出活動	②ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
プロジェクト内容	低炭素社会形成に関する経験・ノウハウ等を有する北九州市指導のもと、ハイフォン市の目指すグリーン成長と低炭素社会の実現にも資するベトナム版エコタウンの実現等を通じた低炭素型事業を対象に、JCMクレジット獲得を目指す。	セメント工場からの廃熱回収発電のフォローアップをメインとし、バイオマス発電、太陽光発電等の低炭素型電力を利用するEVバス等の低炭素型交通等の活動なども含める。ｽﾃｰｸﾎﾙﾀﾞｰとの協議、調整を実施。また、経済性評価、事業性評価を行う。
導入技術	廃棄物発電システム、太陽光発電システム	廃熱回収発電システム
実施スキーム	シート7、シート12　参照	
想定している契約方式事業形式	随意契約を想定	
補助金見込額、費用対効果	調査結果を踏まえ検討	
要調整事項	JCM設備投資事業可能性検討	JCM設備投資事業申請

2-1.
ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動報告

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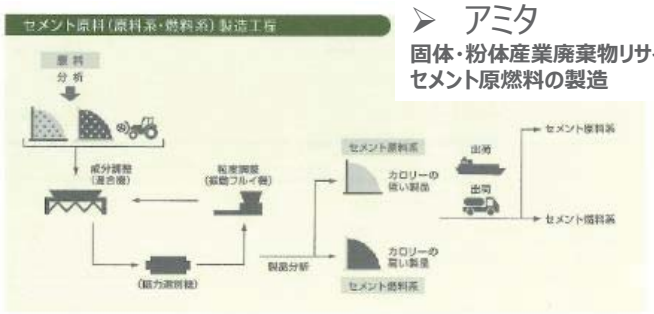
2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ベトナム計画投資省（MPI)においては、UNIDOの支援のもと、ベトナム国内で複数のモデル地域を選定し、ベトナム版エコタウンの実現にむけた活動を展開している。次のモデル地域としてハイフォン市内に存在するDinh Vu工業団地が選定される見込みである。
- Dinh Vu工業団地では、工業団地の価値向上に向けて団地が位置する港湾エリアの風況のよい地域に風力発電を設置するなど、団地のエコ化を強力に推進している。団地のエコ化推進の点から、自らの団地をベトナム版エコタウンのモデルとすることにも積極的で、既にMPIと具体的な協議に入っている。
- 一方、MPIは、北九州市がエコタウン実現のために行ってきた取組みを積極的にベトナム版エコタウンの実現に取り入れたいとの意向を示している。
- 工業団地から発生する各種廃棄物の域内リサイクルの推進を通じた資源循環を実現し、その結果リサイクル利用が困難な廃棄物については熱処理（廃棄物発電など）、さらには工業団地全体の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動を通じて、JCMクレジット獲得に至る低炭素化プロジェクトの組成を目指す。

導入を想定している技術



➢ アミタ
固体・粉体産業廃棄物リサイクル
セメント原燃料の製造

✓ 循環資源製造所の東南アジアへの展開実績あり

【インプット】
様々な産業から排出される汚泥、廃プラスチック・ばいじん・燃え殻などの固体・粉体系の産業廃棄物から、セメント原燃料を製造
【分析】
受入予定の産業廃棄物について、事前に含有成分や性状などを調べ異物等の混入分析
【配合検討】
分析結果から受入可能と判断した産業廃棄物について、ユーザー規格に合わせた成分調整の配合表を作成
【破砕・粉砕】
大きなものや固いものは破砕機や粉砕機で裁断
【調合】
配合表に基づいて様々な産業廃棄物を調合
【アウトプット：セメント原燃料】
セメント原燃料として出荷
カロリーの少ないものはセメント原料である粘土の代替に、
カロリーを多く含んでいるものは燃料として石炭の代替として使用さ、
燃え殻はセメント原料として利用

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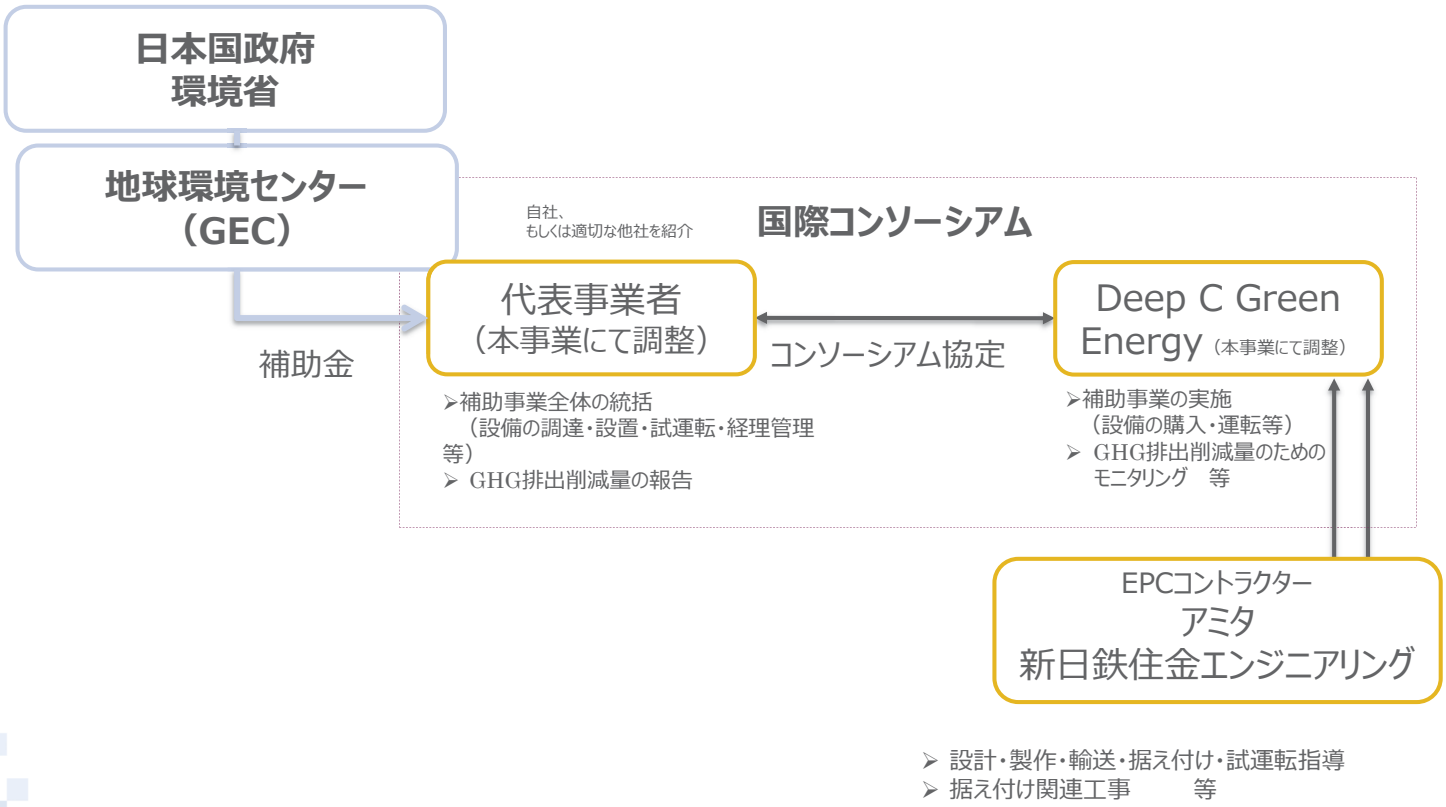
2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
想定している事業実施スキーム等



