FY2016 Project for Ministry of the Environment Japan

### FY2016

# Feasibility Study of Joint Crediting Mechanism Project by City to City Collaboration

Project to Accelerate Low Carbonization in Hai Phong City (Energy Field) (Kitakyushu- Hai Phong Cooperation Project) Report

## March 2017

NTT Data Institute of Management Consulting, Inc.

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### Chapter 1 Background and Objectives of the Project

#### **1.1 Outline of Hai Phong City**

(1) Overview of Hai Phong City

Hai Phong City is a centrally-controlled city (Municipalities of Vietnam) with a population of about 1.9 million, 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

#### (1) 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.

			Reduction of		
Tomo	Amount of GHG	Reduction	energy	Domestic	International
Term	emission reduction	ratio	consumption to	efforts	Support
			GDP		
2011	BAU 10~20%	Q = 100/	1 - 1 50/	100/	100/
$\sim 2020$	BAU 10~20%	8~10%	$1 \sim 1.5\%$ year	10%	10%
$\sim 2030$	BAU 20~30%			10%	20%
$\sim 2050$	1.5~2% year				

 Table 1
 GHG emissions and concentration reduction targets of Green growth strategy

#### (2) Economic Overview

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 1,550 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.

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

Table 2Major economic indicators and others in Vietnam (1990, 2011, 2012)

Source: Ministry of Foreign Affairs, "Official Development Assistance (ODA) Country Specific Data 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.

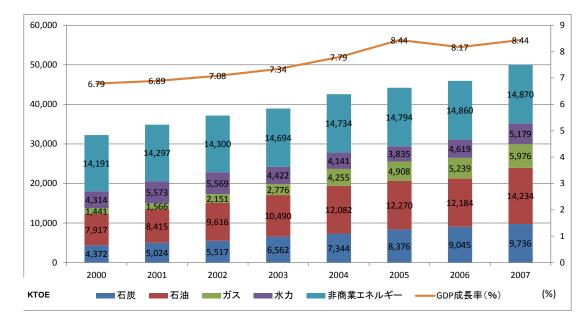


Figure 1 Primary energy consumption and GDP growth rate by resource in Vietnam (2000 - 2007)

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

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.

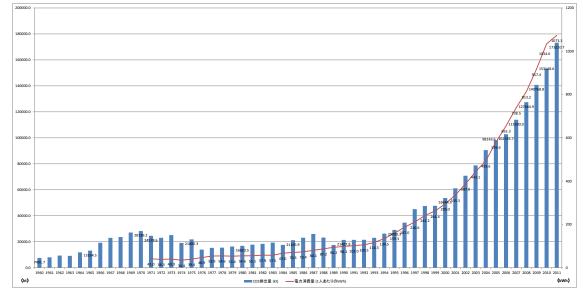


Figure 2 CO2 emissions (kt) and electricity consumption per capita (kWh) in each sector of

Vietnam<sup>1</sup>

 $<sup>^{1}</sup>$  (Note) Data of the amount of CO<sub>2</sub> 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

#### (1) 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)"

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

 Table 3
 Main roles of major departments (Hai Phong City Green Growth Strategy Action Plan)

Technology	
Department of Transportation	<ul> <li>Promote the use of public transportation such as buses.</li> <li>From the truck transportation, try to convert to mass transit using railway and feeder ship (modal shift).</li> </ul>
Department of Mineral Recourse	<ul> <li>Increase the urban green space and waterfront space, to secure the per capita green space area.</li> <li>Human resource development and database creation to periodically check greenhouse gas emissions</li> </ul>
Department of Construction	<ul> <li>Promotion of energy conservation of construction activities and public lighting</li> <li>Introduction of construction technology with less environmental impact</li> <li>Reduce the amount of final disposal by intermediate treatment of waste and recycling.</li> </ul>

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.



Figure3 Relationship 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.

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 4 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 Table 1.3.2.

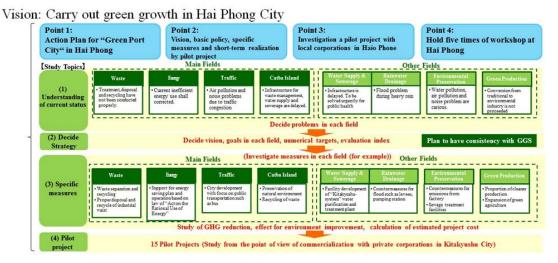


Figure 1 Flow of Hai Phong City Green Growth Promotion Plan Formulation Support

Business classification	Contents	Main Actor	Project term	KPI
1. Efficient use	• To promote energy conservation efforts in energy consuming enterprises, conduct energy-saving diagnosis by utilizing energy conservation center etc. and propose methods of efficient use of energy.	Company,	Short	Energy saving amount GHG reduction amount
and energy reuse that can	• 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.	DOIT	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		Medium	

 Table 1
 Specific measures in the energy field

	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.			
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       • 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		Company citizen	Short	Energy saving amount GHG reduction amount
5. Energy saving of public	• 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
facilities	• Promote energy saving lighting such as LEDs for existing and new road lights and street lights.	DOT		amount
6.	•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 GI	Energy saving amount GHG reduction amount
Promotion of energy management	• 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		
	• 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,		
7. Enhancement of energy conservation promotion	• 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.		Energy saving amount GHG reduction	
system	• 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		amount

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 2 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。 L 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。 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. 芸コンペー 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. スピーチョンベ 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デスト

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。

L. 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。

時間	内容	実施	備考
7:30~8:00	- 客歓迎	LeChan 中学校	生徒に電気省エ
8:00~8:20	- 歌演奏		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	LeChan 中学校の生徒	
	ンシュー		
10:05~10:15	表彰	省エネセンター&	
		LeChan 中学校	
10:30	閉幕	司会者	

IV. コンテストの内容

V. 資金:省エネセンターの資金

Figure 3 Energy saving contest

Program overview

#### (3) 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 4 Trang Cat repository Current status of composting facility

(B) Improper treatment of waste 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 5 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 6 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 7 Amount of current and future waste generation

#### (F) Waste incineration capacity

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

Manager of the facility Place		Capacity	Objects to be incinerated
URENCO	Trang Cat waste disposal field	1.6 t/day(200kg/h)💥	Medical,
URENCO	Trang Cat waste disposal field	0.5t/day(60kg/h)※	hazardous waste
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

 Table 2
 Ability of incineration facilities in Hai Phong city and others

#### (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

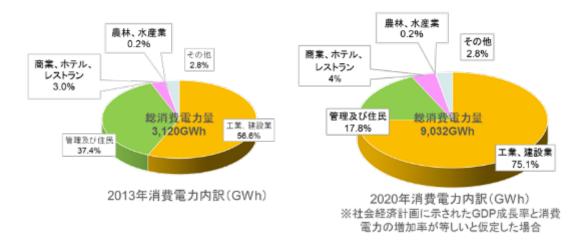
Full-scale operation promotion of energy saving measures, such as the formulation and execution of energy conservation plans of specified business operators based on the Energy Conservation Act, have just started, and are necessary to promote the efficient use of energy through the means including the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



Figure 8 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.

• Table 1.3.4 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 9 Breakdown of current and future power consumption

Table 3 Energy consumption per GDP (2013)

	kWh	GDP(USD)	kWh/GDP	日本のエネルギー
ハイフォン市	31.2×10 <sup>8</sup>	2.73×10 <sup>9⊛1</sup>	1.14	う 効率は6倍
日本	9,236 × 10 <sup>8 **2</sup>	4,902 × 10 <sup>9</sup>	0.19	2

※1 2010年 1USD=21,000VNDで換算、※2 2012年度

④ Issues in transportation

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



Figure 10 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.



Figure 11 Traffic situation around Hai Phong

#### (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.

<sup>&</sup>lt;sup>2</sup> 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.



Figure 12 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.

Table 4   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 $\cdot$ water supply and sewerage
September,2009	Hai Phong Municipal People's Committee Du Chun $\cdot$ 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 $\cdot$ 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)
	<i></i>

 Table 4
 Mutual visit contents of Kitakyushu city - Hai Phong city

#### (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 13 Cooperation history of Kitakyushu city water service

### **Chapter 2 - Purpose and Implementation Structure of Project Possibility Study**

#### 2.1 Purpose and outline of project

- (1) Purpose of project
- ① Japan's international position and expectation for Joint Crediting Mechanism (JCM)

Japan's draft of the commitment, which was submitted to secretariat of the United Nations Framework Convention on Climate Change in July 2015, says that achievable greenhouse gas reduction targets are about 1,042 million tons of CO2, which is a 26.0% reduction in FY 2030 as compared to FY 2013 (25.4% reduction compared to FY 2005). With the Joint Crediting Mechanism (JCM), it is possible to evaluate quantitatively Japan's contribution to reducing and absorbing greenhouse gas emissions, by how much greenhouse gas has been reduced through spreading greenhouse gas reduction technology, products, systems, services, infrastructure, etc., to developing countries. It is expected that apart from the contribution of private-sector projects, projects conducted within the budget of each fiscal year by the Japanese Government , can make it possible to reduce and absorb 50 to 100 million tons of CO2 in total by FY 2030, by constructing and implementing JCM to achieve Japan's reduction target.

Also, in the COP 21 held in Paris France, the "Paris Agreement" was adopted in December 2015, and the importance of stakeholders other than the countries such as cities and companies is increasing more and more. Based on the above, in this project, based on the results of our activities over the past two years we will conduct activities towards acquiring JCM credits in energy fields for reduction of CO2 emissions with the cooperation of Kitakyushu city which has the know-how of the formation of low-carbon society, and Hai Phong city.

#### 2 Promotion of low carbon with aiming for credit acquisition

This project is based on the collaboration between Kitakyushu city, which has the knowhow of forming a low-carbon society, and Haiphong City, try to realize a low-carbon society, and we conducted activities aimed at winning JCM credits mainly in fields with a large margin for CO2 emission reduction based on the results of activities until last fiscal year. In this project, Kitakyushu city, which has know-how to form a low-carbon society aiming to acquire JCM credits, and worked closely with Hai Phong city, and planed and implemented activities on energy conservation fields, which are considered to have a large potential for reducing CO2 emissions, and tried to make Japanese technology cover and advance in wider areas.

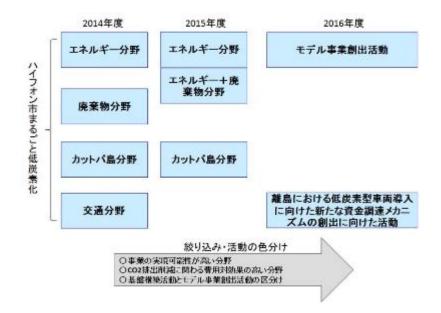


Figure 14 Past activities and activities of this fiscal year in Hai Phong City

# (2) Outline of the project

In this project, the following four themes were set as subjects of survey.

	Table 5 Overview of this m	• ,						
· · · · · · · · · · · · · · · · · · ·	Table 5   Overview of this project survey							
Activity	Technology to be installed	Challenging						
1.Excavation of	Taking advantage of	As a cultivation of a new theme, we						
projects that are highly	domestically proven CNG	took advantage of our past experiences						
unlikely to reduce	and using natural gas Energy	to find projects for JCM projects for						
energy-originated CO2	conservation assumes use of	industries with high energy						
emissions	cogeneration with high	consumption (industrial chemistry,						
	efficiency	food etc.) in the industrial park						
		centering on heavy industry.						
2.JCM of business	Consider possibility of	In Vietnam, although there is no						
with high energy-	introduction of waste heat	introduction record as a JCM project,						
saving CO2 emission	recovery power generation	since there is a track record of similar						
reduction effect	system at cement factory	business in Indonesia, we will try to						
		promote JCM quickly with reference to						
		precedent cases for methodology etc.						
3.Horizontal	In addition to being excellent	The preceding model has already been						
development of similar	in energy saving	adopted as a facility supplementary						
projects (relatively	performance, we also	project, and we will promote further						
high, CO 2 emission	consider introducing high-	dissemination by introducing facilities						
reduction effect	efficiency electric furnace in	early and demonstrating its energy						
"lateral development	Japan that is highly safe for	saving effect, safety, etc.						
of" electric furnace	operation and can be utilized							
introduction business	for a long time if proper							
to foundry factories ")	maintenance is carried out							
4.Construction of a	Empirically introduce the EV	Currently, in Hai Phong City,						
mechanism combined	bus, which is a battery	considering the regulation prohibiting						
with tourist fee for	replacement type, using solar	ferries to catch the island and cars by						
introduction of EV bus	power generation method,	the 2017 when the cut high island and						
at remote island	and measure the effect. In	the mainland of Hai Phong are located						
	parallel, proceed with	near Katba Island by a bridge There.						
	consultation with the	This regulation introduces the EV bus						
	administration concerning	at the demonstration level as the public						

Table 5 Ov	verview of	of this	project surve	y
------------	------------	---------	---------------	---

related f	fund	procurement	transportation means inside Katba
schemes.			Island becomes limited and the
			greenhouse effect reduction effect and
			the EV bus which has the effect of
enviro			environmental conservation are more
			likely to be disseminated, · Aim for
			expansion.

# 2.2 Implementation Structure

The implementation system of this project is shown below.

Regarding the sister city collaboration between Kitakyushu city and Hai Phong city.

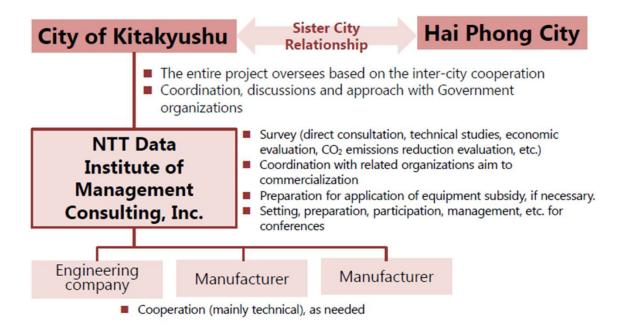


Figure 15 Implementation structure of this survey

(1) Significance of implementing investigation by using city-to-city collaboration

① Easier access to survey target site

Utilizing inter-city collaboration makes it possible to introduce individual companies that are likely to be interested in JCM from neutral institutions such as local governments and universities, and facilitate access to companies. In addition, in the discussion with individual companies, the involvement of local governments improves the transparency and reliability of the activities.

2 Smoothing of administrative procedures and secondary effects

In addition to the above, in the cooperation between cities, when local governments as public institutions that are close to private enterprises involve, smoother promotion of CO2 emission project is expected because local governments can help to facilitate various permission and approval procedures and do institutional backup such as regularization. In addition, as public institutions such as municipalities is expected to guide on safety and hygiene too, not only CO2 emission reduction but also safety and improvement of production at factory operations can be improved as supplemental effects at the local SMEs' factories, etc.

# 2.3 Investigation method and schedule

# (1) Survey method

How to proceed this survey project is shown in the table below.

Expected businesses	1. Finding potential businesses that have been unprecedented in high energy- saving CO2 emission reduction effect from energy origin	2. JCM application of Highly effective business of CO2 GHGs reduced from energy sources	3. Expanding "Electric furnace introduction business in casting factory in Vietnam" sideways	4. Construction of a mechanism combined with tourist fee for introduction of EV bus at remote island
Content	Finding potential cogeneration and fuel conversion projects that utilize CNG for the industrial park in northern Vietnam, centering on the city of Haiphong.	preparation for application to Financing Programme for JCM on waste heat recovery power generation project of cement factory. Also, consider apply this to similar projects.	Implement activities targeting the creation of Financing Programme for JCM Projects that will introduce Japan's highly efficient electric furnace for the whole of Vietnames, mainly in the Midon district.	Continue to discuss the feasibility of introducing tourist fees over the past two years, aim to build a model of low carbonization of remote islands using the mechanism of tourism fee.
Introductory Technology	cogeneration	waste heat recovery power generation system	high-efficiency electric furnace	EV bus
Scheme		B2B		G2G
Image				

# (2) Schedule

The research schedule of this project is shown below.

Table 6Survey schedule

Activity		2016							2017			
Αςτινιτγ	4	5	6	7	8	9	10	11	12	1	2	3
1. Excavation of projects that are highly unlikely to reduce energy- originated CO2 emissions	Discu	ssion		Techno	logy e	conomi		CO2 reductio		pport fo M apply		
2. JCM of business with high energy-saving CO2 emission reduction effect	Арр	ly for JC		arketing t mpany	o other f	actories a	and othe	r compan	ies of the	e same		
3. Expanding "Electric furnace introduction business in casting factory in Vietnam" sideways			Follov	v up			of	ification oduction ct	Briefin sessio Tours	n,		
4. Construction of a mechanism combined with tourist fee for introduction of EV bus at remote island	disc ussi on					disc ussi on				disc ussi on		
○ site survey	•			•				•		•		
<ul> <li>domestic meeting</li> </ul>		•				•			•			
⊖ workshop	•									•		
○ reporting							•				•	

# Chapter 3 Excavation of Businesses that are Highly Effective in Reducing Energy-Originated CO2 Emissions

# **3.1** Outline of investigated project

With the goal of utilizing natural gas in infrastructure development in Vietnam, we proposed projects to large industrial parks and factories, which were the introduction of cogeneration and realization of low carbonization by fuel conversion from fuel with a large CO2 emission factor such as coal. The three projects excavated are as follows.

### (1) Cogeneration installation and fuel conversion

We selected a factory (hereinafter referred to as Company A), located in the northern part of Vietnam, with thermoelectric demand as the main subject of investigation. Since Company A was thinking about introducing an efficient thermoelectric power supply system for heat and since electric demand accompanying the factory expansion increased, Company A conducted a study considering the utilization of the JCM equipment subsidies system.

### (2) Introduction of compressed natural gas (CNG) taxi

We can improve fuel economy and low carbon through fuel conversion by exposing taxi vehicles fueled with gasoline to CNG-compatible vehicles. In the past, consideration was also being carried out in another research project in Vietnam, so we examined things for our own reference.

### (3) Waste electric power generation project at waste disposal sites in Hai Phong city

There is a municipal garbage disposal site called Dinh Vu disposal site near Dinh Vu industrial park located in Hai Phong city. At the site, the loaded waste is piled up and just only covered when it is picked up to a certain height, and there is no appropriate processing carried out. For this reason, there are problems such as bad odors, which decrease the value of the land around the Dinh Vu industrial park, so we started working on realizing the waste disposal business on a business basis, especially by dealing with industrial park operators.

In order to realize the waste power generation project utilizing the waste in Haiphong city, FS was implemented in FY 2005 for the Chang Cat disposal site in Hai Phong city. At this time, it was a survey result that if the chipping fee collected from Hai Phong city could be raised to 35 dollars per ton, the project could be realized. However, we received comments from Hai Phong city that it is difficult to raise the tipping fee. In this investigation, it turned out that the

local industrial estate management companies have a problem consciousness concerning waste disposal, making it possible to realize the waste electric power generation project on a business basis. We are continuously investigating measures to realize the project without increasing the burden on Haiphong city, by not limiting the income source to only electricity sale, but also steam supply etc.

## 3.2 Applied Technology and Related Legal System

Technologies and related legal systems that were investigated for introduction in this project are described below.

### (1) Applied technology

### ① Cogeneration system

Cogeneration system is a generic term for systems that produce and supply electricity and heat from a heat source, which is called "cogene" in Japan, "Combined Heat & Power" or "Cogeneration" overseas.