2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	ベトナム計画投資省（MPI)の考えるベトナム版エコタウンの把握	Dinh Vu工業団地を対象としたベトナム版エコタウン計画の状況確認	北九州市 NDK	MPI Dinh Vu工業団地他
2	Dinh Vu工業団地の再生エネルギー投資計画の確認及び同計画を踏まえたJCM化の可能性検討	Dinh Vu工業団地内の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動	北九州市 NDK	Deep C Green Energy
3	資源の循環利用を目指した、処理対象となる都市ごみと産業廃棄物の確認及びビジネスモデルの検討	2の結果を経て、資源循環を利用したセメント原燃料製造や、産業廃棄物を都市ごみと混焼することによる収益性の向上を目指し、新たなるビジネスモデルの検討	NDK NSENGI AMITA	ハイフォン市 MPI Dinh Vu工業団地他
4	JCM等の補助制度の活用可能性の検討	１～３の調査を踏まえ、事業性を高めるため、JCM設備補助等のイニシャルコスト削減可能性を検討する。	NDK	NSENGI AMITA Dinh Vu工業団地他
5	JCM等の補助制度を活用の場合、詳細検討	各企業への意思・価格ヒアリングなど実施し、実現可能性を高める	NDK	NSENGI AMITA Dinh Vu工業団地他

2-1.ベトナム版エコタウンの実現を通じた低炭素型プロジェクトの創出活動
プロジェクト実現に向けた課題の達成と結果

No.	調査で解決したい課題	獲得目標	達成した成果
1	ベトナム計画投資省（MPI)の考えるベトナム版エコタウンの把握	Dinh Vu工業団地を対象としたベトナム版エコタウン計画の状況確認	ベトナム版エコタウンにあたる"Eco Industrial Park"を規定するDecree 82が公表され、その内容と対応について、Dinh Vu工業団地、HEZAと協議
2	Dinh Vu工業団地の再生エネルギー投資計画の確認及び同計画を踏まえたJCM化の可能性検討	Dinh Vu工業団地内の低炭素化に向けた再生可能エネルギーの導入と団地内企業への省エネ提案等の活動	再エネ導入事業は進展。DEEP-C GEと東電PGが、JVを設立。進行中。
3	資源の循環利用を目指した、処理対象となる都市ごみと産業廃棄物の確認及びビジネスモデルの検討	2の結果を経て、資源循環を利用したセメント原燃料製造や、産業廃棄物を都市ごみと混焼することによる収益性の向上を目指し、新たなるビジネスモデルの検討	入居企業の産廃の種類、量を把握。産廃引き取り費用のレンジの把握、DEEP-Cとハイフォン市の協議により、都市ごみの引き取り費用のレンジが明らかになりつつある。
4	JCM等の補助制度の活用可能性の検討	１～３の調査を踏まえ、事業性を高めるため、JCM設備補助等のイニシャルコスト削減可能性を検討する。	JCM設備補助制度をDEEP-Cに説明。事業実施スキーム、採用設備について議論。継続中。
5	JCM等の補助制度を活用の場合、詳細検討	各企業への意思・価格ヒアリングなど実施し、実現可能性を高める	JCM設備補助制度をDEEP-Cに説明。事業実施スキーム、採用設備について議論。継続中。

結果（現状）：
2018年5月にDinh Vu工業団地を運営するDEEP-Cの社長が交代。当初、DEEP-C GE単独で事業実施という方針が転換され、WTEのノウハウを持った企業とのJVでの実施へ。現在、パートナー探しを実施しつつ、ハイフォン市と都市ごみ処理費用の交渉を継続。

2.1.1　その他成果

2.1.1-1 発表等

- 11月6日　ハイフォン市EIP（Eco-Industrial Park）ワークショップ
  - **ハイフォン市、HEZA、MPI共催**
  - **北九州市によるエコタウンに関する発表**
  - **NTTデータ経営研究所によるJCM制度に関する発表**
- 11月8日　EIP専門家ミーティング
  - **MPI、UNIDO等による共催**
  - **北九州市によるエコタウンに関する発表**
- 1月8日　ジャパン環境ウィーク
  - **北九州市、ハイフォン市、Nam Cau Kien工業団地による都市間連携事業に関する発表**
- 1月6日　Nam Cau Kien工業団地でのJCM設備補助セミナー

2.1.1-2 JCMポテンシャル調査（1）

Nam Cau Kien工業団地

敷地総面積：263ha
　第一期：108ha（入居率100%）
　第二期：155ha（開発中）
総投資額：2300BillionVND
入居企業：34社

Eco-Industrial Parkの第一号候補としてハイフォン市及びHEZAともに推奨する工業団地

同工場社長は、環境対策にかなり積極的に取り組んでいる。

Decree 82で対応が難しいと考えられる緑地面積確保条項にも積極的に対応

2.1.1-2 JCMポテンシャル調査（2）

Vietnam-Italy Steel (VIS) JSCの設備改善事業

VIS社は、日本の共英製鋼が70%出資する鉄鋼会社であり、スクラップ鉄を受け入れ、電気炉（アーク式）で溶融し、リサイクルする事業を営んでいる。

VISは、2つの工場を有している：

ハイフォン工場（製鋼工場）
生産能力 ： 400,000T／年 （2017年生産量 452,369T +113%）
電気炉 （60T）
炉外精錬炉 （60T）
連続鋳造設備 （4ストランド）

フンイェン工場（圧延工場）
生産能力 ： 250,000T／年（2017年生産量 301,201T +120%）
加熱炉 （50T）
連続圧延設備

2.1.1-2 JCMポテンシャル調査（3）

Vietnam-Italy Steel (VIS) JSCの設備改善事業

VIS社は、2018年5月に共英製鋼の子会社となった。コスト競争力改善のため、設備の近代化含め、様々な省エネルギー案を検討中。

・リジェネバーナーの導入（Hung Yen工場）
　実施の主目的：加熱炉燃料原単位の削減
・多機能バーナーの導入（Hai Phong工場）
　実施の主目的：電気炉生産性向上、電気炉用電力原単位削減
・DOCバーナーの導入（Hai Phong工場）
　実施の主目的：取鍋予熱燃料原単位削減
・ハイフォン工場に下工程を作る（Hai Phong工場）
　実施の主目的：異形棒鋼等鋼材の販売量及び生産量拡大
・燃料転換（Hung Yen工場が主 Hai Phong工場も視野）
　実施の主目的：加熱炉燃料使用量の削減(Hung Yen工場)、電気炉多機能バーナー導入時の主燃料と取鍋及びタンディッシュ予熱の燃料使用量削減(Hai Phong工場)
・LED照明の導入（Hung Yen工場が主 Hai Phong工場も視野）
　実施の主目的：両工場共に一般電力原単位の削減
・高効率ファンや高効率ポンプの導入（両工場
　実施の主目的：両工場共に一般電力原単位の削減

2.1.1-2 JCMポテンシャル調査（4）

プルマン・ハイフォン・ホテル・プロジェクト

ハイフォン市の中心街Tran Phu通り12番地における5つ星ホテルの建設。
地下1階、地上32階、客室数320のホテルに1200～1500席の国際会議センターが併設
総投資額約1兆6,000億VND。2020年度中に完成をめざす。
投資会社：Nhat Ha Co., Ltd

同ホテルの換気空調系に高効率な設備（チラーなど）を導入し、さらにEMSシステムも導入し、全体最適化をはかる。

Nhat Ha社から関連図面を受け取り、近日中に設計提案予定。

2019年4月のJCM設備補助への申請を目指す。

2.1.1-3 Eco-Industrial Park推進のMOU

ベトナム政府機関計画投資省（Ministry of Planning and Investment）

ベトナムにおけるEco-Industrial Parkの普及促進を目指している。

UNIDOと共同でEco-Industrial Parkのモデル事業、政策整備を実施中

政令82号（Decree 82）において、エコ・インダストリアル・パークの新規建設あるいは転換を奨励

MPIは、北九州市とハイフォン市の姉妹都市関係に基づく活動を支持
→ 活動を支持するレターの発行

Eco-Industrial Park Vietnam

2-2.
ﾌｫﾛｰｱｯﾌﾟ活動を通じた
低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動
(セメント工場の廃熱回収発電)
報告

NTT DATA

2-2. ﾌｫﾛｰｱｯﾌﾟ活動を通じた低炭素型ﾌﾟﾛｼﾞｪｸﾄの創出活動(セメント工場の廃熱回収発電)
プロジェクト概要・導入を想定している技術の実績

プロジェクトの概要

- ハイフォン市人民委員会から、JCM事業化のポテンシャルのあるターゲットとして紹介を受けたセメント工場（Bach Dang Cement）における排熱回収発電システムの導入事業の実現に向けたフォローアップ活動を実施する。
- Bach Dang セメントは、2019年に新しい工場の稼動を目指して準備を進めているところであり、設計段階からJCMを活用した設備導入の提案を行うことで、スムーズなJCM事業化の実現を狙う。
- 国営セメント製造会社VICEMグループのハイフォン工場に4.75MWの廃熱回収発電システムを導入する計画済み。SPCへの出資者を含めた体制などについて最終協議中。