Cogeneration has two methods. One is to utilize heat generated while producing electricity from internal combustion engines (engines, turbines) and fuel cells, and the other one is to utilize some part of steam as heat, which is made while generating electricity with the steam boiler and the steam turbine. In Japan, internal combustion engines are mainly used, and boiler and turbine systems can be seen in large scale power plants with heat supply and woody biomass cogeneration. In Europe and the United States, the latter way is mainstream, but it is gradually being replaced with natural gas combined cycle.

Generated electric power is supplied in connection with a commercial use, and steam and hot water generated from waste heat are used as a heat source for refrigerating machines, for air conditioning or for hot water supply.

In recent years, the efficiency of the prime mover has advanced, such as a power generation efficiency of 40% (LHV) or more, and a waste heat recovery efficiency of 35% (LHV) or more which can be obtained by cascade utilization of heat, achieving high overall efficiency.

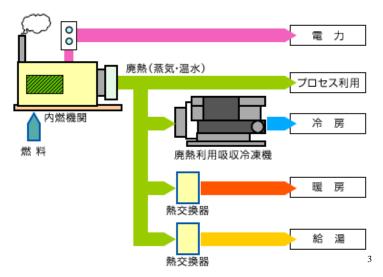


Figure 16 Image of cogeneration system

### ② High efficiency boiler

In order to realize steam supply with high energy efficiency, it is desirable to select the type of boiler to be installed depending on if steam demand fluctuation is in the factory or not. In general, it is efficient to introduce a furnace tube smoke type boiler to middle to large factories where the steam demand does not fluctuate. Meanwhile, in a factory where steam demand fluctuates, by installing a plurality of once-through boilers, it is possible to efficiently operate the boilers because it is possible to change the number of boilers operated depending on demand.

In this project we examined the possibility of improving the efficiency of fuel utilization by introducing a through-flow boiler that uses LPG fuel as fuel because we investigated the introduction of technology to a factory that is subject to fluctuations in steam demand. Normally, natural gas is used as fuel from the viewpoint of combustion efficiency and CO2 emission reduction, but the reason for choosing LPG as the fuel to be used in this project is that the supply infrastructure of natural gas is not well developed in the northern part of Vietnam.

By installing many one-through boilers, it is possible to increase the efficiency of the entire system because it is possible to stop the operation of some boilers when the steam load is low.

<sup>&</sup>lt;sup>3</sup> https://www.ace.or.jp/web/chp/chp\_0010.html

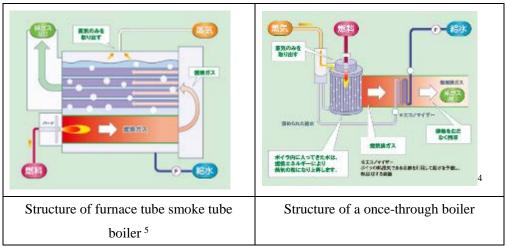


Table 7 Comparison of boiler structure

 <sup>&</sup>lt;sup>4</sup> https://www.khi.co.jp/corp/kte/product/genri\_boi\_ks.html
 <sup>5</sup> https://www.khi.co.jp/corp/kte/product/genri\_boi\_if\_kf.html

### ③ Compressed Natural Gas (CNG) taxi

It is possible to improve fuel economy and eventually low carbonization by releasing vehicles fueled with gasoline to vehicles compatible with CNG. Natural gas vehicles are classified into Compressed Natural Gas (CNG) vehicles and Liquefied Natural Gas (LNG) vehicles depending on the fuel loading form. There are two engine combustion methods. One is the spark ignition engine method using a spark plug and the other is the compression ignition engine method which ignites a natural gas mixture which is a main fuel by spontaneous fire of this diesel by injecting a small amount of light oil as the ignition method and ignition source into the cylinder in the compression stroke. The spark ignition engine method is classified as natural gas only vehicles that uses only natural gas as fuel and a biofuel car that can use gasoline (or LPG) and natural gas to switch between them. The compression ignition engine method is called a dual fuel car because it carries natural gas and light oil.

The number of vehicles currently widely spread worldwide is a vehicle that was converted to a CNG car by a user in a remodeling factory from a gasoline-powered vehicle that the automobile manufacturer manufactured and sold, and most of the cases are bi-fuel cars.

In recent years, there are an increasing number of cases where automobile manufacturers manufacture and sell CNG vehicles, and with a view of the circumstances of the CNG supply infrastructure in the area both natural gas-only vehicle and bi-fuel vehicles are manufactured and sold.

Also, recently large-sized cars are being converted to natural gas vehicles. For large-sized car fuel loading systems, CNG or LNG is selected according to regional fuel supply infrastructure and required cruising distance. Many of the engines are natural gas dedicated spark ignition type engines which is an ignition system attached to the base diesel engine, but dual fuel vehicles are also spreading. Since the thermal efficiency of the engine is higher in the compression ignition method (that is, the amount of carbon dioxide emissions is small), but purification of the exhaust gas is more difficult than in the natural gas-only vehicle, so further technical development of the compression ignition method is desired.

### ④ Waste electric power generation plant

In this project, we are investigating the installation of incineration power generation which uses a stalker furnace. The number of waste power generation facilities for general waste in Japan is the highest in the world, and in all processes such as the collecting of general waste, the generation of power from waste, and the processing of incineration ash which is born from generating power. Japanese technology for this process is the most advanced in the world. The following points are technical features of the waste power generation facility investigated for introduction.

- 1) Responding to various kinds of waste
- It is possible to do a stable combustion of up to 1,200 to 5,000 kcal/kg of lower calorific value.
- 2) Scaling up
- Up to 1,200 t/d can be processed per series.
- 3) High efficiency power generation
- Up to 30% of Power generation efficiency can be achieved.
- 4) Advanced exhaust gas treatment
- Various technologies can be provided according to needs (dry, semi-dry, wet process).
- 5) Stable operation
- More than 8,000 hours of annual operation time was achieved.

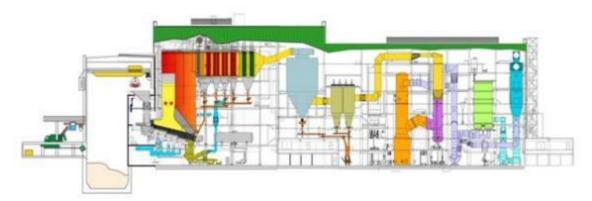


Figure 17 Structure of waste power generation facility as a whole (reference)

### (2) Related legal system

### ① Overview

The laws related to energy saving/renewable energy in Vietnam include the energy efficiency plan, the national energy development strategy, the electric power law, the energy conservation law, and the environmental protection law. Vietnam's laws and strategies are systematically established in the order of national strategy, law, decisions/negotiations and directives. Since the strategy is decided by the Cabinet, it will be higher priority than the decision by each ministry. Legislation is often established based on strategy.

As a basic plan, in 2007 the Cabinet adopted the National Energy Development Strategy up to 2020, with 2050 Vision: 1855/2007 / QD - TTg. The basic plan also includes ensuring energy security, introducing energy saving technology, and protecting the environment. A target ratio for the total primary energy amount of the sum of new energy and renewable energy is set in multiple target annuals.

### 2 Electricity Law (Luật Điện Lực, Electricity Law 28/2004 / QH 11)

With regard to renewable energy, Electricity Law shows that we should provide incentives related to investment, taxes, and electricity charges to the new energy and renewable energy source development project plan in accordance with the Ministry of Finance (MOF) policy, and the necessity of promoting the use of renewable energy for individuals and organizations that electrify especially in remote areas.

In 2005, the Ministry of Industry (MOI, now merged and became the Ministry of Commerce and Industry) and Electricity of Vietnam (EVN) received financial assistance from the World Bank and various international organizations and established a 10 Year action plan (in which strategy and research plans are separated into 5 stages every two years) and a Renewable Energy Action Plan. We established renewable energy potential in remote areas and rural areas (which is difficult to connect to the electricity network) and made renewable energy use plan of off grid to electrify residences without being incorporated in the electricity distribution network. In 2006, The Vietnam Energy Efficiency Plan (VEEEP) came into effect through the Ministry of Commerce and Industry (announced in 2005). Based on this, The Law on Energy Efficiency and Conservation was enacted in 2011, which labeling for home appliances is based on. The Energy Conservation Law obligate promotion of energy saving investment in public transportation in "Article 19, Measures Concerning Energy Conservation Related to Transportation Business, in Chapter IV, Energy Conservation on Transportation Project", such as "1. We recommend activities by Organizations and individuals that are engaged in consulting, design and investment activities related to the development of public transportation systems, activities to produce and use energy-saving transport vehicles, and activities to collect and use biomass fuels which is substituted for liquefied petroleum gas, natural gas, electricity, mixed fuels, gasoline, or oil. 2. Organizations and individuals who operate transportation services should select and implement the following measures. A) To rationalize transportation routes and transportation vehicles for energy saving B) To reduce energy consumption, the provisions concerning maintenance and repair of transport vehicles shall be applied. C) To apply technical measures, management and transportation management measures in order to ensure energy conservation 3. Investors or subcontractors at the time of establishing or modifying transport facilities have the following responsibilities. A) To implement measures on energy conservation to be used for approved projects B) To Introduce measures on energy conservation in construction work."

#### ③ Environment protection law

The Environmental Protection Law which was revised in 2014 declares the promotion of energy conservation and reinforcement as the national responsibility, such as in Article 5: about the national policy on environmental protection, "3. We promote conservation of diverse living things, rational use and control of natural resources, development and recycling and reuse of clean energy and renewable energy, waste reduction etc. " Article 43 states, " 'regarding renewable energy development,' 1. Renewable energy is energy that is developed from wind power, sunlight, geothermal power, wave power, biofuel and renewable energy resources. 2. We encourage the production, import and use of renewable energy-using machinery, equipment and transportation." The Strategy for Sustainable Exploitation and Utilization of Marine Natural Resources and Environment Protection until 2020, vision towards 2030, which was established by Ministry of Natural Resources and Environment in 2014, includes predictions on natural disasters and climate change in the ocean, prevention of degradation of natural resources, suppression of environmental pollution (coastal area) and enhancement of response capabilities in marine ecosystems to climate change.

### ④ FIT system

As decisions related to FIT, there are "Decision on support mechanisms for the development of biomass power projects in Vietnam" and "Decision on support mechanisms for the development of power generation projects using solid waste(s) in Vietnam" and "Decision on support mechanism for the development of wind power project."

As a regional renewable energy plan, in 2014 IE announced 8217/QD-TT g a renewable energy development plan at Tonkin midland and delta up to 2020, with a vision towards 2030. In the northern regional plan, priority items are development and utilization of renewable energy centered on energy from biomass, solar light, and waste, as well as waste power generation including independent systems connected to the electricity transmission network, heat utilization, electricity supply in remote areas such as rural areas that does not connect to the grid at, and technical development support etc.

# **3.3** Implementation of technique investigation based on required specifications

(1) Investigating introduction of cogeneration system

In investigating the introduction of the cogeneration system, we checked the electricity usage amount and the steam usage amount of Company A. This turned out that the base electricity consumption amount was 1,800 kW and the steam use amount was about 10 t/h.

In order to maximize the efficiency of cogeneration, we selected machine with the supply power amount of less than 1,800 kW. Also, we selected a gas turbine with a large amount of steam generated as the prime mover since the steam usage is usually stable. In addition, because a lot of steam is used, we selected an exhaust heat recovery boiler equipped with an additional firing burner.

Specifications of the gas turbine, such as power generation amount, change depending on the temperature. We set the power generation capacity on the premise of Hanoi's annual average temperature of 24°C.

Since operation cannot be stopped at the time of periodic inspection of the gas turbine or stoppage of failure, we decided to install a once-through boiler as a steam supply backup application.

The configuration of the examined system is shown in Table 11.

System	Note	
Gas turbine	Amount of the system	1
	Power generation capacity	1,340 kW
	Cogeneration power consumption	60 kW
	Cogeneration supply power	1,280 kW
	Gas turbine fuel consumption	5,937 kW
	Gas turbine power generation efficiency	22.6 %
	Gas turbine exhaust heat recovery steam amount	4.9 t/h
	Cogeneration overall efficiency	84.6 %
Additional firing	Additional fuel consumption for firing	2,108 kW
system	Amount of steam generated during additional firing	7.9 t/h

 Table 8
 Outline of cogeneration system which considered introduction

	Additional firing CGS overall efficiency	90.8 %
Backup boiler	Type of boiler	AI-4000
	Amount of boiler	5
	Steam supply capacity	16.5 t/h
	Boiler efficiency	86 %

### (2) Investigating introduction of once-through boiler

Installing many once-through boilers can make operation system more efficient because when the steam load is low, it is possible to stop the operation of some boilers, etc. Company A feeding high-temperature water boiler (at 90  $^{\circ}$  C) by drain recovery for energy saving, so we cannot use economizer. Therefore, boiler efficiency is lower than with economizer. In this project, we investigated installing 5 cans of once-through boiler. The specification of the boiler is shown in Table 12.

Maximum	Steam working	Equivalent	Actual	Boiler					
steam pressure	pressure	evaporation	evaporation	efficiency					
		amount	amount						
1.57MPa	1.08~1.41MPa	4,000kg/h	3,300kg/h	86%					

Table 9 Through-flow boiler specification

Actual steam supply amount is 16.5 t/h, but even at present, the maximum steam amount (18 t/h) is used only for 15 minutes at the time of start, so there is no problem in practical use. Normally, about 10 t/h of steam is used with little load fluctuation. Therefore, we decided to stop one can and make 4 cans on operation. In that case, each boiler is operated equally at approximately 75% load. In the manufacturer specs, the thermal efficiency of a once-through boiler at 50 to 100% load is almost the same by combustion control etc.

## **3.4** Investigation for cost for equipment introduction

(1) Investigating introduction of cogeneration system

We estimate the investment cost for installing facilities is about 500,000,000 yen. The result of calculation of CO2 reduction cost versus effect, by setting the numbers of years of equipment use to 15 years, is shown below.

(Number of years of use) 15 years

(Greenhouse gas reduction amount) 5,183 t - CO2/year

(Reduction cost versus effectiveness) 6,431 yen/t-CO2

(2) Investigation for Introduction of once-through boiler

We estimate the investment cost for installing facilities is about 100,000,000 yen. The result of calculation of CO2 reduction cost versus effect by setting the number of years of equipment use to 10 years is shown below.

(Number of years of use) 10 years

(Greenhouse gas reduction amount) 2,852 t-CO2/year

(Reduction cost versus effectiveness) 3,506 yen/t-CO2

(3) Investigation for introduction of CNG car

According to an automaker which we conducted the hearing from this time, the goal of price difference with CNG car and gasoline car is set at 200,000 yen. Supposing that the subsidy amount when utilizing JCM equipment support is 4,000 yen per ton reduction of CO2, the subsidy amount to the CNG taxi will be 4,000 yen/t  $\times$  11.2 t = 44,800 yen, which is approximately 1/4 of the difference with gasoline vehicles.

# 3.5 Investigation of Method of Calculating CO2 Emission Reduction Effect and Monitoring Method

- (1) Investigation of introduction of cogeneration system
  - ① Uptime

We verified the CO2 emission reduction effect in the case that the operation time of the cogeneration system was 7,200 hours.

② Supply electricity amount and steam amount

In this project, the effect of suppressing energy consumption was verified by comparing the existing system and the new system in a simple manner.

	項目	既存システム	新規システム				
事業所	操業時間	7,200 h/y	7,200 h/y				
	電力使用量	18 GWh/y	18 GWh/y				
	蒸気使用量	71,500 t/y	71,500 t/y				
CGS	運転時間 —		7,200 h/y				
	供給電力量	—	9.2 GWh/y				
	供給蒸気量	—	56,880 t/y				
	燃料消費量	—	209 TJ/y				
ボイラ	供給蒸気量	71,500 t/y	14,620 t/y				
	燃料使用量	205 TJ/y	41 TJ/y				

 Table 10
 Comparison of energy consumption between existing system and CGS system

③ The scale of greenhouse gas emissions

In this project, the effect of CO2 reduction was verified by comparing the existing system and the new system in a simple manner.

	項目	1	既存システム	新規システム
	GHG 排出原単位		0.644 t-CO2/MWh	0.644 t-CO2/MWh
录户	年間電	訂力使用量	18 GWh	18 GWh
電気	年間購	春入電気量	18 GWh	8.8 GWh
	年間C	HG 排出量	11,592 t-CO2/y	5,667 t-CO2/y
	燃料種		FO	LPG
	GHG ‡	非出原単位	0.0715 t-CO2/GJ	0.0590 t-CO2/GJ
	年間蒸気使用量		71,500 t/y	71,500 t/y
		ボイラ	71,500 t/y	14,620 t/y
		CGS	—	56,880 t/y
燃料	年間燃料使用量		205 TJ/y	250 TJ/y
		ボイラ	205 TJ/y	41 TJ/y
		CGS	—	209 TJ/y
	年間C	HG 排出量	14,658 t-CO2/y	14,750 t-CO2/y
		ボイラ	14,658 t-CO2/y	2,419 t-CO2/y
		CGS	—	12,331 t-CO2/y
年間 GH	IG 排出:	量	26,250 t-CO2/y	20,417 t-CO2/y

 Table 11
 Comparison of GHG emissions of existing systems and CGS systems

(2) Introduction of one-through boiler

① Steam volume

The annual steam amount is 71,500t (=  $205 \times 1000 \times 0.84 \div (2.79 - 0.38)$ ) from the current condition shown below.

(Supply steam) 2.79 MJ/kg (14kg G/cm 2)

- (Water heat supply quantity) 0.38 MJ/kg (90  $^{\circ}$  C)
- (Annual fuel consumption) 4,942 kL (October 2015 September 2016 results)
- (Current boiler efficiency) 84%
- 2 LPG amount used

When introducing an LPG one-through boiler under the same conditions as below and under the same conditions of an annual steam amount, the annual LPG usage amount is 4,200 t (= 7 1500 × (2.79 - 0.38)  $\div$  47.7  $\div$  0.86).

(LPG calorific value) 47.7 MJ / kg

(One-through boiler efficiency) 86%

③ The scale of greenhouse gas emissions

We calculated the emission of greenhouse gases both in existing systems (FO burner tube smoke tube boiler) and new system (LPG fired boiler) using the FY 2016 Greenhouse Gas Emission Factor made by the Ministry of the Environment. The results are shown in Table 15.

As Company A already conducts drain recovery as energy saving measures, it can not utilize the high-performance economizer of a once-through boiler. Therefore, the efficiency of the once-through boiler is nearly the same as the efficiency of the boiler currently in use, so the difference in GHG emissions is only due to differences in fuel.

		e	e		
	燃料種	GHG 排出原単位	年間燃料使用量		GHG 排出量
既存シス	FO	0.0715t-CO2/GJ	4,942 kL/y	205 TJ/y	14,659 t-CO2/
テム					年
新規シス	LPG	0.0590t-CO2/GJ	4,200 t /y	200 TJ/y	11,807 t-CO2/
テム					年

Table 12Amount of greenhouse gas emissions

### (3) Investigation of CNG car introduction

We calculated the effect of reducing the greenhouse gas emissions of CNG vehicles using an example of travel data of CNG vehicles sold in Thailand and gas composition in Vietnam. We estimated that CNG cars can reduce carbon dioxide emissions by about 20% on tank to wheel in comparison with gasoline-powered vehicles.