導入を想定している技術

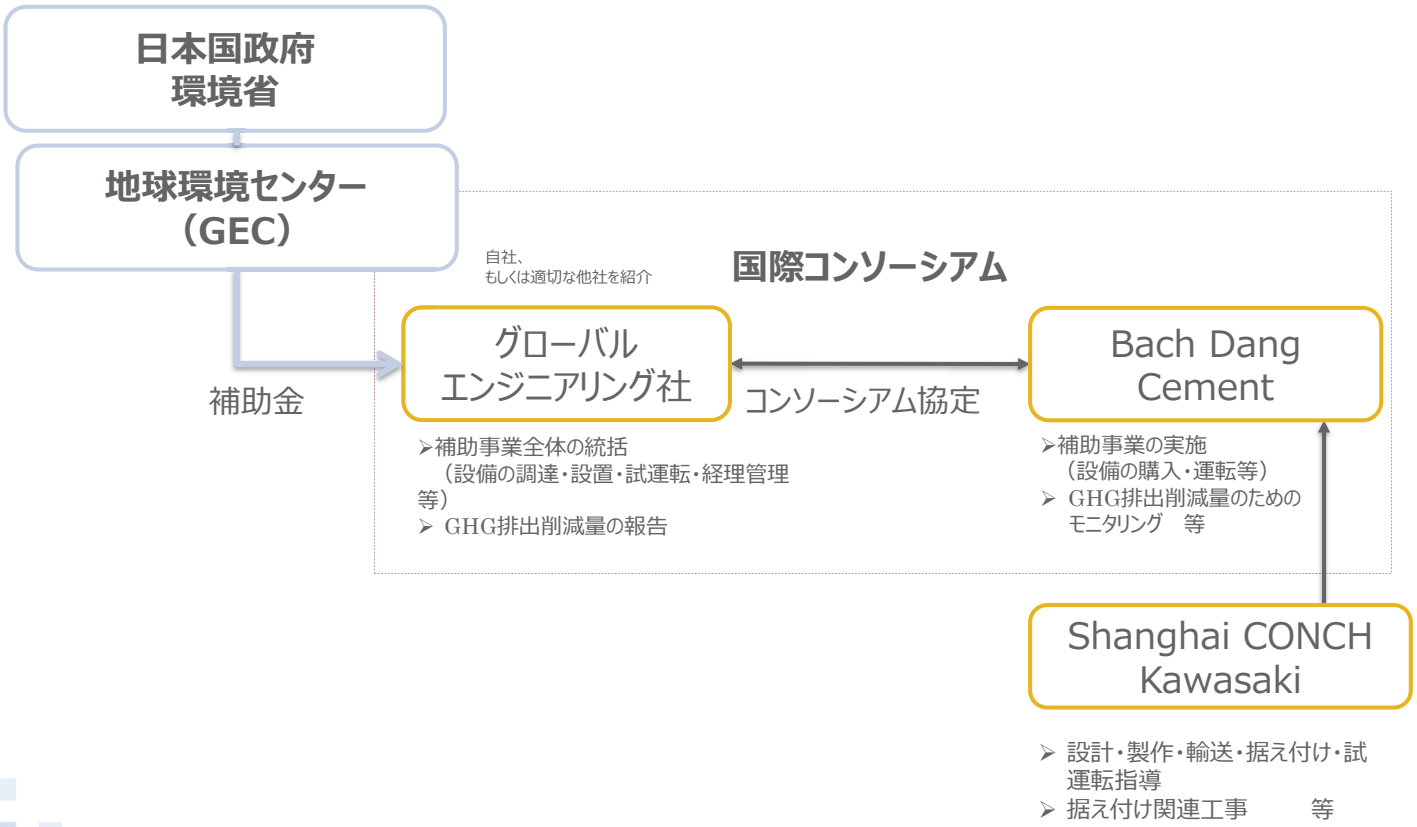
- Shanghai CONCH Kawasaki社製の廃熱回収発電システム

- ✓ 全世界で240件以上の導入実績を有している
- ✓ これまで利用されず捨てられていた熱を回収し発電を行うことで、系統電力からの電力利用量を削減することが可能となる。その結果、系統電力を通じて排出されていたCO2量を削減することが可能となる。

JCM事業としては2件の導入実績あり。
1. 2013年 インドネシア セメント工場への廃熱回収発電システムの導入(JFEエンジニアリング)
2. 2016-7年 タイ セメント工場への廃熱回収発電システムの導入（NTTデータ経営研究所）

NTT DATA

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
想定している事業実施スキーム等



2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
プロジェクト実現に向けた課題

No.	調査で解決したい課題	獲得目標	担当	相手方
1	エンジニアリング会社等と連携した技術検討	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	NDK	Shanghai CONCH Kawasaki
2	1の結果を踏まえた経済性評価	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	NDK	Bach Dang Cement
3	2の検討結果を踏まえたCO2排出削減量評価	設備導入によるCO２排出削減効果の試算を行う	NDK	-
4	評価結果を踏まえた意思決定の支援	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	NDK	Bach Dang Cement
5	発注・契約方式の確認	設備導入の契約に当たり、発注方法、契約方式を確認	NDK	Bach Dang Cement
6	継続支援	JCM設備補助の二次公募へ申請	NDK	Bach Dang Cement

⇒ 11月中旬、JCM二次公募不採択。Bach Dangセメント社と課題解決の検討開始

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
排出削減総量および補助金の見込み額

CO2排出削減量の算出方法

- 廃熱回収発電を行った後の発電電力を系統から調達した場合のCO2排出量をリファレンス排出量とする。
- 廃熱回収発電を行った場合の発電電力は、廃熱回収発電システムそのものの消費電力を除いて、全てセメント工場において自己消費することとなり、プロジェクト排出量は0とする。
- リファレンス排出量からプロジェクト排出量を引き算して、CO2排出削減量とする。

○**Ery = Rey − Pey**
Ery： プロジェクト期間yにおけるCO2排出削減量[tCO_2/y]
REy: リファレンス排出量 [tCO_2/y]
PEy: プロジェクト排出量 [tCO_2/y]
○**REy = EGy * EFgrid**
EGy: 購入系統電力を代替する廃熱回収システムによる正味発電量
EFgrid: プロジェクトにより代替されるタイの系統電源のCO2 排出係数
EGyの決定
EGy=EGGEN − EGAUX
EGGEN: 廃熱回収システムによる総発電量
EGAUX: 廃熱回収システムによる電力消費量
EGAUXの決定
EGAUX=EGCAP * 24 * 365
EGCAP: 電力を消費する廃熱回収システムの機器の定格容量最大値の合計
○**PEy= 0**

CO2排出削減量（想定）

現時点で想定しているCO2排出削減量ならびに、投資額とのCO2削減費用対効果は以下のとおり。

年度	平29(2017)	平30(2018)	平31(2019)	平32(2020)	平33(2021)	累計	法定耐用年数	費用対効果
補助申請予定額(百万円/年)	250	250				①500	④9	
GHG削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	②94,100		①/(②/稼働年数)/④)×1,000,000(単位：円) 2,951円
エネルギー起源二酸化炭素削減量(t-CO2/年)	18,820	18,820	18,820	18,820	18,820	③94,100		①/(③/稼働年数)/④)×1,000,000(単位：円) 2,951円