Since the fuel consumption per day of the car A of a taxi company that we consulted with is 16 liters, if you operate the car 300 days a year, the annual gasoline consumption will be 4,800 liters. Gasoline's CO2 emission consumption rate is 2.332 kg-CO2/liter, so if you use a gasoline-powered car you will generate 11.2 tons of CO2 per year. Since 20% of CO2 emissions can be reduced by CNG conversion, the annual CO2 reduction amount is 2.24t, and if the use period of the vehicle is 5 years, 11.2 tons of CO2 can be reduced during this period.

# **3.6** Commercialization plan (implementation system, funding support scheme, commercialization schedule etc.)

- (1) Introduction of cogeneration system/one-through boiler to Company A
  - ① Implementation Structure

The implementation system of the cogeneration system/one-through boiler introduction project to Company A is shown below. As Company A is a Japanese company with headquarters in Japan, we are investigating the following schemes for international consortium composition.

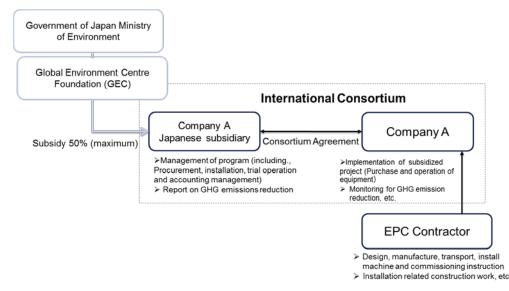


Figure 18 Cogeneration system / project implementation scheme related to introduction of oncethrough boiler

### ② Funding support scheme

Company A invests with its own funds, but depending on the investment scale, it is clarifying the intention to utilize the JCM equipment subsidy support. Currently, we are investigating two options, introduction of boiler and introduction of cogeneration, but we will utilize the JCM equipment subsidy support when introducing cogeneration.

### ③ Commercialization schedule

This study deals with the increase in energy demand accompanying the factory expansion, and the schedule for commercialization depends on the schedule of plant expansion.

At the time of the survey, we are reviewing the factory expansion schedule inside the company, and it is expected that if we aim at JCM commercialization, it will be applied at least

as early as FY 2018.

(2) CNG Taxi

① Implementation Structure

The implementation system of the CNG taxi introduction project is shown below. Regarding the international consortium composition, we are thinking about the following schemes.

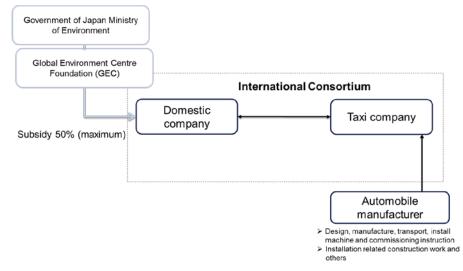


Figure 19 Project implementation scheme for introducing CNG taxi

② Funding support scheme

For the cost of introducing the CNG taxi, we will utilize the JCM equipment subsidy support.

### ③ Schedule of commercialization

There are three subjects, which are whether taxi operators take massive introduction of CNG taxis, whether stand operators proceed with construction of CNG filling stations according to the introduction of taxis and supply CNG at an appropriate price, and whether automobile manufacturers will bring CNG vehicles to market at an appropriate price.

These subjects are liable to fall into the relationship of so-called "chicken and egg" and "trilogy", and it is extremely important for taxi operators, stand companies, and automobile manufacturers to work together in cooperation. In addition, if economic efficiency is difficult to achieve, it is also an important issue if we can obtain support measures from the government and local governments.

First, we will introduce CNG vehicles on a trial basis at a taxi Company and measure the effect of that, and specifically, we aim to apply for JCM equipment subsidy support after FY 2019.

# 3.7 Issues in commercialization

### (1) Introduction of cogeneration system/one-through boiler to Company A

Since the availability of the project depends on the contents of the investment plan of Company A, the future direction of the plan will be the key to implementing the project. When aiming at JCM commercialization, since the CO2 reduction effect on the investment amount exceeds the standard of 4000 yen per 1 tCO2, we need to investigate for improving economy such as review of the system composition to be introduced.

### (2) CNG Taxi

Currently, natural gas supply in Vietnam is done mainly in the south (near Ho Chi Minh) using domestic gas. Natural gas supply is also done in the northern part, but there is not enough supply capacity, and it is difficult to supply gas for CNG vehicles.

The output of domestic natural gas is expected to decline in the future, and the introduction of LNG is planned. In Vietnam's LNG Master Plan (March 2015), it is planned to build two LNG accepting bases in the south by 2020 and to increase to five places of LNG accepting bases including the northern by 2030. Therefore, even if LNG is introduced, it is possible to promote CNG vehicles only near Ho Chi Minh for the time being. For this reason, we are currently planning to introduce CNG vehicles to taxi companies that are interested in introducing CNG taxis around Ho Chi Minh.

# **3.8** Future schedule

### (1) Introduction of cogeneration system/one-through boiler to Company A

This study deals with the increase in energy demand accompanying the factory expansion, and the schedule for commercialization depends on the schedule of plant expansion. At the time of the survey, we are reviewing the factory expansion schedule inside the company, and it is expected that if we aim for a JCM entrepreneur, it will be applied at least as early as FY 2018.

### (2) CNG Taxi

The future schedule is being investigated as follows.

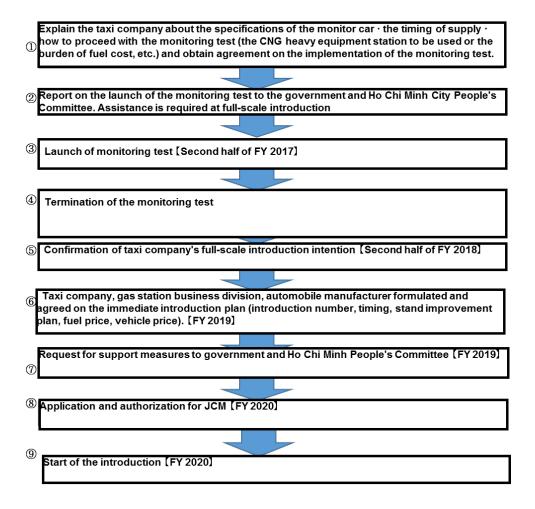


Figure 20 Schedule for consideration of CNG taxi introduction project

# Chapter 4 Joint Crediting Mechanism of Businesses Highly Effective in Reducing Energy-derived CO2 Emissions (CO2 from energy use)

# 4.1 Background and situation of activities

We assume a project introducing waste heat recovery power generation equipment to cement factories in Vietnam would be a highly effective project for reducing energy-originated CO2 emissions.

We specifically collaborate with VIETNAM CEMENT INDUSTRIES (VICEM), one of the largest cement companies in Vietnam, and have continued research regarding the project to introduce waste heat recovery power generation equipment to the Hai Phong Plant, owned by the company since last fiscal year.

In this survey, we mainly conducted the following investigation.

- · Investigation of technologies to be adopted
- · Investigation of business model
- · Evaluation of business performance (economic efficiency)

Based on the results of the above investigations of a technology to be introduced, we will adopt "a system that performs power generation by a steam turbine after performing waste heat recovery" and the VICEM Hai Phong Factory equipped a heat recovery power generation facility that consumes electric power obtained by itself. In addition, we conducted a comparative study based on results, if we should have utilized equipment subsidized projects with the JCM system or not.

Based on the results of this series of investigations, we prepared to apply for equipment subsidized projects using the JCM system in FY 2008, and submitted a public subscription proposal in May 2016.

The outline of the proposed project is as follows. [International Consortium Representative] NTT Data Institute of Management Consulting, Inc.

【International Consortium Joint Operator】 VICEM Hai Phong Cement Limited Company

[Outline of Project]

We introduced waste heat recovery power generation equipment to an already existing cement production plant in Hai Phong city, Vietnam, and the generated electric power is used in the factory. This will replace the power from one made in a conventional way and contribute to the reduction of GHG emissions.

[Outline of technology and system to be introduced] Technologies and system to be introduced is outlined below.

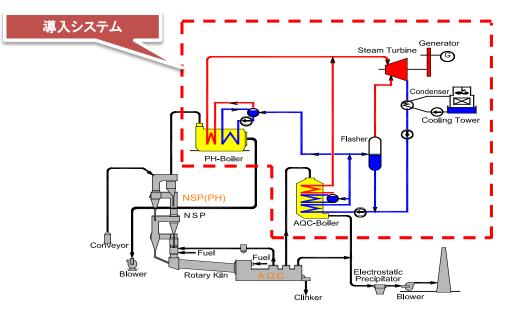


Figure 21 System implementation

[Estimated GHG emission reduction amount]

It is estimated that the GHG emission reduction amount will be 17,592 t-CO2 /year at the time of applying for equipment subsidized projects using the JCM system.

When investing the CO2 emission reduction amount, the target and the investment amount for achieving the target, this project was also excellent in cost-effectiveness and obtained unofficial announcement of the equipment subsidized projects.

However, despite thorough consideration beforehand, it turned out that there was a problem in the handling of subsidies, etc. in the state-owned enterprise VICEM, and although we received a notification, the activity of equipment subsidized projects had to be stopped.

Based on the above circumstances, we reconsidered the business model, not subject to restrictions as a state-owned enterprise, and continued to consider the feasibility of business.

## 4.2 Replanning of business model

As shown in 4.1, what was supposed to be as a business model in the past was a business model where the state-owned company VICEM Hai Phong Cement Limited Company owned the waste heat recovery power generation facility and operated and maintained the facility itself. It is a model to consume electric power generated by the equipment owned itself.

As shown below, as a project company, we proposed to VICEM Hai Phong Cement Limited Company that we establish a company (special purpose company: SPC) that develops, operates and maintains the waste heat recovery power generation facilities as a project company, which buys waste heat from the cement plant and generates electricity and sells the electric power to the cement plant.

In the case of taking this new business model, the role of the state-owned company VICEM Hai Phong Cement Limited Company can be switched to purvey services by purchasing electricity made by waste heat recovery instead of previous roles such as ownership of facilities, operations, maintenance, and self-use.

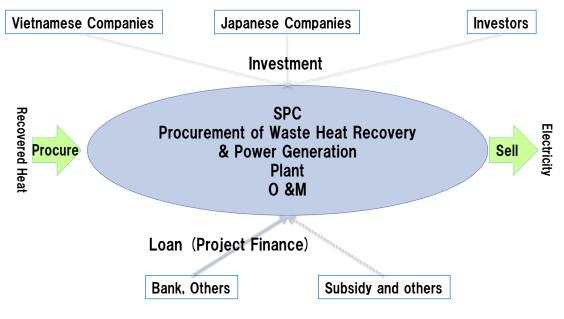


Figure 22 Business model plan

VICEM Hai Phong Cement Limited Company showed interest in the conversion of the above business model and consulted with the parent company VICEM, and as a result, seven cement plants owned by VICEM were sequentially planned to be introduced waste heat recovery power generation facilities.

Currently, the parent company VICEM is mainly taking the situation of participating factories into consideration and making an introduction schedule in sequential order, and now preparations are underway to introduce waste heat recovery power generation facilities to the plants based on the above business model.

As a result of the shift of the business model, applicants to the facility's supplementary business using the JCM system will be a private company which is entrusted with a contract to sell electricity to VICEM. Since it is unknown at the moment which company will become a trustee of electricity sales, we will continue to explore the applicability of the JCM system while waiting for selecting the electric power seller.

## 4.3 Excavation of new cement factory for lateral expansion

With intercity collaboration between Kitakyushu city and Hai Phong city, we received information from Hai Phong city that there is a plan to construct a new cement plant near Hai Phong city.

Currently, it is said that cement manufacturing capacity across Vietnam exceeds domestic demand and surplus cement is exported to neighboring countries. Meanwhile, in major cities such as Ho Chi Minh, Hanoi, Hai Phong, Da Nang, the rush of putting up buildings, hotels, apartments, industrial parks and other factories etc., which reflect a strong economic situation creates a demand for cement large. For this reason, new facilities for cement plants and the extension of existing cement factories are becoming active at suitable sites in areas surrounding large cities.

Company B, which is headquartered in Hanoi and built a cement plant in the outskirts of Hai Phong city, has decided to invest in the cement plant in anticipation of active construction demand in the area around Hai Phong.

The assumed scale of the cement plant is that it is capable of producing 3,000t/day of clinker, and waste heat recovery power generation equipment is planned to be built at the same time as the factory development. At the present plan, we are aiming to commence operations during FY 2019.

In response to the introduction from Haiphong city, we have already introduced the JCM system to VICEM which is also very interested in applying the JCM system. We plan to continue activities to apply the JCM system for the introduction of waste heat recovery power generation equipment in the future before the start of operations in FY 2019, while keeping consistency with the facility's development plan. We believe that it is necessary to apply for equipment subsidized projects using the JCM system in FY 2018 in order to start operations of cement plants during FY 2019.

# Chapter 5 - Lateral Development of "Electric Furnace Introduction Business in Foundry in Vietnam"

## 5.1 Background and situation of activities

This project is a project that was born as an early achievement of the Kitakyushu - Haiphong city intercity collaboration project. There are many foundries in the My Dong district that exists in the northern part of Hai Phong City, and it is said that in the estimate as many as 140 companies are operating there. About 120 of these companies still utilize coal furnaces which is a low fuel cost.

On the other hand, sophistication of foundries is also required in Vietnam where the manufacturing industry is advancing as China plus one, and electric furnaces are starting to be introduced as more efficient options when compared to coal furnaces. Currently, it is said that about 20 companies are beginning to introduce the electric furnace over the coal furnace. Most of the electric furnaces that will introduced are made in China, where energy saving performance is not so high, and there was a problem that it was not safe enough to use.

Therefore, we have been working on introducing Japanese electric furnaces, excellent in safety performance with high efficiency, to 2 leading foundry companies from the My Dong area. Generally, it is said that Japanese products are high performance, but the price is high, which is also true for the electric furnace. Therefore, we attempted to reduce the burden of the initial cost to adopt Japanese products by utilizing project facility assistance using the JCM system. We assumed that Japanese products with excellent energy saving performance can demonstrate superiority over the electric furnaces made in China through the reduction of the electric power cost in long term.

The local companies were small and medium-sized enterprises with local capital. There was a credit problem, and only one Japanese company could agree to sell electric furnaces.

In cooperation with the electric furnace maker, we reached a basic agreement after a price negotiation, and applied for project equipment support project using the JCM system. The outline of the adopted project is as follows.

[International Consortium Representative] NTT Data Institute of Management Consulting, Inc.

[International Consortium Joint Operator]

Thanh Phuong Iron Casting Machinery Private Enterprise Ha Lan Co., Ltd.

### [Project Outline]

The foundries in Hai Phong City/My Dong District usually uses a coal furnace, but the number of enterprises trying to switch to an electric furnace, which is highly convenient, is beginning to increase. Though the shift to electric furnaces with poor energy efficiency is progressing, we introduced a highly efficient electric furnace which was devised from copper tubes forming coils to improve energy efficiency and reduce CO2 emissions.

[Outline of technology and system to be introduced]

The introduction system is outlined below.

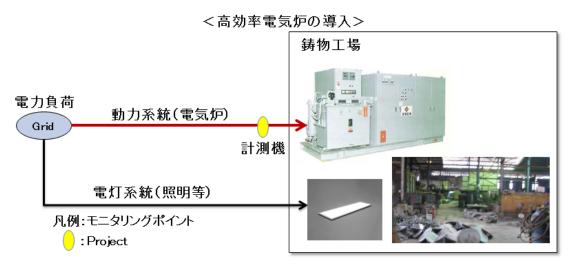


Figure 23 System to be installed

### [Estimated GHG emission reduction amount]

We calculated the electricity consumption in the case of introducing the electric furnace which is currently in widespread use, and the electricity consumption of the high efficiency electric furnace is based on the electricity emissions factor of Vietnam. It was 968t-CO2/year.

As mentioned above, the furnace which is currently prevailing in the market is a coal furnace but as the electric furnace is gradually spreading, the reference was set with an electric furnace instead of a coal furnace, so the amount of CO2 emission reduction is a relatively a small number.

Regarding this project, we have been negotiating contracts based on yen. However, the exchange rate of yen and Vietnamese dong has fluctuated greatly from the time of applying for project facility assistance project using the JCM system, and at the time of the conclusion of the EPC contract, after the equipment subsidy was confirmed, due to the influence of exchange rate fluctuation, the price of the local currency had risen considerably from the point of the prior agreement. As a result of this issue, we decided to pass on the implementation of the equipment subsidiary project that time.

We initially planned that by introducing a Japanese-made electric furnace to two leading companies in the My Dong area we would demonstrate its energy saving effect, safety, and its ability to stably produce high quality products and promote dissemination of electric furnaces to other companies. However this strategy was forced to be reviewed.

## 5.2 Appeal to the industrial park

In response to the changes in the situation described in the preceding paragraph, we selected factories that use electric furnaces in the industrial parks located in and around Hai Phong city, and investigated the need for highly efficient electric furnace introduction.

As a result, it turned out that there are needs for electric furnace introduction in three companies in total, two companies operating in industrial parks in Hai Phong city, and one company operating in industrial parks around Haiphong city.

We visited the three companies individually, and examined the possibility of CO2 emission reduction and economic efficiency, etc.

Since it turned out that two companies out of the three companies had a possibility of reducing CO2 emissions and that it was possible to apply project facility assistance using the JCM system, we conducted a detailed study with the two companies.

As a result of the detailed study, it turned out that one company has a problem with a factory renewal plan and that introduction of a high efficiency electric furnace is difficult for the time being. In addition, the other company has already procured some equipment from an electric furnace for backup and it is highly likely that the company will procure only some part from an electric furnace, so it was judged that introduction of the electric furnace to this company was hard to become an object of the equipment subsidiary project using the JCM system.

Through hearings, investigation, of these companies, it turned out that furnaces made in China, which is spreading in the market, can adversely affect other electric products in foundries because the quality of furnace made in China is not necessarily stable, and harmonic wave countermeasures are not applied to it.

Despite the high cost of initial investment for equipment from Japan's electric furnace, it is considered to have a possibility of spreading use in the Vietnamese market because it is superior in energy saving performance and stable operation with consistent quality, so we continue to try to find companies which has a suitable situation to take this project in.

# Chapter 6 Building a mechanism combined with tourism commission towards introduction of EV bus in the remote island

# 6.1 Background of considering the system

(1) Business environment in Cat Ba Island

① Main industry of Cat Ba Island

Since a main industry of Cat Ba Island is tourism, a lot of tourists are expected to visit the island. On the other hand, a number of rare ecosystems remain in the island, and therefore, the tourism industry should be revitalized while conserving the ecosystems. As it is now, the tourists are concentrated in the summer period. Past researches show that it could be difficult to recoup investment costs for energy conservation measures in various tourist facilities, because occupancy rate of tourist facilities in the island, such as hotels and restaurants, largely fluctuates by season.

### ② Natural environment in Cat Ba Island

Cat Ba Island is a tourism island, which has rich natures and ecosystems and is designated as one of UNESCO Biosphere Reserves. Currently, however, development progress and insufficient environmental conservation have caused environmental problems including garbage problem and marine pollution. Therefore, for sustainable development in the future, it is urgent to implement an effective project for environmental conservation measures by using large-scale and advanced environmental technology.

### ③ Policy trend relating to Cat Ba Island

In 2014, Hai Phong City formulated "Cat Ba Island Sustainable Tourism Development Master Plan: until 2025 and toward 2050" and "Hai Phong Green Growth Promotion Plan" in association with Kitakyushu City. The city also plans to promote environmentally conscious development and projects in the future. Especially, a project for recycling of waste and introduction of environment-friendly transportation, which are included in "Hai Phong Green Growth Promotion Plan," are also planned as comparatively large-scale projects for facility introduction, early realization of the projects are expected.

The construction of Tan Vu Bridge connecting Hai Phong City and Cat Hai Island will complete in 2017. The number of tourists who visit Cat Ba Island after Cat Hai Island is expected to increase. Furthermore, there is some restriction plan for car traffic into Cat Ba Island by ferry.

#### ④ Past activities

Based on the above situation, while realizing new financial mechanisms (new financial resources of Hai Phong City) called remote island model since 2014, research institutes have carried out surveys and consultation in an effort to create JCM project along with the financial mechanisms.

In addition, zero-emission EV bus introduction project has been promoted in conjunction with solar panels since FY2015.

#### (2) Current condition of Cat Ba Biosphere Reserve Sustainable Development Fund

Cat Ba Biosphere Reserve Sustainable Development Fund was established in 2009 with financial support from Vietnam National Committee for Man and Biosphere Program (MAB), Hai Phong City, Cat Ba Biosphere Reserve Management Board, and Vietnam-Japan Steel. The fund has been used for environmental education activities, researches for a sustainable development system, etc. However, since the fund relies on charitable contributions from companies and other organizations, the fund does not function effectively due to poor finances under economic depression over the past few years. It is unclear whether there is a chance to actively utilize the fund in the future. As for an environmental education project, educational activities are carried out every year for primary school students, senior high school students, and fishing people in the island, and these activities are financially supported by international organizations including World Wide Fund for Nature (WWF).

#### (3) Improvement in tourism commission collection system

#### Now, tourists to Cat Ba Island pay

Currently, tourists visiting Cat Ba Island pay Cat Ba National Park tourist fee and Cat Ba Bay tourism commission at the entrance. Annual revenue from the commission based on 2013 result is that the former is 1.5 billion VND and the latter is 3.8 billion VND. It has been used as a fund for environmental conservation activities, such as salaries for cleaning staff and educational activities in Cat Ba Island.

However, the current collected amount is not enough to provide sufficient environmental conservation measures and new environmental conservation projects. We also found that only one person is allocated at the ticket booth to collect Cat Ba Bay tourism commission. It is not able to collect all commission. Therefore, we proposed increasing the collection rate through the mechanization of ticket sales, which improves Cat Ba Bay tourism commission collection system, to Hai Phong City and Cat Hai District People's Committee.

# 6.2 Outline of system under consideration

## (1) Overview of Cat Ba Island entree fee

The entry fee to Cat Ba Island, which is provided by this proposal, will be charged to the tourists visiting the island, and this aims at continued support for new projects to protect, preserve, and maintain the natural environment, the public health infrastructure as well as tourist attractions on Cat Ba Island as a whole. The outline of Cat Ba Island entry fee (draft) is shown as below.

Tuble 15 Outline of Cut Du Island entry ice (duar)					
課金主体	ハイフォン市				
手数料目名	カットバ島の環境保全と観光ブランド向上のため				
	の観光手数料				
課金客体	旅客船等によりカットバ島に入域する行為				
手数料収入の使途	島の持続可能な成長発展に資する新規の環境保全				
	事業、環境配慮型事業				
課金標準	旅客船等によりカットバ島に入域する回数				
支払い義務者	旅客船等によりカットバ島に入域する者				
徴収額	1回の入域につき 20,000 VND (1USD、120円)				
徵収方法	ハイフォン市の委託による特別徴収				
収入見込額	年間 200 億 VND(100 万 USD、1 億 2 千万円)				
非課金事項	カットバ島に住所を有する者				
	カットバ島に職を有する者				
	未成年				
委託費見込額	年間3億VND(15,000 USD、180万円)				
徴収を行う期間	条例施行後、必要に応じて見直しを行うこととす				
	る規定あり。				

 Table 13
 Outline of Cat Ba Island entry fee (draft)

However, residents and business operators on the island as well as commuters to the island will not be subject to the fee because a passenger ship is the only transportation to the island and one of the basic infrastructures for livelihoods for them. Hence, only tourists are subject to the fee.

A function of the fee is different from the current other systems as described below. Tourists visiting Cat Ba Island will pay a part of the operating cost to preserve the whole environment as well as to control and maintain rich natural environment and tourist attractions on Cat Ba Island because they will become beneficiaries through their experiences. Therefore, it is evaluated that

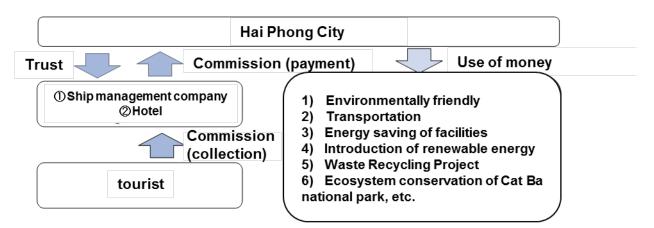
introduction of the fee system will not cause a double charging problem.

(2) Way and system of collecting admission fee

The operation which includes charging fee to enter the area, or the entry fee to the island, on a passage ticket of speed boat or ferryboat and paying it to the Hai Phong City will be entrusted to companies operating speed boats and ferryboats to collect the entry fee. The operation will be entrusted to the companies operating boats because this way will make the fee collection efficient, considering that tourists have only a sea route to visit Cat Ba Island.

The collected entry fee will be managed by Hai Phong City. Environmental preservation projects eligible for subsidy, including multiyear projects, will be selected from among the public, and the projects will be supported by subsidy every year. The fee collection operation and the projects eligible for subsidy will be managed by Cat Hai District.

The subsidy rate to operating cost will be determined by Hai Phong City through consultation with Cat Hai District.



#### Fund raising draft plan proposal

① The fee is added to the price of the boarding ticket for tourists entering Cat Ba Island, and the shipping company pays the collected amount to the city.

② The hotels in Cat Ba Island add the fee to the hotel charge, and each hotel pays the collected amount to the city. (Or it decides the amount in advance based on the number of rooms in the hotel and collects that.)

Figure 24 Cat Ba Island entry fee system

Roles of each entity in the above system are defined as follows:

- Hai Phong City : A main entity receiving the entry fee, Selecting projects eligible for subsidy
- Cat Hai District : Managing the fee collection operation, Managing projects

eligible for subsidy

- Companies operating boats : Consignees for the fee collection operation
- Tourists : Paying the entry fee
- Private companies and public corporations, etc. : Implementing subsidized projects for environmental preservation

# (3) Collected amount

The entry fee of 20,000 VND (about 1 USD or 120 yen) per person is a reasonable amount based on the results of questionnaire investigations performed among tourists in September 2015, and annual revenue is estimated to be 20 billion VND (1 million USD or 120 million yen).

### (4) Ensuring fairness and transparency in use of entry fee

Subsidized projects conducted by using the entry fee revenue as the financial resource should support new environmental preservation projects in Cat Ba Island. Subsidized projects should be selected from among private business operators basically through an annual public nomination process via review of their proposals by the third-party committee appointed by Hai Phong City. The subsidy rate to operating cost will be determined by Hai Phong City through consultation with Cat Hai District.

### (5) Checking similar systems

 Environmental Protection Tax : Environmental Protection Tax (EPT) is a tax system prescribed in Environmental Protection Tax Law enforced on January 1st, 2012 in Vietnam. It is an indirect tax imposed against products which is likely to have a harmful influence on the environment. Only products prescribed in the law (gasoline, oil, fat, coal, and others) are subject to taxation, and tax rates should be determined by the unit of each taxable product.

No.	内容	単位あたり	税額(ドン)
Ι	ガソリン、油、油脂		
1	ガソリン (エタノールを含まない)	lit	1,000-4,000
2	飛行機燃料	lit	1,000-3,000
3	ディーゼルオイル	lit	500-2,000
4	石油	lit	300-2,000
5	燃料油	lit	300-2,000
6	潤滑油	lit	300-2,000
7	油脂	kg	300-2,000

Table 14Tax rate table of environmental protection tax target products (prescribed by the<br/>8th Environmental Protection Tax Law)

Π	石炭		
1	亜炭	ton	10,000-30,000
2	無煙炭	ton	20,000-30,000
3	脂肪炭	ton	10,000-30,000
4	その他石炭	ton	10,000-30,000
Ш	液体水素・フロン (HCFC)	kg	1,000-5,000
IV	課税対象のビニール袋	kg	30,000-50,000
v	使用が規制されている除草剤	kg	500-2,000
VI	使用が規制されている殺虫剤および農薬	kg	1,000-3,000
VII	使用が規制されている林産物に係る防腐剤	kg	1,000-3,000
VIII	使用が規制されている倉庫用消毒剤	kg	1,000-3,000

(出典:JETRO)

② Environmental Hygiene Fee : Cat Hai District imposes the refuse collection charge as the environmental hygiene fee on resident and business operators such as hotels and restaurants. Total amount of the environmental hygiene fee that public facility administrators and the incorporated association for city services received was 770 million VND (actual result in 2014). 36.54% of whole expenses for the services (such as refuse collecting, managing disposal site, sewage disposal, managing road infrastructure, etc.) of the incorporated association were financed by the Environmental Hygiene Fee, but the remaining 63.46% were financed by Hai Phong City. The Environmental Hygiene Fee is currently calculated based on 7 unit prices and the details are described below.

(1)30,000 VND per month for ordinary households

215,000 VND per month for small households and inns operated in private houses

③80,000 VND per month for small-scale businesses at home and merchants

(4)120,000 VND per month for larger businesses at home and merchants

(5)180,000 VND per month for administrative organizations with garbage amount of less than 1 cubic meter per month

6 180,000 VND per cubic meter for administrative organizations with garbage amount of more than 1 cubic meter per month

⑦280,000 VND per cubic meter for private businesses (restaurants, hotels, and companies)

- ③ Sightseeing fee : This is a system of Hai Phong City that collects fees from tourists when they enter specific tourist spots, including the national park on Cat Ba Island and Cat Ba Bay, to be used for salary for cleaners on the island, activity funds of the Cat Ba Bay management society and Department of Agriculture and Rural Development. The received amount had been insufficient for them, and therefore, Hai Phong City decided to raise the entry fees in 2014. The current entry fees are as follows:
  - Cat Ba Bay : 30,000 VND per visit
  - Forest in the national park : 40,000 VND per visit
  - Ocean in the national park : 30,000 VND per visit

The annual revenue from the admission fees for sightseeing consisted of 3.8 billion VND from the one for Cat Ba Bay and 1.5 billion VND from the one for the nation park (actual result in 2013).

#### (6) Acceptability of the proposal system

Regarding tourists' acceptability of new entry fee system, it is considered that tourists agree to pay the entry fee for the environmental preservation and that they judge that the amount is acceptable as long as it is a reasonable amount, based on the results of questionnaire survey performed on Cat Ba Island in September 2015. In this survey, although around 60% of 160 Vietnamese tourists randomly selected were frequent visitors to Cat Ba Island who had visited more than once a year, the low percentage, around 3%, of the tourists answered that the introduction of the entry fee would lead to reduce their visit frequency. Rather than the negative side, such as financial burden, they expected that favorable effect on tourism would be obtained by executing the environmental preservation projects certainly and continuously with the introduction of the entry fee and by preserving the environment of Cat Ba Island. About half of them answered that the introduction of the entry fee would lead to increase their visit frequency to Cat Ba Island, and the rest of them answered that it would not make any difference to their visit frequency.

In other words, the introduction of the entree fee would promote the development of the tourism industry which is the largest industry on Cat Ba Island and would have a positive impact on both of environment and finance by enabling the large-scale and effective environmental preservation projects to be executed with the introduction; thus, it can be said that significance of introduction of the entry fee is extremely high.

(7) Implementation of eco-friendly traffic system using financing schemes

Eco-friendly traffic systems on Cat Ba Island, especially introduction of electric vehicles (EVs) with low environmental load, will be promoted, and EV conversion will be conducted for 2 routes (Route 13 and 14), which are dealing with the demand of transportation mainly for tourists, of the fixed-route buses on Cat B Island. Companies in Kitakyushu City will cooperate with the bus operating companies on the island concerning the EV bus technology. The electric power for buses will be supplied by bus butteries charged by solar power after installing solar power generator system at the sites of the bus operating companies.

Introduction of 10 EV buses is scheduled for 2017 before opening of Tan Vu Bridge, after arrangements were made by actual operation with a bus for safe operation of EV fixed-route buses which are suitable for Cat Ba Island in 2016.

To promote spreading of eco-friendly traffic systems on Cat Ba Island, it is required to prohibit using current diesel-powered transportation, including buses and passenger cars, to meet transportation demand which is expected to increase along with opening of Tan Vu Bridge, and to implement measures such as using eco-friendly traffic systems, including electric buses; therefore, it is required to implement the following effective measures:

- Prohibiting passenger vehicles from entering via ferries from Cat Hai Island to Cat Ba Island
- Prohibiting introduction of new diesel-powered buses on the island



Income estimation model in the first year is shown below.

EVバス・太陽光発電導入:	59,000千円(総額)	
	(10,030 mil VND) ⇒10,000千円/年×6カ年	(10円/ <b>人・</b> 年) <sup>(*1)</sup> ×6カ年
	(1,700 mil VND)	(1,700 VND)

Figure 25 Required amount of admission fee for proposal project and the fee per tourist (\*1)EV バス導入は JCM 設備補助(50%)を前提として計算を行った。

収入:	グリーン手数料徴収 120,00	00千円(20,000 mil VND)
	120円 (20,000 VND) / )	人・年×100万人 <sup>(*2)</sup> /年=120,000千円 (20,000 mil VND) /年
支出:	バイオガス化事業	28,000千円 (4,760 mil VND)
	固形燃料化事業	22,000千円 (3,740 mil VND)
	EVバス導入費用	10,000千円(1,700 mil VND)・・・6カ年で終了
	その他の環境保全事業	58,200千円(9,500 mil VND)・・・海洋汚染対策等
	その他(徴収委託料等)	1,800千円 (300 mil VND)

Figure 26 Entire balance of entrance fee business

(\*2)観光客数は、全体で約140万人だが、18歳未満からは徴収しないものとし、約100万人が徴収対象であると仮定した。

## 6.3 Applicable Technologies

Technologies, which are considered for application after introduction of the system, are shown as below.

(1) Electric vehicle (EV)

Electric vehicles (EVs) are classified by performance and practical stage into three generations: 1970's - the middle of 1990's (the first generation), the latter half of 1990's – the middle of 2000's (the second generation), and after the middle of 2000's (the third generation). The third generation's EVs, mass-produced model, were sold initially to domestic corporations, and have been introduced probatively as rental cars and taxi with a central focus on professional and official uses and demonstration experiment/model project. EVs have been sold to individuals since 2010, and the estimated number of EV sales is about 55,000 as of 2013. Based on the trend forecasting until 2030, car lines of EVs are estimated to be all out around 2018 - 2020, and the EVs are anticipated to spread in a larger scale from 2025. Efforts on technology development including modularization, weight reducing, electrically motorizing, IT, and automated driving are addressed on a full scale.

As for EV buses to be introduced in the project, we will apply the technology of Soft Energy Controls Inc., a company based in Kitakyushu City. EV buses of Soft Energy Controls have the following seven features:

1) Utilization of a lithium-ion battery by using the company-owned technologies

2) Realization of the world lightest EV buses by aluminum-alloy semi-monocoque bodies

3) Realization of 0.8Wh/km, the world smallest level of electricity consumption among full-size buses

- 4) Introduction of the latest real-time battery management system
- 5) Installation of ceiling soft solar panels
- 6) Efforts on power peak cut by using electrical storage system
- 7) Solar power storage

In addition, because of realization of cost-cutting, the cumulative driving distance surpassed 50 million km in China. AS initially commercializing of low carbon technologies for developing countries just ended, we are in the next stage where we spread EV buses into various developing countries in Asia. The lightweight EV buses are loaded with large-capacity batteries, which realize the lowest price along with longer-distance running ability compared to that of other companies.