2-2. フォローアップ活動を通じた低炭素型プロジェクトの創出活動(セメント工場の廃熱回収発電)
プロジェクト実現に向けた課題の達成と結果

No.	調査で解決したい課題	獲得目標	達成した成果
1	エンジニアリング会社等と連携した技術検討	廃熱回収発電設備の規模、発電見込み量等の概要、設置に要する期間に関し協議	Shanghai Conch Kawasaki Engineering (SCKE)社と連携して実施。
2	1の結果を踏まえた経済性評価	投資額・投資回収年数、内部収益率等を明らかにした上で、現地企業の意向を確認	経済性評価を実施し、Bach Dang Cementと協議。合意を得る。
3	2の検討結果を踏まえたCO2排出削減量評価	設備導入によるCO２排出削減効果の試算を行う	SCKE社提供の仕様等及びBach Dang Cement提供のプラント運転計画に基づき、CO2排出削減量を算定。
4	評価結果を踏まえた意思決定の支援	JCM設備補助への応募を行う場合は、その準備を行う。共同事業者への意思確認を併せて行う	Bach Dang Cementが、JCM設備補助応募を希望したため、代表事業者を紹介。応募準備を開始。
5	発注・契約方式の確認	設備導入の契約に当たり、発注方法、契約方式を確認	国際コンソーシアム協定書など各種契約等がスムーズに締結されるよう支援を実施。
6	継続支援	JCM設備補助の二次公募へ申請	関連する資料をそろえ、応募書類を完成させ、二次公募へ応募。

結果（現状）：
平成30年度JCM設備補助事業二次募集に申請。結果は、不採択。資金調達状況を証明する書類の準備が不足気味であったことなどが原因と考えられる。
Bach Dang Cement社は、いまだJCMを活用してのWHR設備導入を希望しており、必要書類の整備など助言をしながら再申請を検討中。

3． まとめ

まとめ

北九州市とハイフォン市の姉妹都市提携は非常に強固なものであり、ハイフォン市は、北九州市の支援の下、グリーン成長推進計画を進めている。

計画投資省は、ハイフォン市との協業、その中でのエコ・インダストリアル・パークの確立に期待しており、その活動を強く支持している。 → MOUの発行へ

この関係の下、多くのJCM候補プロジェクトを見つけることが可能
H30年度の2つの事業
(1) 廃棄物発電は、処理費の交渉、体制の変更で議論継続中
(2) セメント工場WHRシステム導入は、設備補助申請したものの不採択。課題解決へ向け、活動中

新規案件：
（1）VIS社　電炉を有する鉄鋼製造ラインの改善
（2）プルマン・ハイフォン・ホテル　高効率空調システムの導入

エコ・インダストリアル・パーク確立の支援：Nam Cau Kien工業団地

NTT DATA

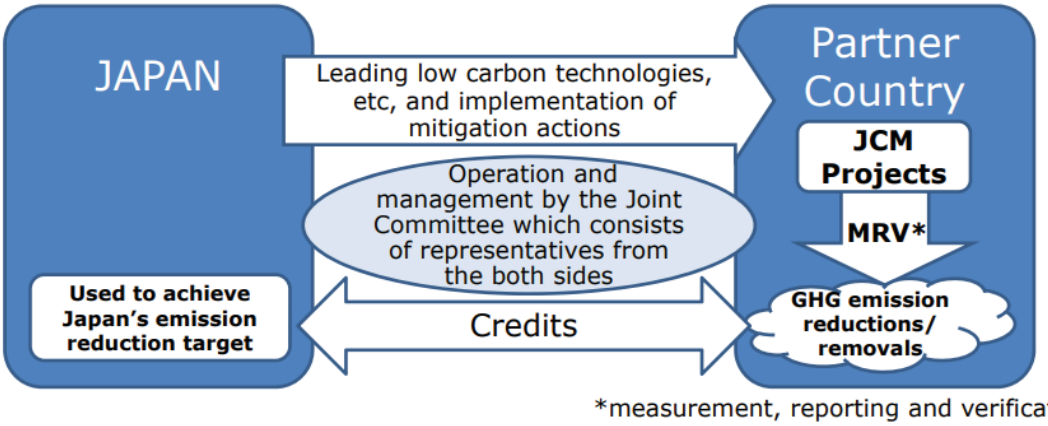
Global IT Innovator

Introduction of JCM Subsidy System for the Facilities to Reduce CO2 Emissions

November 6, 2018
NTT Data Institute of Management Consulting, Inc.
Socio & Eco Strategic Consulting Unit

1.What is JCM?

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.



*measurement, reporting and verification

2. JCM partner countries

- Japan has held consultations for the JCM with developing countries since 2011 and has established the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand and the Philippines.

Mongolia
Jan. 8, 2013
（Ulaanbaatar）

Bangladesh
Mar. 19, 2013
(Dhaka)

Ethiopia
May 27, 2013
(Addis Ababa)

Kenya
Jun. 12,2013
(Nairobi)

Maldives
Jun. 29, 2013
(Okinawa)

Viet Nam
Jul. 2, 2013
(Hanoi)

Lao PDR
Aug. 7, 2013
(Vientiane)

Indonesia
Aug. 26, 2013
(Jakarta)

Costa Rica
Dec. 9, 2013
(Tokyo)

Palau
Jan. 13, 2014
(Ngerulmud)

Cambodia
Apr. 11, 2014
(Phnom Penh)

Mexico
Jul. 25, 2014
(Mexico City)