No	TYPE	仕様	ユーザー	台数	開始年月日	累積走行距離 (km)
1	SDL6120EVG SDL6105EVG	1.航統距離(km) 360 2.車両重量(kg) 12,000 3.最高車速(km/h) 70 4.重車定員(人) 92	臨沂市公共交通	30 30 40 5	2010年10月20日 2010年12月24日 2010年12月30日 2012年2月20日 2013年3月20日	17, 000, 000
2	SDL6120EVG SDL6105EVG	1.就読距離(km) 360 2.車両重量(kg) 12,000 3.最高車速(km/h) 70 4.要車定員(人) 92	許昌交通	21	2011年 1月 1日	2, 700, 000
3	SDL6120EVG	1.航統距離(km) 360 2.車両重量(kg) 12,000 3.最高車速(km/h) 70 4.乗車定員(人) 92	青島バス	50 10	2012年10月19日	250, 000
4	SDL6120EVG	1.航线距離(km) 360 2.市両重量(kg) 12,000 3.最高車連(km/h) 70 4.乗車定員(人) 92	国利新エネルギー	13	2011年11月17日	110,000
5	SDL6120EVG	1.机结距離(km) 360 2.車両重量(kg) 12,000 3.最高車速(km/h) 70 4.要車定員(人) 92	日照市交通局	16	2012年 7月26日	650,000
6	SDL6120EVG	1.航线距離(km) 360 2.車両重量(kg) 12,000 3.最高車速(km/h) 70 4.乗車定員(人) 92	河南環宇新エネルギー	20	2012年 6月14日	未集計
7	HC-150-120 HC-150-105	1.款該距離(km) 300 2.車両重量(kg) 14,200 3.最高車速(km/h) 70 4.要車定員(人) 51	香港華夏神龍 Hong Kong Great Dragon	12	2012年 9月21日 2012年 9月27日	150,000
8	SDL6120EVG	1.航統距離(km) 360 2.車両素量(kg) 12,000 3.最高車速(km/h) 70 4.乗車定員(人) 92	東莞新エネルギー	2	2011年 6月27日	60, 000
		合計		281台	合計	20, 920, 000

Table 15 Examples of actual EV bus travel experience (Source: Soft energy control)

2014年現在、SDL6120を中心に公道走行中のEVバスは500台以上、累積走行距離は5,000万kmを超える実績を誇る。

Table 16 Comparison of full size EV bus in Japan (Source: Soft energy control)

3	A		BOARDARS	EAMS	1010	MENT.
0.01	546-43EV-081	國務地区指計各個線/OX	第一日日本語の意味(1-44,6-43)	が自然的ション変遷システム		構成基金のイシステム
1-2-8	2616241#1464	Case #	1.11.14.10 (Lateral Party Color	INC	2 <b>22</b>	
10:17.8	アルモフレーム、世界の総量			再生可能エネルギーで営業運行		大手な教部と天意
	int(パス集連構通システム)			1.5mm/2-9-で東電		(ムキスジョン開催) あたい) 788
建行解除年月	BRT Bus Repit Transit			001483/1360 #/1Mm		847 (Bus Reald Transft
187 <b>8</b>			Carles and Carles			
\$ <del>\$</del> 7-5	第計走行実績:300075km ソーラーも参考システムにより、30 台のEV/12スが回時に支着可能な 大型充電ステージョンの実現	後島単四 ディーゼルーEV パス本体は使格に含まない。	後達東第(2合) ポスタービンー研究V パス半体は価格に含まない。	75MMYソーラーシステムとの総合せ にて必要な電力は全て発展 大容量電電システムにて表現電力 もサポートできるスマートシステムと して運行。	and the second	大量構造パス、1999になる素質要先5 ステムシバスシーン等を認み合わせる ことで、進業数・定時後の確長や構造す たの使大が可能となる素式の機能を えたパスシステム
事员保持	4,200,7575	1230万円(変換量のみ)	8.100万円(清遺費のA)	22億円(7.948(2-5-青む)		
党電ステーション価格	500291P9	上版に含む	LECAC	急速充電システム含む		
10.0	1	1/2	1/2			
100 TON 1	E and service and a	中古バスの改善	進過/(法	1		0
走行算着	MAX-KIDkin (東負前時)	11.1km.#41202/88		8km, 10km # 212 @		
/ (先往標	ノンステップバス	ノンスタッグバス	アンステップバス	ノンステップバス	ハンステップバス	ノンステップバス
112412	12m×25m×325m	8.99m × 2.3m × 2.00m		11.065m×2.495m×3.475m	11m×2.5m×3.46m	8.99m × 2.295m × 3.005m
	30.6	5445		72.4	72.8	49.8
パッテリー市業	200kwh	43kmh		\$3.22kah	\$123 wh	60.32km/r
1222028	360km(無負物時)	40km		10km(173547)	40km(エアコンオン)	
	BDam.	70km/h		Ellen h	itike./h	
****	11.4ton			11.25kar	11,25ton	
モーター出力	120km			2426-	240im	

As for penetration of EVs in Vietnam, a very few EVs are in practical use mainly for sightseeing in resorts, although its use is limited to partial areas of the public roads. The main type of EVs is open-air and shared-use. Many of the EVs are low-cost vehicles made in China or Vietnam, which use short-life lead batteries. The same situation is seen in Cat Ba Island, and other transport service company than QH introduced about ten EVs in the last year. QH also has an EV on a trial basis. EV buses have not been introduced because law systems relating to public operation of EV buses have not been consolidated yet. (However, we confirmed that Hai Phong City's traffic bureau has a policy to allow experimental running of EV buses only in the tourist destination of Cat Ba Island.)

As a policy, Nationally Appropriate Mitigation Actions (NAMAs) have set a goal of introduction of 30,000 eco cars in 2020. If we assume 10% of the eco cars are EVs, we are supposed to aim for introduction of around 3,000 EVs. However, the current condition shows there are huge cost constraints.

#### (2) Solar power

As resources for battery charge of EV buses described in the last section, we considered introduction of CIGS thin film flexible solar system.

CIGS has the highest conversion efficiency among thin film solar panels, and the crystal type is expected to generate electricity under the circumstances where solar power does not work (time periods of little sunshine including cloudy weather, early morning, and dusk). Among several merits, the first merit of CIGS solar cells is resistance to heat, which is effective especially in Vietnam. Compared to crystalline silicon solar cells, CIGS solar cells are said to have higher "temperature coefficient." Temperature coefficient is a number that indicates degree of resistance of a material to get warmed. CIGS solar cells hardly heat in the broiling sun, and therefore, the conversion efficiency is less likely to decrease. The second merit is its structure by which the generating capacity hardly decreases even in shadow. Since crystalline silicon solar cells are placed in series, if one of solar cells is in shadow, the current degrades in the whole solar cell module. As for CIGS solar cells, only a cell in shadow hardly generates electricity, and the other cells can generate electricity. Therefore, CIGS solar cells are less affected by the installation environment.

In addition, since CIGS solar cells have a feature of high absorption of light, thickness of CIGS compound layer can be reduced up to  $2-3\mu m$ . Compared with 200-300 $\mu m$  of thickness of silicon solar module, the thickness is notionally reduced to about 1/100. The weight is one-sixth of existing solar panels, which realizes  $2.5 \text{kg/m}^2$  of weight reduction. Therefore, there is no need of strong mount.

Furthermore, CIGS solar cells excel in high material stability. Since the product is vacuum-coated with resin, it is suitable for use along the coast, where damages by seawater and plentiful moisture can be considered. This feature is also suitable for use in the climate of Cat Ba Island.

On the other hand, the demerit of CIGS solar cells is that the conversion efficiency is lower compared to that of household solar power system. However, a recent study shows CIGS solar cells have achieved high conversion efficiency: 29% of the theoretical value and 17.2% of the result value.

Improvement in products is expected in the future.

Also, the feature that the solar panels are less affected by cloudy weather (electricity can be generated with about half of the solar radiation of crystal panels) gives another advantage to use in Cat Ba Island, located in the northern part of Vietnam with a lot of cloudy days. In addition, zf power generation efficiency of the panels hardly decrease even by oblique incident light, resin parts of the panel can be flexibly bended so that the panel can be folded up into concertinas, and thus, the panels are suitable for the condition of the island which has limited-site area.

(3) EV bus adopting zero emission - battery exchange type in cooperation with solar power generation

Zero-emission EV buses are considered to introduce by utilizing solar power generation and battery exchange system in which battery charging is controlled by the battery management technology of Soft Energy Controls Inc. Battery exchange system enables the buses to travel a long distance irrespective of charging time.



Figure 27 Image of zero emission - battery exchange type EV bus

# 6.4 Relevant policies and legal systems

(1) Preferential treatment policies for EVs and public buses by Vietnam government

In Vietnam, currently EVs have been allowed to run in limited areas, especially tourist destination. EVs mainly used for tourists may benefit from applications of reduction of import duties (notification on December 8, 2011, 133/2011/ND-CP) and simplification of inspection, etc. at vehicle registration (notification on December 31, 2014, 86/2014/TT-BGTVT).

Vietnam government also holds up a policy for promoting public buses (decision on May 5, 2015, 2015/13/QD-TTg). According to systems and policies that encourage development of public transportation by bus, the followings are supposed to introduce for public transportation bus system: preferentially granting a subsidy (article 4), tariff exemption to imported parts (article 5 par. 1), free of registered fee for owners of renewable energy-powered buses (article 5 par. 2), installation of operation management bases (article 6, article 9 par. 1), and consideration of fare discounting for preschoolers, disabled people and students (article 7 par. 1). Hereafter, laws and rules are estimated to be established based on the decision.

### (2) Status of discussions with Hai Phong City's traffic bureau

In order to promote eco-friendly public transportation, Hai Phong City's traffic bureau shows an attitude to proactively support EV bus project of the proposal.

In the future, legal systems for EVs to run a public road are expected to be consolidated, and Hai Phong City has a policy to promote public EV buses on a full scale.

# 6.5 Future schedule

(1) Activities to appeal mainly achievement of demonstration project of EV bus introduction In another project, Demonstration of EV bus introduction has started since 2015. Necessary procedures, such as export and import procedures for technology introduction, acquisition of number plates, and acquisition of permits for test running, have been carried forward with support from relevant departments of Hai Phong City.

In February 2017, the ceremony for test running of EV bus was held. The buses had already started running demonstration on the roads in Cat Ba Island and can run 160km per charge. When the bus is out of charge, the battery can be replaced with another one. The riding capacity of the bus expected as 50 persons. In the ceremony, demonstration ride on the bus was also implemented.

It was confirmed that officials of the people's committees of Haiphong city who participated in the ceremony had the intention to expand the operation area if demonstration of EV buses showed good results.

We also proceed with a plan to increase the numbers of introduced EV buses to total of 10 by 2018 and total of 30 by 2020. As a beachhead into that, we appeal achievement of demonstration.



Figure 28 EV bus introduction ceremony held in February 2017<sup>6</sup>

<sup>&</sup>lt;sup>6</sup> http://www.viet-jo.com/news/social/170211090532.html

#### (2) Continuous discussions with stakeholders

Aiming for realization of Cat Ba Island entrance tax, we have proceeded discussions with several areas affected by introduction of the system.

In the discussions, Positive feedback has been generally given about concept of the system. However, since several tourist fees have already been posed in Cat Ba Island, some parties have given negative comments concerning realization of introduction because new tour fee may decrease tourism competitiveness of Cat Ba.

We investigate information about existing fee systems and continuously collect information towards realization of institutional design without duplication. In addition, we also need to consider institutional design by which burden for tourists do not look like increasing obviously, and to discuss with stakeholders.

According to information from the Department of Foreign Affairs, Hai Phong City, a major developer in Vietnam has an ongoing plan towards large-scale resort development. We plan to offer the project to the developer so as to encourage eco-friendly investments while revitalizing tourism industry.

# Chapter 7 Holding Workshop

# 7.1 Workshop to be held at the location of domestic municipalities

(1) Overview

"Bilateral Credit (JCM) Intercity Collaboration Seminar" was held for domestic municipalities that have entrusted JCM project formation possibility research projects utilizing Intercity Collaboration, and staff and related companies of Asian municipalities. Organized by the Ministry of the Environment, the workshop was held in Kitakyushu City and Tokyo a total of twice in a year

(2) Date and time held

In Kitakyushu city: 9:30 to 17:45 on October 20, 2016 In Tokyo metropolitan area: 9:00 to 17:00 on January 23, 2017

(3) Contents

Each seminar was held in the following program.

- ① In Kitakyushu city
  - Opening remarks
  - JCM Intercity Collaboration project and JCM fund financing scheme
  - · Case study of JCM project by learning from successful examples of advancing JCM equipment financing projects
  - Topic provides: Technical selection and budgeting in general waste disposal - Cases of general waste disposal -
  - Case study of overseas municipalities participating in Intercity Collaboration projects in FY2008
  - Discussion 1:Status of survey performance and issues in implementation etc. of F / S
  - $\cdot$   $\,$  Discussion 2:Issues and solutions in survey performance and implementation of F / S
  - Closing

② In Tokyo metropolitan area

(Morning section) Private seminar

- Greeting from the organizer
- Project case briefing session
- Overview of fund scheme

(Afternoon section) Open seminar

- Greeting from the organizer
- Introduction of financial support schemes and examples to promote low carbonization in Asian cities
- Examples of actions taken by participating cities of Intercity Collaboration projects
- Panel Discussion
- Closing remarks
- (4) Reference materials

Minutes from participating in the seminar on the day and materials used by our company for presentation are attached as reference materials.

# (Memo 1)

JCM City to City Collaboration workshop at Kitakyushu

Thursday, October 20, 2016 9:30~17:30 At: RIHGA Royal Hotel Kokura 3F

Participants: See attachments and handouts. Below all titles are omitted. Mr. Muraoka, Ms. Yamakawa (Record), NTT Data Institute of Management Consulting, Inc.,

Contents;

- Greeting from Ministry of the Environment (Mr. Mizutani, Manager, International Cooperation Office, Ministry of the Environment)
  - Expressing expectation for spread of Intercity Collaboration projects
- Explanation about JCM
  - Mr. Sai, International Cooperation Office, Ministry of the Environment
    - ♦ Explanation of JCM overview, Introduction of Intercity Collaboration FS
    - $\diamond$  Vietnam is the most successful from the number of cases
  - > Mr. Saito, GEC
    - ✤ Explanation of equipment financing projects, tasks in implementation
    - ♦ Number of cases expanded to 85 cases this year. However, the bias for each country remains large. For example, there are zero case in Chile, and there are other countries that only one or two projects have been implemented yet.
    - ♦ When the standard of cost effectiveness is not satisfied, subsidy reduction may occur.
    - $\diamond$  The following issues may be raised up to now.

- No representative company is found
- · Lack of understanding of partner participants
- Financing Prospect for j partner participants (There are cases where loans were not really accepted)
- Confirmation of contract conditions since it is a maximum of 3 years, it takes time to establish SPC although it is depending on a country, confirmation whether bidding is required or not
- Mr. Ozawa, International Cooperation Office, Ministry of the Environment
  - $\diamond$  about JFJCM (Japan Fund For JCM)
  - ♦ Established fund in ADB from 2014 and contributed 1.2 billion to the fund in 2016
  - ✤ Full amount of the project cannot be subsidized. It will serve as a grant for the addition of superior low-carbon equipment. The rest is supposed to use ADB's normal loan
  - Target countries are 10 developing countries, which joins as ADB members, among JCM signatory countries (Bangladesh, Cambodia, Indonesia, Laos, Maldives, Mongolia, Palau, Vietnam, Myanmar, Thailand)
  - ♦ Features, differences from JCM equipment financing
    - The subsidy rate is 10% of the total cost of the project (the denominator also includes parts that do not contribute to CO2 reduction)
    - · Reception open all year round.
    - Local subsidiary may apply. The composition of the international consortium is unnecessary.
    - Verification can also be financially assisted through technical assistance scheme.
  - $\diamond$  About the application process
    - Depending on the maturity, it takes about half a year to 2 to 3 years to adopt. Suited for Infrastructure etc.
  - $\diamond$  Adopted case
    - There is only one case in the past: Smart Mal grid of

Maldives.

- The projects to be adopted soon are those that change transformers to amorphous in Mongolia
- Case study of JCM projects learned from equipment financing success example
  - > Mr. Muraoka, NTT Data Institute of Management Consulting, Inc.
    - How to proceed with the survey project, Surabaya shopping mall and Vietnam foundry factory, cement waste heat recovery power generation were introduced
    - ♦ Challenges faced through the survey project
      - · Financial statements do not come out in Indonesia
      - There are several financial statements found in Vietnam.
      - As for the monitoring for the statutory useful life: Mismatch of the life of the building and the service life of the facility
      - There is no certain rule about how to capture credit
      - · Price negotiation is severe when introducing equipment
      - The issue of who will take foreign exchange risk.
      - The fact that consulting is necessary for technology theory
  - Yokohama City Batam
    - Yokohama City conducted consulting on improvement of operation of chiller
    - $\diamond$  Issues
      - By personnel revision, when the person in charge is changed, the consultation started from scratch.
      - It takes time because the understanding of the other party's JCM financing program is inadequate
      - Confirmation of conditions requiring bidding is needed.
- Overall Q & A
  - Q: (from IGES) Relationship between Tam City and Yokohama City, contents of cooperation?
    - ♦ A:Because there is no credit from the Japanese company side, a mechanism to being trusted by the city involvement is under

implementation. (Mr. Hirokawa)

- Q: Would like to know details of JFJCM's Agri Project. (Asia Gateway)
  - ♦ A: As this project is not officially approved yet, it is too soft to be published at the present time(MOE)
- > Comment on NTT's presentation:

Is the issue of schedule that the investment schedule and the application schedule do not match? If it is a bidding case, it may be said that it is conditionally adopted. In addition, there are secondary public invitations, I would like to be able to operate as flexible as possible. (MOE)

- ♦ Understood. In the case of private enterprises, there is a direction that they cannot wait for working under the rules such as having to sign a contract after receiving a grant decision. (Mr. Muraoka)
- Topic provision: Technology selection and budgeting in general waste disposal (Mr. Takeuchi)
  - Q: What is the most important thing in carrying out general waste disposal in ASEAN in the future? (Mr. Ozawa, MOE)
    - ♦ A: To gain an understanding to residents. (Mr. Takeuchi)
    - ♦ A: The problem that the plant made in Japan is high. However, when conducting maintenance for many years, they feel its high quality. Since introduction of an inexpensive plant leads to problems during maintenance such as not being able to operate stably, it is necessary to check the contents as well as the cost
  - Q: It is not only the cost but the contents, but what is the procedure for bidding? (MOE)
    - ◇ A: Manufacturer hearing should be open. As a city, 1.
       Presentation of furnace type incineration capability, 2.
       Schedule, 3. Hear from the budget. (Mr. Takeuchi)

- ☆ A: Based on this, created a deep specification document. Since a detailed proposal comes from the manufacturer, we will examine it based on the proposal. (Mr. Takeuchi)
- ➢ Q: It is said that 12 companies were bidding companies, but from what viewpoint a successful bidder was chosen? (MOE)
  - ♦ A: It is a price. Whether to make a comprehensive evaluation is decided according to the situation. (Mr. Takeuchi)
- Q: When talking to the manufacturer, what kinds of information are presented such as garbage composition? (MOE)
  - ♦ A: Present only a bare skeleton and collect widely applicable information. (Mr. Takeuchi)
- Introduction of participating local governments participating Intercity Collaboration
  - > Cambodia · City of Phnom Penh: Mr. Para Sor
    - In collaboration with Kitakyushu city, City of Phnom Penh is now proceeding the study for proper waste management, recycling, energy efficiency enhancement, green production etc.
  - > Cambodia · City of Siem Reap: Mr. Sophean Ung
    - ♦ Formulated policies aimed at lowering carbon emissions mainly focusing on waste disposal
    - ♦ Hope to be able to learn techniques to realize low-carbon urban development through Intercity Collaboration
  - > Batam City, Indonesia Mr. Azril Apransyah
    - Collaboration with Yokohama City. It is an island region and is considering JCM implementation centering on solar panel introduction
  - Malaysia Iskandar Regional Development Authority Mr. Velerie Siambun
    - ♦ Collaboration with Kitakyushu City. As an Iskandar plan, we

aim to reduce CO2 emissions by 40% compared to 2005 by 2025

- ♦ LOU was signed off, but it is a challenge to raise funds.
- ➢ Overall Q&A
  - ♦ Please let me know if there are issues with high priority in each city. (MOE)
    - · Garbage problem in Siem Reap. (Siem Reap)
- Mongolia · Ulaanbaatar city Mr. Galymbek Khaltai
  - ♦ Collaboration with Hokkaido
  - ♦ Air pollution due to coal use in boilers and heating appliances is serious
  - ♦ We are building a system that can monitor the state of air pollution on the WEB network, but we would like to focus on creating a mechanism to control air pollution.
- > Myanmar · Ayahwadi Division Mr. Aung Khaing Soe
  - ♦ The country has established the Green Economic Policy Framework (GEPF), and there is a framework of development aiming for low carbon growth.
  - ♦ The main issue is lack of the proper disposal of waste and we are hoping for activities including capacity building from Intercity Collaboration.
- > Myanmar Yangon City Mr. KO KO Kyaw Zywa
  - ♦ Collaborating with Kawasaki City
  - ☆ As part of the realization of a low-carbon society in Yangon, we are considering the construction of W2E plant
  - $\diamond$  Also implemented solar panels as a pilot project.
- Thailand Rayong Province, Mr. Suriya Siriwat, Industrial Estate Authority Thailand, Ms. Husna
  - ♦ In Rayong prefecture, during the W2E study of municipal solid waste, 1000t is occurred daily, of which 56% is garbage.
  - ♦ We are considering introducing cogeneration at Map Ta Phut

industrial park and introducing high efficiency chiller to eco center.