Saudi Arabia
May 13, 2015

Chile
May 26, 2015

Myanmar
Sep. 16, 2015

Thailand
Nov. 19, 2015

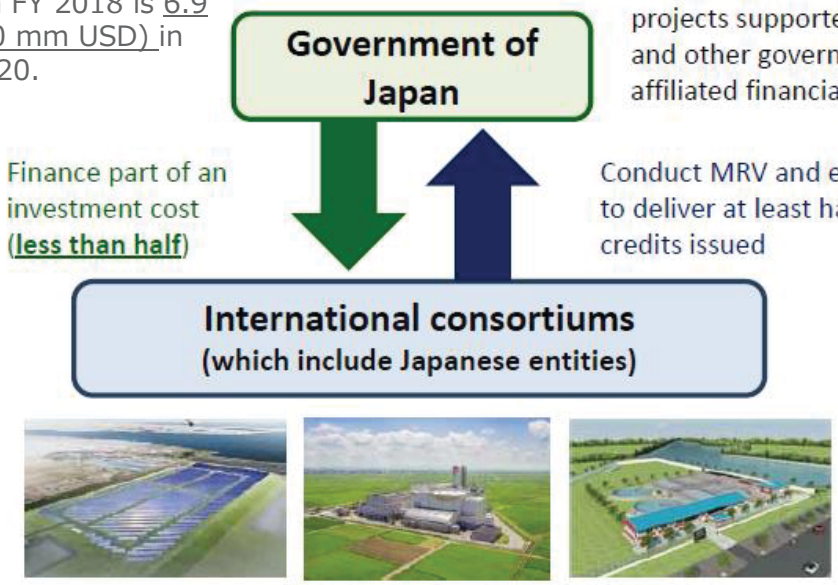
the Philippines
Jan. 12, 2017

3. JCM Subsidy Program

The budget for projects starting from FY 2018 is 6.9 billion JPY (60 mm USD) in total by FY2020.

(1 USD = 100 JPY)

※Includes collaboration with projects supported by JICA and other governmental-affiliated financial institute.



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4. Number of JCM Projects by applied technology type and country

Sector	Technology	Country: Mongolia	Bangladesh	Ethiopia	Kenya	Maldives	Viet Nam	Lao PDR	Indonesia	Costa Rica	Palau	Cambodia	Mexico	Saudi Arabia	Chile	Myanmar	Thailand	Philipines	Total
Energy Efficiency	Boiler	1					1		2				1			2	1		8
	Regenerative Burners								1										1
	Gas Fired Furnace						1												1
	Air Conditioning System						2		1								1		4
	Chiller		2				3		4	1		1					3		14
	Refrigerator								1							2	3		6
	Absorption Chiller Using Waste Heat								2								2		4
	Swirling Induction Type Air Conditioning System																1		1
	Air Conditioning Control System						1		1								1		3
	Double Bundle-type Heat Pump						1		1								1		3
	Fridge and Freezer Showcase								1								1		2
	Air Compressor						1										1		2
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	Reefer Container						1												1
	CNG-Diesel Hybrid Bus								1										1
	Total	7	5	1	2	1	21	2	32	3	4	6	5	1	1	8	35	8	142

5. JCM Characteristics (1)

- Total Number of JCM projects is 142 as of 23 July 2018.
  - Upper limit of Financial Support by JCM:
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- JCM projects in Viet Nam
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  - Technologies for JCM is not limited to the ones on the table.
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- The proposed project must contribute to the emissions reductions of CO2 originated from energy.
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  - The International Consortium should consist of one Japanese entity and one local entity at least.
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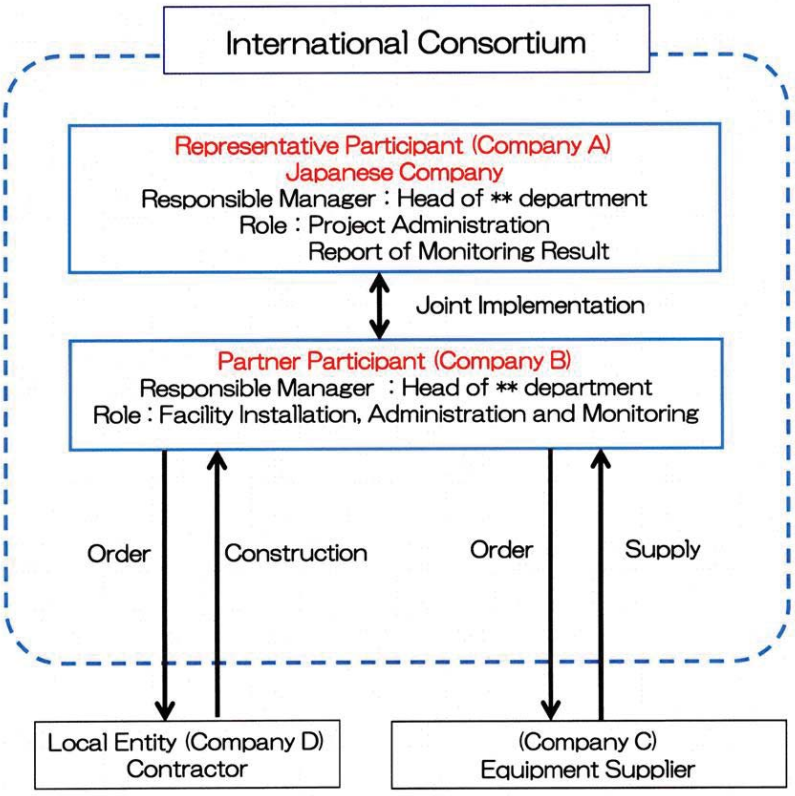