- > Vietnam Hai Phong City Mr. Do Quang Hung

  - ♦ We are hoping for Intercity Collaboration to help it grow as a green port city.
- ≻ Q&A
  - ♦ I want to know the current situation of the project being implemented in Rayong prefecture. (MOE)
    - As for the introduction of cogeneration, FS is continuously under implementation.
    - The Eco Center is pursuing consultations for budgeting.
  - ♦ As for the waste power generation, what kind of technology is being considered as JCM? (Mr. Yokohama)
    - Power generation system for incineration. (Map Ta Phut City)
    - It is the power generation as part of the waste power generation plant. (Kitakyushu city)
- Discussion 1 FS situation and issues in implementation
  - As for the waste disposal and water treatment, etc., the primary concerns is whether local policies will be realized. Needing longterm support. (Fukushima City)
  - By taking long time axis, education of people is necessary. (Yokohama)
  - I understood that the municipality is carrying out capacity building as part of the master plan support. AS for the hope of devices with a long-term perspective, I would like to include it in future policy review by taking advantage of the JICA.

- Discussion 2 Issues and solutions in FS Investigation and implementation
  - Introduction of Intercity Collaboration cases (Kawasaki City, Yokohama City, Kitakyushu City)
  - Yokohama and Kawasaki have commonly implemented a water purification pump and solar panels of the Waterworks Bureau.
  - ➢ Issues of Intercity Collaboration
    - ♦ Output setting. I think that not only short-term things but also mid- and long-term perspectives are necessary. (Kawasaki City).
    - ♦ Differentiation from JICA is necessary. Under the participation of municipalities and private enterprises, separation of their own roles, efforts to establish as business. (Nippon Koei Co., Ltd)
    - ♦ I want to realize the application of JCM in B 2 B and B 2 G for the low carbonization of the entire city. (Kawasaki City)
    - ☆ Finetech Inc. is a member of YPORT's SME alliance that aims to reduce CO2 emissions by energy management and new materials. (Finetech Inc.)
    - ♦ With the project of Vietnam's cement factory waste heat recovery power generation, there was a problem that money did not flow to state enterprises. In addition to governmental administration + governmental administration, consideration with the country is necessary. (Kitakyushu city)
    - ♦ As for the timing of municipal garbage bidding, there are restrictions on equipment financing projects. (MOE)

End of the memo 1

## (Memo 2)

# JCM Intercity Collaboration Seminar at Tokyo Discussion notes

Monday, January 23, 2017 Morning section: 9:00 to 11:00 At TKP Shinbashi Conference Center

Afternoon section: 14:00 to 17:00 At Iino Hall & Conference Center 4th floor Room B

Participants (titles omitted):

For attendees in the morning, see the list of participants

Approximately 150 participants in the afternoon

For both sections, Ms. Yamakawa and Mr. Ajiro participated from our company.

Contents

<Morning section>

• Part One

For details of discussion, refer to the handouts. The contents are briefly shown below.

[Asia Gateway Corporation: Cambodia · Siem Reap Province]

- ➢ In cooperation with Kanagawa Prefecture and Siem Reap, we support three kinds of energy, transportation, municipal waste.
- Introduction of photovoltaic power generation system to a hotel, Waste to Energy using hotel municipal waste, and E-TukTuk etc. are being studied. We are considering, through establishing SPV, introducing solar power generation system to hotel roof.
- [JFE Engineering Co., Ltd.: Indonesia · Bali State]
- We are considering garbage incineration power generation. We are conducting a survey of, including examination of MRV methodology, startup of SPV, Tipping Fee and assumption of revenue by FIT.

- Funding, selection of EPC companies, detailed discussion of Tipping Fee, and confirmation of legal system are four issues.
- [ Mitsubishi Research Institute Co., Ltd.: Myanmar · Ayahawi Division]
- We are considering waste and water treatment related in Pathein industrial city under construction. We are collaborating with Fukushima City. We plan to formulate projects such as rice husk power generation projects and introduction of photovoltaic power generation systems at sewage treatment plants.

[Ex Research Institute Ltd.: Rayong Province, Thailand]

- ➤ We are aiming for JCM project of waste disposal facility in Rayong prefecture in eastern Thailand to solve waste disposal task. Garbage sorting → Combustion of combustibles → Generation by combustion heat → Selling electricity to the grid is assumed. 1,500 tons of garbage occurred in the prefecture
- [NTT Data Institute of Management Consulting, Inc. : Rayong province, Thailand]
- Low carbonization, introduction of cogeneration into chemical plants. The exhaust heat recovery plant in Saraburi province was also JCM projected
- [Nikken Sekkei Civil Co., Ltd.: Cambodia · Phnom Penh City]
  - Progress on the action plan was explained. In six areas we are organizing tasks, conducting an action plan, and discovering pilot projects, etc.
- [NTT Data Institute of Management Consulting, Inc. Cambodia · Phnom Penh City]
  - Introduction of research proposals in the energy field. We are conducting surveys for large hospitals, large shopping malls and large cement factories.

[NTT Data Institute of Management Consulting, Inc. Haiphong City]

- Introduction of research projects in the energy field. We are conducting surveys for large hospitals, large shopping malls and large cement factories.
- [NTT Data Institute of Management Consulting, Inc. Malaysia · Iskandar District]
- We are excavating projects based on LOU in Kitakyushu city and IRDA. We are considering introducing 5 MW cogeneration of low carbon technology to an industrial park.

# •Part 2

For details of discussion, please refer to the handouts. The contents are briefly shown below.

- 【Public Interest Foundation Corporation Global Environment Centre Foundation JCM equipment financing projects】
  - Subsidy of up to 50% of the initial investment amount. The budget for fiscal year 2007 is about 6 billion yen. As for the country, there are many projects in Thailand, Indonesia and Vietnam. Solar panels, chillers and boilers are top 3 in technology. For cost-effectiveness, guidelines for evaluation are 4000 yen / tCO 2.
  - [Asian Development Bank About JFJCM]
  - Established with the support of the Ministry of the Environment of Japan. Investment of 42.6 Million USD from Ministry of the Environment between 2014-2016. One JCM partner country and 11 member countries of ADB will be target countries (Mongolia, Bangladesh, Maldives, Vietnam, Laos, Indonesia, Palau, Cambodia, Myanmar, Thailand, Philippines). In addition to the project of ADB, 10% of the project cost is subsidized as Grant or Interest Subsidy.

[Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. Green Climate Fund]

 GCF: Green Climate Fund. 48 countries, 10.3 Billion USD fund. The fund is allocated equally to adaptation and mitigation. Afternoon section

- [Greeting from Mr. Naruhiro Kajihara, Ministry of the Environment]
- About 50% of the population is concentrated in urban areas, and more than 70% of CO2 emissions are generated from urban areas. It is extremely important to reduce CO2 in urban areas.
- [Mr. Sai, Ministry of the Environment About JCM Intercity Collaboration Project]
- Myanmar was added to a partner country on January 12, 2017. A workshop in Kitakyushu city was held on 20 and 21 October 2016. Even at COP 22 in Makelash, Intercity Collaboration Project was introduced as a side event on November 8, 2016.
- We are also looking for Intercity Collaboration projects for next fiscal year. Public announcement at the end of February, proposals in March, decisions taken at the end of March are planned.

[ Mr. Bannai, Public Interest Foundation Corporation Global Environment Centre Foundation about JCM equipment financing projects]

- Subsidy of up to 50% of the initial investment amount. The budget for fiscal year 2007 is about 6 billion yen. Public offering in early April, deadline for proposals in May, project selection at the end of July.
- As for the achievements so far, many countries have Thailand, Indonesia and Vietnam projects. Solar panels, chillers and boilers are top 3 in technology. As cost-effectiveness, 4000 yen / tCO 2 is a guideline for evaluation
- [Mr. Teshima, Asian Development Bank About JFJCM]
- Established with the support of the Ministry of the Environment of Japan. Investment of 42.6 Million USD from Ministry of the Environment between 2014-2016. One JCM partner country and 11 member countries of ADB will be target countries (Mongolia, Bangladesh, Maldives, Vietnam, Laos, Indonesia, Palau, Cambodia, Myanmar, Thailand, Philippines). In addition to the project of ADB,

10% of the project cost is subsidized as Grant or Interest Subsidy.

[Mr. Maruyama, Mitsubishi UFJ Morgan Stanley Securities Co., Ltd. Green Climate Fund]

GCF : Green Climate Fund. 48 countries, 10.3 Billion USD Fund contribution. GCF operates under the guidance of COP. It is necessary to work closely with NDA (National Designated Authority) and AE (Accredited Entity). A wide range of support fields is characterized. Funds are equally allocated to adaptation and mitigation. Mitigation and adaptation, each of which has four fields of focus. The six metrics are ① Project impact ② Paradigm shift ripple effects ③ Sustainable ④ Is it matched to needs ⑤ National lead ⑥ efficiency and effectiveness. NDA and AE will judge whether it matches the national strategy. Please refer to handouts for AE and NDA, certification executing agencies.

[Mr. Suzuki, Mr. Okuno, Yokohama City: Yokohama City's initiatives]

- We are collaborating with Thailand · Bangkok (photovoltaic power generation system and EMS), Vietnam · Danang (high efficiency pump), Indonesia · Batam (air conditioning system), Philippine Cebu (currently JICA project). We are promoting PAT (Port Authority of Thailand) and Green Port 5-year project.
- [Mr. Aoung Min Naing, Myanmar / Mr. Shishido, Fukushima city: Activities of Myanmar · Aiyadhi Province Division]
- > There is a waste problem. Supporting policy formulation including recycling from Fukushima city. Based on experience in Fukushima city, we are cooperating in the field of reenergization and disposal
- [Mr. Nguyen Trung Hieu, Vietnam: Hai Phong City's initiatives]
- Hai Phong City has a sister city with Kitakyushu City. Projects such as EV bus, household garbage composting etc. were introduced.

[Mr. Amano, Kanagawa Prefecture: Siem Reap]

- Securing electricity against rapid urbanization is a challenge. Kanagawa Smart energy plan and knowledge such as efforts from centralized power supply to decentralized power supply are also useful in Siem Reap
- [Mr.Ung Sophean, Siem Reap, Cambodia: Efforts at Siem Reap]
- As a famous city as a tourist city and a population of 250,000 people, with 5 million tourists come, various problems are occurring. The city is aiming for the vision of the city, sustainable development. Securing water resources, ensuring green, the city of culture and education, the city of tourism resources. From the environmental point of view, it is necessary to establish an execution plan. We are promoting projects such as waste recycling and composting. We are aiming at dissemination of electric vehicles for tourists

[Mr. Urasaki, Hokkaido / Mr. Ohashi, Sapporo city: Efforts at Mongolia-Ulaanbaatar]

- There are problems such as power tightness and waste disposal. We are cooperating from the geographical common point of cold district. We are considering solar power generation system, heat storage heater for heating, Waste to Energy of chicken feces. There are two patterns: the case where the government actively acts, and the case where the local enterprises actively act while the government supports it. Make cooperation dense. In Ulaanbaatar city, air pollution problems are occurring as 700,000 people in 200,000 households use coal for heating during the winter season.
- [Mr. Fukobei, Kawasaki City: Efforts at Yangon City]
- Cooperated with Yangon City by making full use of the experience of environmental improvement in Kawasaki City. As a JCM equipment financing project, we are promoting the introduction of high efficiency chillers and boilers. FS of the introduction of photovoltaic power generation system for water purification plant is also ongoing. Not only having the keyword "low-carbon society" but creating a

concrete image with the common awareness of the direction to be aimed, planning is very important for subjective participation.

- [Mr. Sono, Kitakyushu city: Activities of Rayong Prefecture]
- Utilizing the knowledge and experience of Kitakyushu City which has been addressing environmental issues, it supports various countries. Doing environmental international research. Established Asia Low Carbonization Center and developing Kitakyushu model to Asia.
- With trusting relationships established, various support have been conducted for Surabaya, Hai Phong, Iskandar, Rayong and Phnom Penh as Intercity Collaboration. By utilizing Intercity Collaboration, The city may contribute in a wide range of fields from upstream such as master plan formulation, follow-up such as environmental education. Careful when planning to make it an achievable plan. Making a pilot project leads to a sense of realization and promotion of project promotion in the target counties.
- [panel discussion]

•

- Kanagawa Siem Reap
  - ♦ Trigger of initiatives is that Siem Reap came to visit Fujisawa SST etc.
  - Taking advantage of utilization of reenergies and introduction of decentralized energy which is the characteristic of Kanagawa prefecture (sunlight, wind power, gas cogeneration)
  - ♦ Electric tuk tuk, simple open cars and buggy introduced with support of Asian gateway
- Hokkaido Ulaanbaatar
  - Collaborate on the introduction of low-carbon technology in cold areas, based on past cooperative relationships on issues such as air pollution due to population increase in Ulaanbaatar. Also aim for jobs of local companies. Waste heat recovery etc. utilizing feces of poultry houses also implemented
  - $\diamond$  Understanding is that there are two cases in Intercity

Collaboration: one is that local governments with advanced cases proactively provide know-how and technology while the partners mainly operate, and the other is that municipalities are in a supportive position.

- ♦ In the future, strengthen relationship continuation. The change in the counterpart is still an issue.
- Kawasaki City Yangon
  - ✤ Implemented introduction of high efficiency boiler for sunlight, food factory.
- Kitakyushu City Rayong Province
  - ✤ Introduction of Cambodia project, Thailand waste heat recovery power generation as advanced to equipment financing projects.
  - ✤ By providing comprehensive support from the upstream phase, it is possible to make a wide range of proposals. Long-term follow-up and personnel exchanges are considered a merit.
- Entire Discussion
  - ♦ What is the role of Siem Reap side? (Mr., Mizutani, Manager, Ministry of the Environment)
    - There are three. Implementation of the plan. Capacity for staff. Acquire appointments with private enterprises. (Siem Reap),
  - ♦ I want to hear if there is difficulty unique to Sapporo city: characteristics, considerations for cold regions. Also, I think that it is an unusual case involving two local governments (prefectures and municipalities).
  - ✤ For cold regions, I think that no country other than Mongolia is cold in JCM partner countries, but if it is cold, fermentation cannot be operable. On the other hand, it seems that there are cases concerning heating technologies which is not necessary in a warm country.
    - Regarding cooperation between Hokkaido Government Office and Sapporo City, companies are concentrated in

Sapporo due to population composition. The business site may be outside the city. In addition to wanting to make it possible to provide multifaceted support, as we have been working together on a regular basis, this is the framework of this time.

- Winter is long (from the end of October to the end of April) Air pollution is a problem because about 700,000 people (out of 3 million people) are warming with coal
- ♦ Kawasaki city
  - We would like to establish the significance of the low carbon society as a common recognition with the Yangon side first. In addition, concrete images and actual projects are important
  - Respect for each other's view points and targets
- ♦ Because Kitakyushu city has many project developments, it has a comprehensive model of Kitakyushu model, what kind of things do you do in realizing? Also, if you have the tips for cooperating with more than one. (Mr. Mizutani, Manager, Ministry of the Environment)
  - The point is that you cannot set goals that are too high for the plan. We aim to incorporate into the plan what we can accomplish suited to ourselves. Based on the experiences I have witnessed in the case that only the plan is thick and not realized, set goals that can be realized in the medium to long term. It is also a point to do a pilot project. In case where we have visitors to Japan, we have them work with a pilot to understand what are really conducted.
  - There are opportunities to have contacts with multiple local governments based on the fact that there are many environment related facilities in the city and there are many facilities to accept visitors. In addition, in cooperation with the International Technical Cooperation Association and IGES Kitakyushu City Urban Center, information sharing

and follow-up may sometimes help. Cooperation with local governments as well as related organizations is a key to realizing projects with many cities.

- ♦ If there are any expectations from the Rayong prefecture side.
   (Mr. Mizutani, Manager, Ministry of the Environment)
  - We anticipate plans for making Rayong prefecture eco-town in the future, and medium- to long-term initiatives. (Rayong County)
- > How private enterprises participate in Intercity Cooperation
  - ♦ Kanagawa
    - Although specialized in JCM, there is a support organization for companies in the prefecture to expand overseas as well as the International Affairs Division, Kanagawa Industry Promotion Center Division. They are the windows as they are accepting request for consultations.
  - ♦ Hokkaido
    - Some companies in the province are entering Mongolia, and . as there is also a organization called the Economic Exchange Promotion Committee, others have contacts with companies interested through it.
  - ♦ Kawasaki city
    - We think that not only technology, hard, but also soft aspect of environmental administration is important. As a place to consult with the administration, Kawasaki Green Innovation Cluster is set up. While sharing information, we are accepting counseling concerning environmental business in the city.
  - ♦ Kitakyushu city
    - We are positively calling out to city group companies. There is a Kitakyushu Environmental Industry Promotion Council, which holds a regular meeting once every two months, and we perform public relations of JCM there. In addition, by

disclosing the activities of the Asia Low Carbon Center to the mass media, we are creating new matching opportunities

- $\succ$  Questions from the venue
  - ♦ Waste in Indonesia

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- $\diamond \quad \text{Questions about Haiphong E-Waste}$
- $\diamond$  About the problems of waste disposal, 3R trends
  - Due to time expiration, it is decided to respond to questions by each one informally. (Ministry of the Environment)
  - In the panel discussion, could not you see something like an answer? (Ministry of the Environment)
- ♦ Is JCM's FS a proposal or an organizing scheme?
  - It is a proposal. (Ministry of the Environment)
- $\diamond$  Is an city to city agreement needed at the time of application?
  - It is good to have a sister city or a memorandum, or the expression of interest is the minimum. Please check the application procedure after next month. (Ministry of the Environment)
- Paneled Cashion Summary (Mr. Mizutani, Manager, Ministry of the Environment)
  - It is based on not repeating the experience of pollution that occurred in Japan
  - > The expansion of the city is characteristic of this year, and there were proposals from many municipalities
  - I think that it is good to overlay Intercity Collaboration in Japan over those overseas: (Sapporo and Hokkaido), and collaboration in Nagoya and Kitakyushu city in the field of water supply.
  - Expansion of stakeholders. While I often talk with the international Bureau and the Environment Bureau, there is a story of the Port Authority from Yokohama City. It seems interesting that there is a room for expansion.
  - > Fund financing schemes are also improving

End of the notes

# 北九州市(日本国)とハイフォン市人民委員会(ベトナム社会主義共和国)による 姉妹都市友好協力関係に関する協定

日本国北九州市とベトナム社会主義共和国ハイフォン市人民委員会(以下、「両者」という)は、両市の発展のために協力関係と友好交流を深化させることを願い、ここに互いを 姉妹都市として認め、下記内容について同意する。

第1条 協力の内容

- 1 両者は、日本国とベトナム社会主義共和国の友好関係並びに、相互尊重、平等、及び日越両国の政策と法規の下の利益の理念に基づき、両市市民の友好関係を促進する ことに一体となって取り組む。
- 2 両者は経済、環境、教育及び人材育成の分野において相互に協力及び協働し、交流 を更に促進する。
- 3 両者は、両市の企業間活動を支援し、企業間の協力関係の創造を促進して、企業間 の協力事業が実施される間の調整を行う。
- 4 両者は観光、文化、学術等の分野における交流のための機会創造に取り組む。
- 5 両者は、両市間の交流促進の調整に、北九州市総務企画局国際部とハイフォン市外 務局をあてることに合意する。

第2条: 効力

本協定は署名後に発効し、両者の一方から相手方に対する協定終了意思の書面通知から 30日後まで効力を有する。

本協定は2014年4月18日に日本国北九州市において署名を行う。本協定は日本語、 ベトナム語及び英語で作成され、等しく効力を有するが、解釈において疑義がある場合は、 英語版が優先される。

日本国 北九州市

市長 北橋 健治

ベトナム社会主義共和国 ハイフォン市人民委員会

委員長 ズォン・アイン・ディエン

# THỎA THUẬN

## GIỮA

# THÀNH PHỐ HẢI PHÒNG, NƯỚC CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT NAM VÀ THÀNH PHỐ KITAKYUSHU, NHẬT BẢN VỀ VIỆC THIẾT LẬP QUAN HỆ THÀNH PHỐ KẾT NGHĨA

Ủy ban nhân dân thành phố Hải Phòng, nước Cộng hòa xã hội chủ nghĩa Việt Nam và Chính quyền thành phố Kitakyushu, Nhật Bản (sau đây gọi tắt là "hai Bên"),

Với mong muốn thúc đẩy mối quan hệ hợp tác và giao lưu hữu nghị vì sự phát triển của hai thành phố,

Hai bên xác lập quan hệ THÀNH PHỐ KẾT NGHĨA,

Và nhất trí thỏa thuận như sau:

## Điều 1: Nội dung hợp tác

1. Hai Bên sẽ cùng thống nhất thúc đẩy mối quan hệ hữu nghị giữa nhân dân hai thành phố, trên nền tảng quan hệ hữu nghị giữa nước CHXHCN Việt Nam và Nhật Bản, tôn trọng lẫn nhau, bình đẳng, cùng có lợi, phù hợp với chính sách và luật pháp của Việt Nam và Nhật Bản.