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- Two important Factors in the examination of JCM proposals:
  - The possibility to implement the proposed project actually
  - The amount of CO2 emission reductions (originated from energy)
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- Why is the amount of CO2 emission reductions important?
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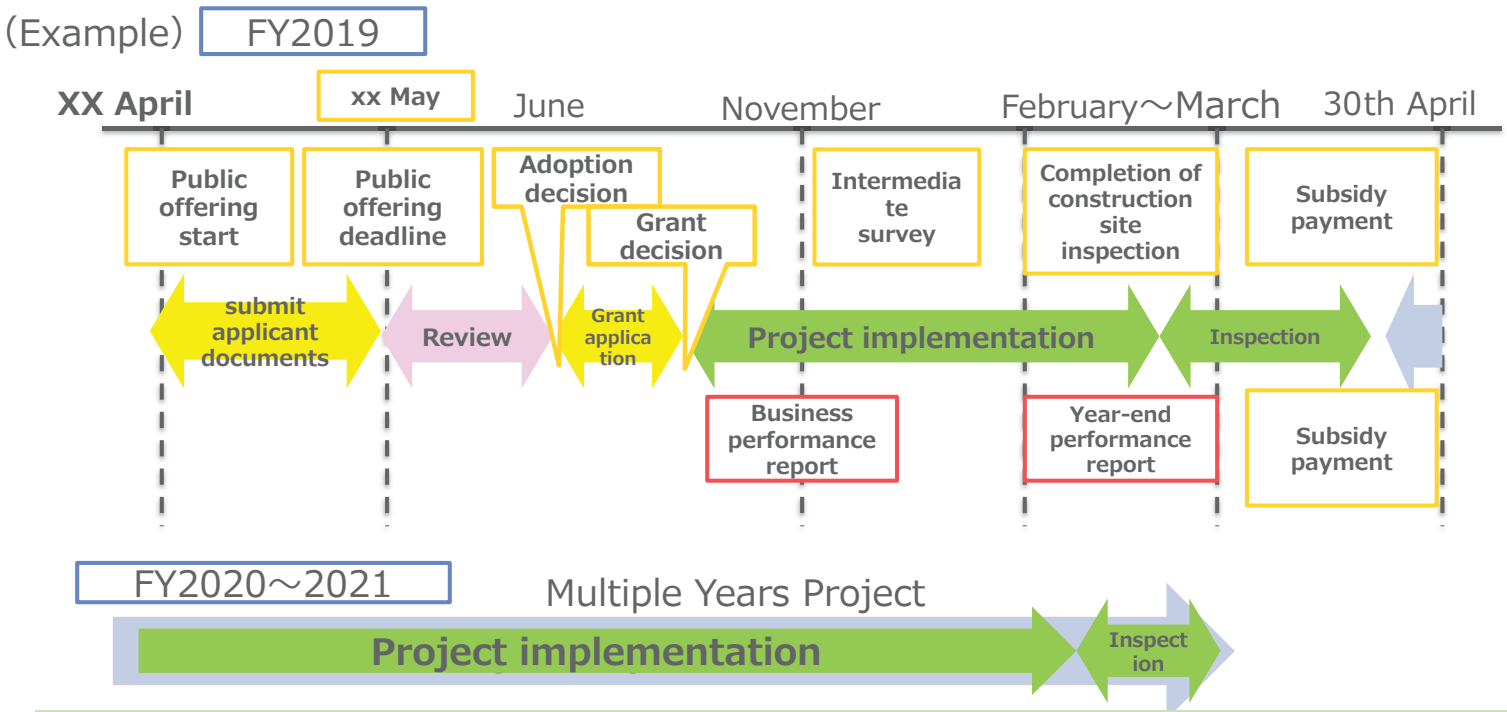

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Thank you for your attention !

If you have any questions, please contact me.
E-mail: abey@keieiken.co.jp

NTT DATA

Global IT Innovator

Reference f：Material of NamCauKien_JCM Seminar

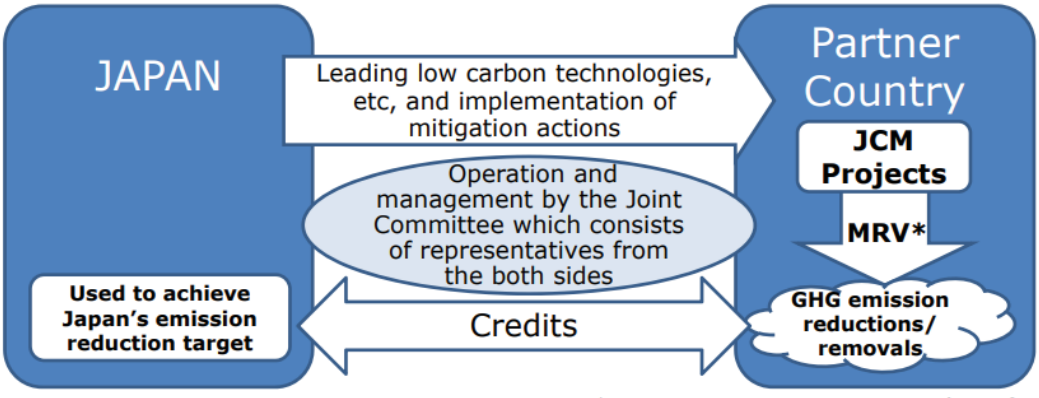
Introduction of JCM Subsidy System for the Facilities to Reduce CO2 Emissions

January 8, 2019

NTT Data Institute of Management Consulting, Inc.
Socio & Eco Strategic Consulting Unit

1.What is JCM?

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.



*measurement, reporting and verification

2. JCM partner countries

- Japan has held consultations for the JCM with developing countries since 2011 and has established the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia, Chile, Myanmar, Thailand and the Philippines.

Mongolia
Jan. 8, 2013
（Ulaanbaatar）

Bangladesh
Mar. 19, 2013
(Dhaka)

Ethiopia
May 27, 2013
(Addis Ababa)

Kenya
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Maldives
Jun. 29, 2013
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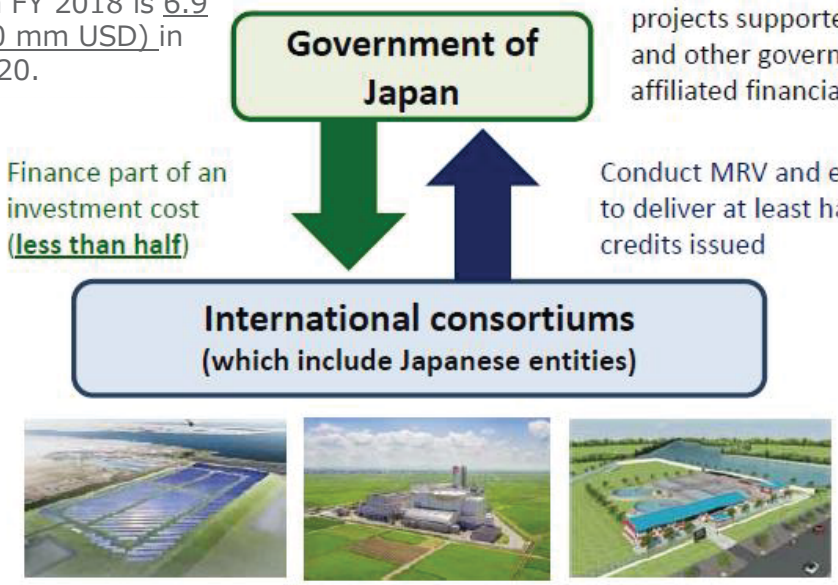

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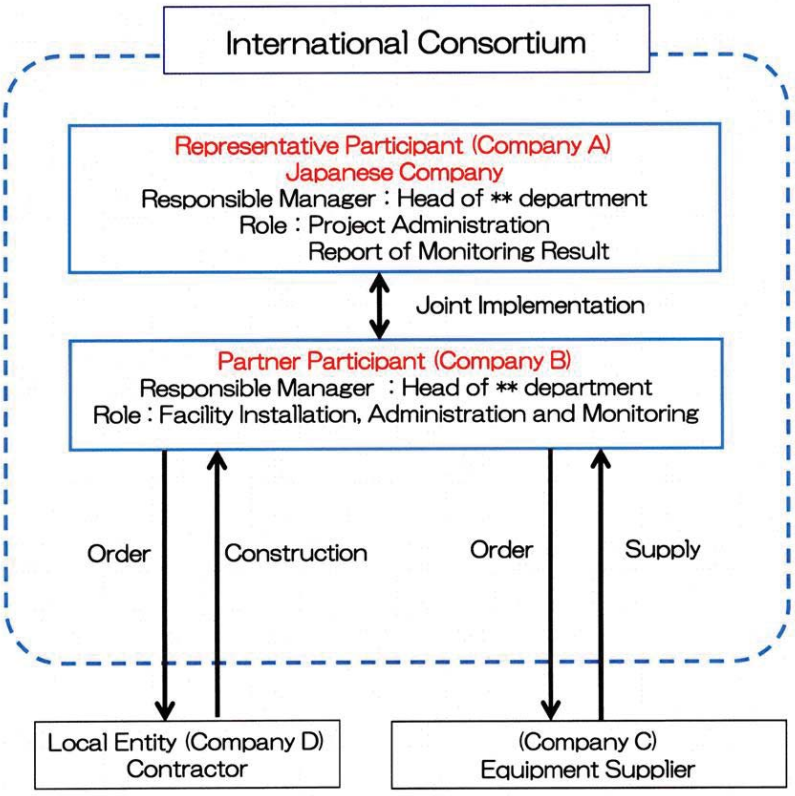

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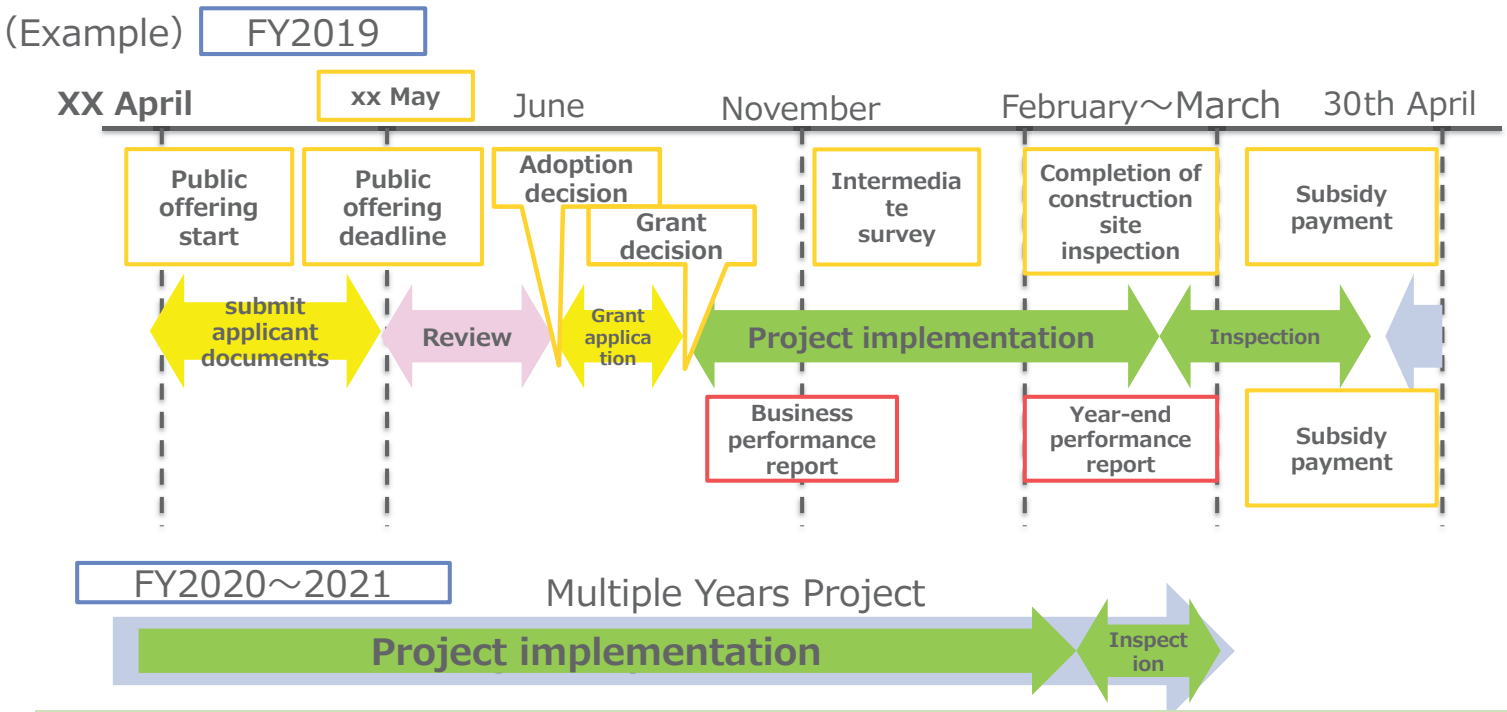

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