2. Hai Bên sẽ hợp tác và phối hợp với nhau trên các lĩnh vực kinh tế, môi trường, giáo dục đào tạo và thúc đẩy hơn nữa các hoạt động giao lưu, trao đổi liên quan đến lĩnh vực này.

3. Hai bên cùng hỗ trợ các hoạt động kinh doanh và tăng cường các mối quan hệ hợp tác và phối hợp thực hiện các dự án hợp tác giữa hai địa phương.

4. Hai Bên sẽ cùng nhau tạo cơ hội giao lưu trao đổi trong các lĩnh vực du lịch, văn hóa, nghiên cứu.v.v.

5. Hai Bên thống nhất cử Sở Ngoại vụ thành phố Hải Phòng và Sở Ngoại vụ, Cục Hành chính và Kế hoạch thành phố Kitakyushu là cơ quan đầu mối trong việc thúc đẩy giao lưu trao đổi giữa hai thành phố.

## Điều 2: Hiệu lực

Thỏa thuận hợp tác này có hiệu lực kể từ ngày ký và hết hiệu lực sau 30 ngày kể từ khi một trong hai Bên có thông báo bằng văn bản cho Bên kia về ý định chấm dứt Thỏa thuận hợp tác.

Thỏa thuận hợp tác này được ký tại thành phố Kitakyushu, Nhật Bản ngày ..... tháng 04 năm 2014 thành hai (02) bộ, mỗi bộ gồm 03 thứ tiếng: Việt, Nhật và Anh, các văn bản có giá trị như nhau. Trong trường hợp có sự giải thích khác nhau, bản tiếng Anh sẽ được dùng làm căn cứ.

# TM. ỦY BAN NHÂN DÂN TP HẢI PHÒNG,

CỘNG HÒA XÃ HỘI CHỦ NGHĨA VIỆT

NAM

Ông Dương Anh Điền Chủ tịch

TM. CHÍNH QUYỂN THÀNH PHỐ

# KITAKYUSHU, NHẬT BẢN

北橋健治

Ông Kenji Kitahashi Thi trưởng

#### AGREEMENT

# BETWEEN HAIPHONG CITY (THE SOCIALIST REPUBLIC OF VIET NAM) AND THE CITY OF KITAKYUSHU (JAPAN) REGARDING SISTER-CITIES FRIENDSHIP AND COOPERATION RELATIONS

The People's Committee of Haiphong City, the Socialist Republic of Viet Nam and the Government of the City of Kitakyushu, Japan (hereinafter referred to as "both Parties"),

Wishing to deepen their cooperative relationship and friendly exchange for the development of both cities,

Hereby recognizing each other as SISTER CITIES,

Have agreed on the following:

## **Article 1: The Content of Cooperation**

1. Both Parties will work together to promote the friendship relation between their citizens, based on the friendship relation between the Socialist Republic of Viet Nam and Japan, and the principles of mutual respect, equality, and benefits in accordance with the policies and law of Viet Nam and Japan.

2. Both Parties will cooperate and collaborate with each other in the fields of economy, environment, education and training, and will promote exchange even further.

3. Both Parties will support business-to-business activities, will work to promote the creation of such cooperative relationships; and coordinate during the implementation of the cooperative projects between both sides.

4. Both Parties will work to create opportunities for exchange in the fields of tourism, culture and academia and so on.

5. Both Parties agree to nominate the Department of Foreign Affairs, Haiphong City and the International Affairs Department, General Affairs and Planning Bureau, City of Kitakyushu, to be the coordinators regarding the promotion of exchange between the two cities.

#### **Article 2: Validity**

This Agreement shall become effective upon signing, and will remain in effect until 30 days after the date on which either Party notifies the other in writing about its intention to terminate this Agreement.

The Agreement is signed in the City of Kitakyushu, Japan, on 18<sup>th</sup> April, 2014 in duplicate in the Vietnamese, Japanese and English languages, all texts being equally authentic. In the event of divergence of interpretation, the English version shall prevail.

**ON BEHALF OF HAIPHONG PEOPLE'S COMMITTEE, THE SOCIALIST REPUBLIC OF VIET NAM** Mr. Duong Anh Dien

Chairman

## ON BEHALF OF THE GOVERNMENT OF THE CITY OF KITAKYUSHU,

JAPAN

Mr. Kenji Kitahashi Mayor

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(4月)

#### 株式会社 NTT データ経営研究所

#### (1) 4月の主な活動

- ・[共通]「現地ワークショップ」、「第一回現地調査」を実施した。(仕様書項目 2-5,2-6④)
- ・[2-1.従来にない事業発掘]東京ガスハノイ事務所様との協議を実施した。(仕様書項目
   2-1①)
- ・[2・4.離島における EV バス導入に向けた観光手数料]ハイフォン市人民委員会、カット ハイ県人民委員会等、制度設計にかかり関係のある行政機関との協議を実施した。(仕 様書項目 2・4.①)

#### (2) 5月の主な活動予定

- ・[共通] 第一回国内進捗報告会を実施予定。(仕様書項目 2-62)
- ・[2-1.従来にない事業発掘]東京ガスハノイ事務所様との協議結果を踏まえた案件発掘に 向けた基礎情報収集(仕様書項目 2-1①)
- ・[共通]報告書作成のための基礎情報収集(仕様書項目 2-7)

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# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(5月)

#### 株式会社 NTT データ経営研究所

#### (1) 5月の主な活動

・[共通] 第一回国内進捗報告会を実施予定。(仕様書項目 2-62)

・[2-1.従来にない事業発掘]東京ガスハノイ事務所様との協議結果を踏まえた案件発掘に向

- けた基礎情報収集(仕様書項目 2-1①)
  - ・[共通]報告書作成のための基礎情報収集(仕様書項目 2-7)

#### (2) 6月の主な活動予定

- ・[2-1.従来にない事業発掘]東京ガスハノイ事務所様との協議結果を踏まえた案件発掘に 向けた基礎情報収集(仕様書項目 2-1①)
- ・[共通]報告書作成のための基礎情報収集(仕様書項目 2-7)

(3) スケジュール及び進捗状況

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口到我们	4月	5月	6月	7月	8月	日6	10月	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による検討	6	技術検討		経済性検討		CO2削減 効果試算	意思たる	意思決定に向け た支援	向け	
2.エネルギー起源CO2排出削減効 果の高い事業のJCM化	。 設備	設備補助申請		ー企業(	企業の他工場、 		に業への	他企業へのマーケティング	ティン	Ĩ,		
3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開			740	<u> </u>			· · · · · · · · · · · · · · · · · · ·	[ 算入効果 0.65m	説明会 一	С. С. С. С. С. С. С. С. С. С. С. С. С. С		
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○ 国内会議(2回程度)		•				•			•			
○ 現地ワークショップ (2回程度)	•#0 */									● 徽郡令		
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# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(6月)

#### 株式会社 NTT データ経営研究所

#### (1) 6月の主な活動

- ・[2-1.従来にない事業発掘]東京ガスハノイ事務所様との協議結果を踏まえた案件発掘に 向けた基礎情報収集(仕様書項目 2-1①)
- ・[共通]報告書作成のための基礎情報収集(仕様書項目 2-7)

#### (2) 7月の主な活動予定

- ・[共通] 第二回現地調査進に向けた調整を開始。(仕様書項目 2-62)
- ・[共通]報告書作成のための基礎情報収集(仕様書項目 2-7)

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<ul> <li>・6月末時点の進捗状況を以下に示す。</li> </ul>												
日見帰共					2016年	111				2	2017年	
口到4月日	4月	5月	6月	月7	8月	日6	10月	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による 検討	R	技術検討		経済性検討		CO2削減 効果試算	意 た え	意思決定に向けた支援	自け	
2. エネルギー起源CO2排出削減効 果の高い事業のJCM化	。 一 記 一				企業の他工	」 「場、 ●□	「「業」	シーク	他企業へのマーケティング	Ĩ,		
3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開			740	770-7~°	ĥ		意で	 導入効果 の検証	説明会、 見学会間	<mark>説明会、</mark> 見学会開催		
4. 離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	卣 摄 職					直 協 議				直 協 職		
○ 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)	● # ↓ ↓ ↓ ↓ ↓									● 《報報》		
○ 報告書の作成		基礎 調査	基礎調査				●ドト				● 版	

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(7月)

株式会社 NTT データ経営研究所

#### (1)7月の主な活動

・[仕様書 2-1 従来にない事業発掘]

- ▶ 現地企業の抽出・働きかけ(項目 2-1①)
- ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 補助事業フォローアップ
- ・[仕様書 2-5] 第二回現地調査に向けた調整
- ・[仕様書 2-7]報告書作成のための基礎情報収集
- (2) 8月の主な活動予定
  - ・[仕様書 2-1 従来にない事業発掘]
    - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
    - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
  - ・[仕様書 2-2 セメント廃熱回収]
    - ▶ 補助事業フォローアップ
  - ·[仕様書 2-3 鋳物工場]
    - ▶ 設備補助のフォローアップ、調整
  - ・[仕様書 2-4 観光手数料]
    - ▶ 観光手数料の徴収制度検討(項目 2-4①)
    - ▶ 低炭素型事業に対する観光手数料活用の仕組み検討(項目 2-4②)
  - ·[仕様書 2-5] 第二回現地調査
  - ・[仕様書 2-6] 環境省への進捗報告会
  - ・[仕様書 2-7]報告書作成のための情報収集

・7月末時点の進捗状況を以下に示す。												
日月福井					2016年					7	2017年	
口到近日	4月	5月	6月	月7	8月	日6	10J	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による 検討	R	技術検討		経済性検討		C02削減 効果試算	意見たる	意思決定に向けた支援	희당	
2.エネルギー起源CO2排出削減効 果の高い事業のJCM化	影備			「合業」	同一企業の他工場、		他企業へのマーケティング	- - - と (	下して	Ĩ,		
3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開			-040	<del>ر ۲</del> –			o 續	 導入効果 の検証	説明会、 見学会[	説明会、 見学会開催		
4.離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	直接 協議					直接 協議				直 協 職		
○ 現地調査	•			•				•		•		
〇 国内会議(2回程度)		•				•			•			
○ 現地ワークショップ (2回程度)	●									●霧報令		
○ 報告書の作成		基礎 調査	基礎 調査				●ドト				最後 版	

(3) スケジュール及び進捗状況

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(8月)

株式会社 NTT データ経営研究所

#### (1) 8月の主な活動

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 補助事業フォローアップ
- ・[仕様書 2-3 鋳物工場]
  - ▶ 設備補助のフォローアップ、調整
- [仕様書 2-4 観光手数料]
  - ▶ 観光手数料の徴収制度検討(項目 2-4①)
  - ▶ 低炭素型事業に対する観光手数料活用の仕組み検討(項目 2-4②)
- ·[仕様書 2-5] 第二回現地調查
- ・[仕様書 2-6] 環境省への進捗報告会
- ・[仕様書 2-7]報告書作成のための情報収集

#### (2) 9月の主な活動予定

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 補助事業フォローアップ
- ・[仕様書 2-3 鋳物工場]
  - ▶ 設備補助のフォローアップ、調整
- ・[仕様書 2-7]報告書作成のための情報収集

# (3) スケジュール及び進捗状況

・8月末時点の進捗状況を以下に示す。

日見」「「「」」「「」」「」					2016年	111				N	2017年	
口割残日	4月	5月	6月	月7	8月	日6	10月	11月	12月	1月	2月	3月
1.従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による 検討	R	 技術検討		経済性検討		C02削減 効果試算	意たち	意思決定に向け た支援	희당	
2.エネルギー起源CO2排出削減効 果の高い事業のJCM化	影響			同一企業の他工場、	の他二		企業への	他企業へのマーケティング	レイト	Ĩ,		
3. "ベトナムにおける鋳物工場へ で画を声道1 車業"で様展問												
い电ぶげ得入事業 い側波用			レオロ	フォローアップ	ĥ		薸	導入効果	説明会、	JÍI.		
							<u>6</u>	の検証	見学	見学会開催		
4.離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	直接 協議					直接 脇襲				卣 機 讔		
○ 現地調査	•			•				•		•		
〇 国内会議(2回程度)		•				•			•			
○ 現地ワークショップ (2回程度) 度)	• # C * C									●緩報会		
○ 報告書の作成		基礎 調査	基礎 調査				●☆♪				● 版	

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(9月)

株式会社 NTT データ経営研究所

#### (1) 9月の主な活動

・[仕様書 2-1 従来にない事業発掘]

- ▶ 現地企業の抽出・働きかけ(項目 2-1①)
- ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-3 鋳物工場]
  - ▶ 設備補助のフォローアップ、調整
- ・[仕様書 2-7]報告書作成のための情報収集

#### (2) 10月の主な活動予定

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-6]都市間連携セミナーでの発表準備
- ・[仕様書 2-7]報告書作成のための情報収集
- ・中間検査の準備

日里塘玉					2016年					2	2017年	
	4月	5月	6月	7月	8月	6月	10A	11月	12月	印月	2月	3月
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による 検討	R	技術検討		経済性検	訓 公	C02削減 効果試算	意思たえ	意思決定に向け た支援	히け	
2. エネルギー起源CO2排出削減効 果の高い事業のJCM化	設備				-企業の他工場、		「 業 く の	他企業へのマーケティング	「イト」	Ĩ,		
3. "ベトナムにおける鋳物工場への雷気炉道3.事業"の補展開												
			コキロ	フォローアップ	ĥ		蒙	導入効果	説明会、	41		
							ð	の検証	見学	見学会開催		
4.離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	直接 拹讔					直 協 職				卣 摄 職		
○ 現地調査	•			•				•		•		
〇 国内会議(2回程度)		•					•		•			
○ 現地ワークショップ(2回程 度)	・ * た く た く									● 離談		
○ 報告書の作成		基礎 調査	基礎 調査				トレト				最終 版	

(3) スケジュール及び進捗状況・9月末時点の進捗状況を以下に示す。

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(10月)

株式会社 NTT データ経営研究所

#### (1) 10月の主な活動

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-6]都市間連携セミナーでの発表準備、発表
- ・[仕様書 2-7]報告書作成のための情報収集
- 中間検査対応

#### (2) 11 月の主な活動予定

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-6]都市間連携セミナーでの発表準備
- ・[仕様書 2-6]次回現地調査のための資料作成、日程調整
- ・[仕様書 2-7]報告書作成のための情報収集

(3) スケジュール及び進捗状況

・10月末時点の進捗状況を以下に示す。

日四諸并					2016年						2017年	
山割浜田	4月	5月	6月	月7	8月	日6	10J	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による 検討	6	技術検討		経済性検討		C 02 削減 効果試算	意たった。	意思決定に向け た支援	向け	
2.エネルギー起源CO2排出削減効 果の高い事業のJCM化	設備			一企業	- 企業の他工場、 		に業へ	5-20	他企業へのマーケティング	Ĩ,		
3. "ベトナムにおける鋳物工場への画点に道1 車並"の雄屈間												
い电ぶげ等入事業 い頂法用			フォロ	フォローアップ	ĥ		嫐	入効果	説明会、	41		
							9	の検証	見学う	見学会開催		
4.離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	直接 協議					直接 皺讔				直接 滅 職		
○ 現地調査	•			•				•		•		
〇 国内会議(2回程度)		•					•		•			
○ 現地ワークショップ (2回程度)	● # ↓ ↓ ↓ ↓ ↓									● 《書章		
○ 報告書の作成		<sup>基礎</sup> 調査	基礎 調査				●ドト				● 最終 版	

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(11月)

株式会社 NTT データ経営研究所

#### (1) 11 月の主な活動

- ·[仕様書 2-5]現地調査
  - ▶ 11/20~25の日程にて、現地調査を実施。
  - ハイフォン市外務局を中心に関係する行政機関、企業と協議し、プロジェクトの進捗報告と継続的な協力要請を実施した。
- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-7]報告書作成のための情報収集

#### (2) 12 月の主な活動予定

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-5]次回(1 月)現地調査のための資料作成、日程調整
- ・[仕様書 2-6]環境省への報告会、また報告会に向けた資料の作成
- ・[仕様書 2-7]報告書作成のための情報収集

・11 月末時点の進捗状況を以下に示す。												
王王指王					2016年					2	2017年	
	4月	5月	6月	7月	8月	日6	10月	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協 検討	現地協議による 検討	8	技術検討		経済性検討		CO2削減 効果試算	意 た3	意思決定に向け た支援	희녀	
2. エネルギー起源CO2排出削減効 果の高い事業のJCM化	設備				企業の他工具	「場、他1	他企業へのマーク	~~~~	ーティング	Ĩ,		
3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開				 フォローアップ			蒙	導入効果	説明会、	415		
							ê	の検証	見学	見学会開催		
4.離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	直接 協議					直 拹 讔				直接 協議		
○ 現地調査	•			•				•		•		
〇 国内会議(2回程度)		•					•		•			
○ 現地ワークショップ(2回程 度)	●									● 饕☆		
○ 報告書の作成		基礎 調査	基礎 調査				•				最終 版	

(3) スケジュール及び進捗状況

b\_Monthly report in Japanese

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(12月)

株式会社 NTT データ経営研究所

#### (1) 12月の主な活動

・[仕様書 2-1 従来にない事業発掘]

- ▶ 現地企業の抽出・働きかけ(項目 2-1①)
- ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ▶ CO2 削減効果算出方法、モニタリング方法に関する検討(項目 2-1④)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一企業の別工場への横展開(項目 2-22)
  - ▶ 横展開可能なセメント工場の抽出・働きかけ(項目 2-2③)
- ・[仕様書 2-5]次回(1 月)現地調査のための資料作成、日程調整
- ・[仕様書 2-6]環境省への報告会、また報告会に向けた資料の作成
- ・[仕様書 2-7]報告書作成のための情報収集

#### (2) 1月の主な活動予定

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-4 低炭素型事業に対する観光手数料活用の仕組み検討]
- ・[仕様書 2-5]次回(1月)現地調査のための資料作成、現地対応
- ・[仕様書 2-6]都市間連携セミナへの出席
- ・[仕様書 2-7]報告書作成

い及び進捗状況
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月末時点の進捗状況を以下に示す。
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	2016年 2017年	5月 6月 7月 8 9月 10月 11月 12月 1月 2月 3月 月 月	義による 技術検討 経済性検討 CO2削減 意思決定に向け たま援	設備補助申請 同一企業の他工場、他企業へのマーケティング 	フォローアップ     導入効果     説明会、       の検証     見学会開催	■ 直接 直接 直接 加議 加議	•	•		基礎 基礎 · · · · · · · · · · · · · · · · ·
					9	安美		•		•
	2016年	<b>2</b> 日 0		e業の他工場	_گ 	「「」」				
							•			唐 御 御
			現地協議による 検討	9備補助E 		また ま お		•		斯 調 管 記
5		4月				も協議	•		● # <u>↓</u> ↓ ↓ ↓ ↓ ↓	
		<b>沽動埧</b> 目	1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	2. エネルギー起源CO2排出削減効 果の高い事業のJCM化	3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開	4. 離島におけるEVバス導入に向け た観光手数料と組合せた仕組みの 構築	現地調査	国内会議(2回程度)	現地ワークショップ(2回程	報告書の作成

# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(1月)

株式会社 NTT データ経営研究所

#### (1) 1月の主な活動

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-4 低炭素型事業に対する観光手数料活用の仕組み検討]
- ・[仕様書 2-5]現地調査のための資料作成、現地対応
- ・[仕様書 2-6]都市間連携セミナへの出席
- ·[仕様書 2-7]報告書作成

#### (2) 2月の主な活動予定

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-4 低炭素型事業に対する観光手数料活用の仕組み検討]
- ・[仕様書 2-5]現地調査のための資料作成、現地対応
- ·[仕様書 2-7]報告書作成

	ς Υ								
2017年	2月	自け							
	1月	意思決定に向け た支援	Ĩ,	説明 <del>会、</del> 見学会開催	直 協議	•		●巖報会	
	12月	意見たる	「イト」	説明会 見学会			•		
	11月	C 02削減 効果試算	- - ら - と 0	- 導入効果 の検証		•			
	10月		他企業へのマーケティング	<del>و</del> ف			•		•
	日6	経済性検討			直接 皺				
2016年	8月		企業の他工場、	ĥ					
	月7	技術検討	□-企業			•			
	6月	R		<u>7</u> 40					基礎 調査
	5月	現地協議による 検討					•		基礎 調査
	4月	現地協	₩.		直接 皺	•		● # ¢ t ∩	
注書h 1百日		1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	2. エネルギー起源CO2排出削減効 果の高い事業のJCM化	3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開	4. 離島におけるEVバス導入に向け た観光手数料と組合せた仕組みの 構築	現地調査	国内会議(2回程度)	現地ワークショップ(2回程	報告書の作成

(3) スケジュール及び進捗状況

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# 平成 28 年度 JCM 都市間連携事業 「北九州市 - ハイフォン市連携事業」 月次進捗報告(2月)

株式会社 NTT データ経営研究所

#### (1) 2月の主な活動

- ・[仕様書 2-1 従来にない事業発掘]
  - ▶ 現地企業の抽出・働きかけ(項目 2-1①)
  - ▶ 要求仕様に基づく技術検討の実施(項目 2-12)
- ・[仕様書 2-2 セメント廃熱回収]
  - ▶ 同一スキームを用いた他企業への横展開の検討
- ・[仕様書 2-4 低炭素型事業に対する観光手数料活用の仕組み検討]
- ・[仕様書 2-5]現地調査のための資料作成、現地対応
- ・[仕様書 2-7]報告書作成
- · [仕様書 2-6 その他]
  - ▶ 環境省への進捗報告会と資料作成

#### (2) 3月の主な活動予定

- 報告書の納品
- 会計検査に向けた証憑の整理

ケジュール及び進捗状況
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3) イクンユール及び運行状況 ・2月末時点の進捗状況を以下に示す。													
日見帰共					2016年					2	2017年		
口到近日	4月	5月	6月	7月	8月	日6	10月	11月	12月	1月	2月	3月	
1. 従来にないエネルギー起源CO2 排出削減効果の高い事業の発掘	現地協	現地協議による 検討	6	技術検討		経済性検討		CO2削減 効果試算	意思決定を支援	意思決定に向け た支援	비나		
2. エネルギー起源CO2排出削減効 果の高い事業のJCM化	設備				企業の他工場、		企業への	他企業へのマーケティング	ーナー	Ĩ)			
3. "ベトナムにおける鋳物工場へ の電気炉導入事業"の横展開				<u>                                      </u>	ĥ		蒙	導入効果	説明会、	414			
							Ĝ	の検証	見学	見学会開催			
4. 離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの 構築	直接 協議					直接 協議				靣 摄 譺			
〇 現地調査	•			•				•		•			
〇 国内会議(2回程度)		•					•		•				
○ 現地ワークショップ (2回程 度)	● <i>†</i> <i>t</i> <i>t</i> <i>t</i> <i>t</i> <i>t</i> <i>t</i> <i>t</i> <i>t</i>									●澱報会			
○ 報告書の作成		基礎 調査	<sup>基礎</sup> 調査				•					•	

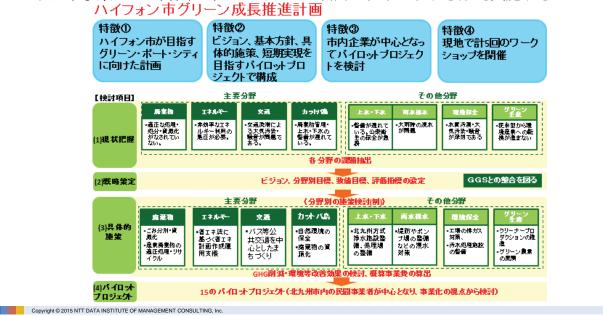


- 5. 離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの構築
- 6. 調査実施スケジュール

# 0.事業の背景

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- 2015年5月に北九州市の支援のもと、ハイフォン市のGreen Growth Strategy Action Plan: 1463/QD-UBNDの具体的な行動計画を明示した実践編である「ハイフォン市グ リーン成長推進計画」を策定した。同計画は、ハイフォン市と北九州市が協議を重ねた 上で策定され、ハイフォン市人民委員会から法的にも認めらてれている。
- 2015年度以降、この計画に沿った15の課題について具体的なプロジェクトを進めてきており、本事業もこの計画の中のいくつかの項目をサポートする形で実施する。



# 1. 本年度想定している事業内容概要

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本年度実施予定の4つの事業の概要について、以下のように整理しました。

想定事業	1. 従来にないエネル ギー起源CO2排出削減 効果の高い事業の発掘	2. エネルギー起源 CO2排出削減効果の高 い事業のJCM化	3. "ベトナムにおける 鋳物工場への電気炉導 入事業"の横展開	4. 離島におけるEVバス 導入に向けた観光手数料 と組合せた仕組みの構築	
プロジェクト 内容	ハイフォン市を中心と するベトナム北部の工 業団地を対象に、CNG を活用したコジェネ レーションや燃料転換 プロジェクト等の発掘 を行う	セメント工場の廃熱回 収発電事業について、 JCM設備補助事業への 申請準備を進める。ま た、類似案件の横展開 を検討する	ミドン地区を中心に幅 広くベトナム全土を対 象として、我が国の高 効率な電気炉を導入す るJCM設備補助対象事 業の創出に向けた活動 を実施	過去2年間、観光手数料 の導入可能性を議論して きたものを引き続き、観 光手数料の仕組みを用い た離島の低炭素化のモデ ル構築を目指す	
導入技術	コジェネレーション等	廃熱回収発電システム	高効率型電気炉	EVバス	
実施スキーム		別表参照			
想定している 契約方式/事業 形式	随意契約 物売りのみを想定	随意契約 物売りのみを想定	随意契約 物売りのみを想定	制度検討のため 該当なし	
補助金見込額、 費用対効果	調査結果を踏まえ検討	5.5億円(50%想定) 2000円/1tCO2	調査結果を踏まえ検討		
要調整事項	プロジェクト実施企業 発掘	なし	プロジェクト実施企業 発掘	制度構築に向けた関係各 局との調整	
課題	燃転は石炭とCNGの価 格競争が課題	2016年4月設備補助事 業に申請済	現地企業の与信確認 中国製炉との価格競争	利害関係者との調整	

# 2. 従来にないエネルギー起源CO2排出削減効果の高い事業の発掘

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# 2-1. 想定している技術①

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## ● 本年度は新しく以下の事業の実現可能性調査を進めることを想定しております。

	燃転+高効率機器の導入	コジェネ導入	(交通)
想定メニュー	石炭、重油等 →天然ガス	コジェネレーション システム	(CNG車) (バス・タクシー)
概要・基礎情報	○現在石炭を使用している ボイラや炉などの設備の燃料を天然ガスに転換 ○2016/1の首相の声明で 2030年までに石炭中心の電 源構成見直しが決定	<ul> <li>ホテルや化学系工場な ど、熱と電気の需要がある設備に対してコジェネレーションシステムを導入する</li> <li>中央制御型のボイラを使用しているホテルリストあり</li> </ul>	<ul> <li>新規導入されるバスやタクシーをCNG車にする</li> <li>既存のバスやタクシーをCNG車に更改</li> <li>ハノイではタクシー25,000台、バス1,200台が稼働</li> <li>HCMCでは2016年3月に23台のCNGバスが導入された</li> </ul>
JCM事業化案	○高効率機器導入時の初期 費用に対して最大50%の補 助 (※燃転のための設備は対 象外)	○コジェネシステムの導 入に係る初期費用に対し て最大50%の補助	○既存のバスを更改しCNG化す るための費用に対して最大50% の補助
課題	○石炭の価格が安い	○大規模な熱需要につい て要調査	○過去の調査報告書を参考に JCM事業化の可能性を検討



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## ○プロジェクト概要

電気と熱の需要のある工場やホテル等に対して、コジェネレーションシステム を導入する。

○技術の概要

コジェネレーションシステム

○特徴

コジェネレーションシステムは、発電時に発生する排熱を熱エネルギーとして回収し、 電熱併給とすることで高いエネルギー効率を実現することができる設備である。中でもガス タービン型コジェネレーションは、熱需要の変動が少ない運用に有意であることから、常時 稼働の工場での利用に適している。

# ○実績表(JCM設備補助事業として)

納入年月	納入場所	概要説明
2015年	インドネシア	自動車製造工場におけるガスコージェネレーションシステムの 導入(川崎重工製 7.8MW高効率ガスエンジン)
2015年	タイ	二輪車製造工場におけるオンサイトエネルギー供給のた めのガスコージェネレーションシステムの導入(新日鉄住金工 ンジニアリング製 7MW級ガスエンジン)
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# 2-2.排出削減総量及び補助金の見込み額、費用対効果

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- プロジェクト実施時のCO2排出削減量と費用対効果についてはいずれも未定です。
- 要求仕様や制約となる事項を確認し、導入機器の検討を行います。
- その後、既存方法論などを参考に、リファレンスシナリオとの比較を行うことでCO2排出 削減量を計算する予定です。

# ○エネルギー起源CO2排出削減量

排出削減総量(t-CO2) =

エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年)

# ○エネルギー起源CO2排出削減に関わる補助金額の費用対効果

CO2削減コスト(円/t-CO2) = 補助金(円)÷(エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年))

# ○GHG排出削減に関わる補助金額の費用対効果

GHG削減コスト(円/t-CO2換算) = 補助金(円)÷(GHGの年間排出削減量(tCO2換算/年)×耐用年数(年))

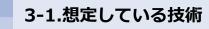
# 2-3.調査上の課題等

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No.	調査で解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	現地企業の抽出・働きかけ	JCM事業実施の候補となる企業 を抽出する(2月まで)	ハイフォン 市 北九州市 NTT	現地企業	東京ガス様の調査をもとにした個別の企 業へのアプローチにより、JCM事業実施 に向けた働きかけを行う
2	要求仕様に基づく技術検討 の実施	現地企業の要求仕様を満たし、 CO2排出削減に資する省エネ/低 炭素型な機器を選定する(11月)	NTT	国内ベン <i>ダ</i> 等	現地企業の要求仕様をもとに、各ベンダ に仕様を満たす機器のスペックを確認す る
3	設備導入にかかる経済性検 討	設備導入による省エネに伴い、投 資回収期間等の条件が許容範囲で あることを確認する(2月まで)	NTT	国内ベン ダ等	ベンダから得た見積もりならびに省エネ 性能をもとに、投資回収期間の算定を行 う
4	CO2削減効果算出方法、モ ニタリング方法に関する検 討	設備導入によるCO2排出削減量の 算出を行う(2月まで)	NTT	国内ベン ダ等	ベンダから得た省エネ性能と既存の承認 済みMRV 方法論をもとに、CO2排出削 減量の計算を行う
5	代表事業者の抽出・働きか け	JCM事業化の際、国際コンソーシ アムの代表事業者となる日本企業 を発掘する(2月まで)	NTT	国内企業	JCM事業実施に向けた、代表事業者とな りうる企業の抽出し、働きかけを行う
6	現地企業のJCM事業実施に 向けた意思決定	現地企業がJCM事業実施する旨意 思決定する(2月まで)	NTT	現地企業	現地企業に対してJCM制度の説明、2~ 4で検討した内容の説明を行うことで JCM事業実施に向けた意思決定をサポー トする
7	資金調達方法の確認、JCM 事業主体となる企業の財務 状況の確認	JCM事業化に向けた資金調達方法 の確認とともに、JCM事業主体と なる企業の財務状況を確認する(2 月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認 とともに、JCM事業主体となる企業の財 務状況を確認する
8	発注・契約方式の確認	設備導入の契約に当たり入札が必 要か、随意契約が可能か確認(2月 まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認
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3. エネルギー起源CO2排出削減効果の高い事業のJCM化



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#### ○技術の概要

セメント工場での廃熱回収発電システム

## ○特徴

廃熱回収発電システムは、セメント工場、高炉、コークス炉などの排ガスから 熱回収し発電を行う設備である。特にセメント工場では、廃熱発電システムの設 置により、工場全体の電力消費量の約30%をまかなうことが出来る省エネルギー 設備であり、CO2排出量削減にも貢献している。

## ○実績表

納入年月	納入場所	概要説明
2013年11月受注 2015年3月施工完了	インドネシア	<ul> <li>セメント焼成プロセスから排出される廃熱を排熱回収発 電設備によって電力エネルギーに転換し、現在使用している電力会社からの電力と代替するNEDOのエネルギー 有効モデル事業。</li> <li>具体的には、インドネシア・PTセメンパダン社内に発電容量8.5MWのセメント排熱回収発電設備を日本・インドネシア共同で建設。</li> <li>発電所での化石燃料の使用を減らし、発電所からの温室効果ガスの排出を削減した。CO2削減量は43,117t/年。</li> </ul>

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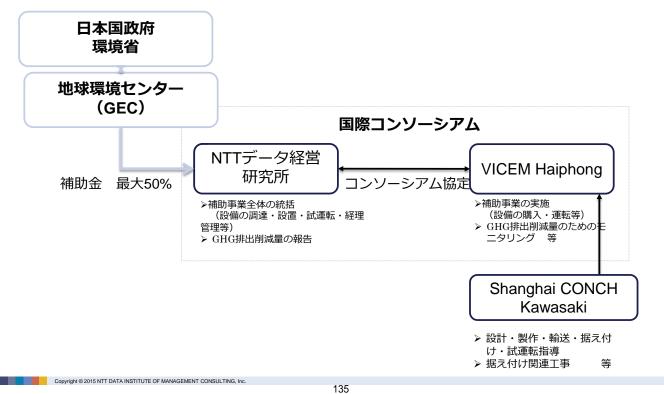
3-2.事業実施スキーム

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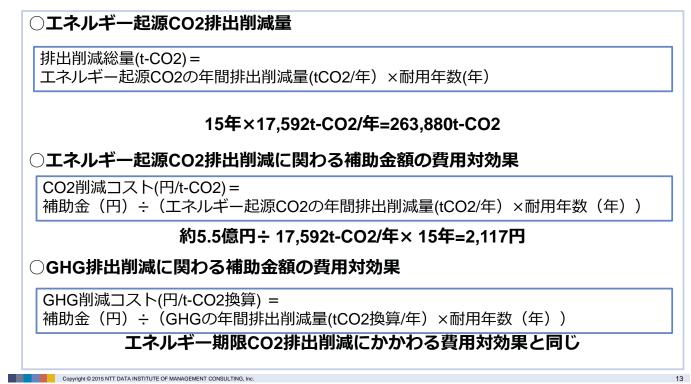
セメント工場への廃熱回収システム導入事業の実施スキームについて、以下のように検討しました。



# 3-3. 排出削減総量及び補助金の見込み額、費用対効果

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セメント工場での廃熱回収発電プロジェクト実施時のCO2排出削減量と費用対効果について、以下のように試算しました。



# 3-4.その他要調整事項、調査上の課題等

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No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	ハイフォン市人民委員 会へのJCM事業化の成 果アピール	設備補助事業採択後、工事 着工後(11~2月まで)	北九州市 NTT	HPPC	ハイフォン市人民委員会に対して 事業採択の報告とともに期待され る成果をアピールする
2	同一企業の別工場への 横展開	設備補助事業採択後、工事 着工後(11~2月まで)	NTT	VICEM	設備補助申請後のサポートを行う とともに、同一企業の他工場内に て、まだ廃熱回収発電設備が導入 されていない生産ラインに対する 検討支援
3	横展開可能なセメント 工場の抽出・働きかけ	設備補助事業採択後(7~2月 まで)	NTT	-	国内の廃熱回収プラントの設置さ れていないセメント工場の抽出な らびに働きかけを行う
4	資金調達方法の確認、 JCM事業主体となる企業 の財務状況の確認	JCM事業化に向けた資金調達方 法の確認とともに、JCM事業主 体となる企業の財務状況を確認 する(2月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認とともに、JCM事業主体となる企業の財務状況を確認する
5	発注・契約方式の確認	設備導入の契約に当たり入札が 必要か、随意契約が可能か確認 (2月まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認



# 4-1.想定している技術

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# ○プロジェクト概要

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ハイフォン市・ミドン地区に存する140程度の工場のうち、規模が大きく、地域の リーダー的存在である2つの企業の鋳物工場に、我が国の高効率な電気炉を導入す る。

# ○技術の概要

鋳物を製造する際、材料の金属を溶融するための炉である。

## ○特徴

日本製の炉は、1kgの溶融にかかるエネルギー消費率は0.55 kWh程度と、ベトナム国内で普及が進んでいる中国製の電気炉(1kgの溶融に1.0kWh程度)の半分近い省エネ効果がある。加えて、故障が少なく、20年以上の稼働が可能である。

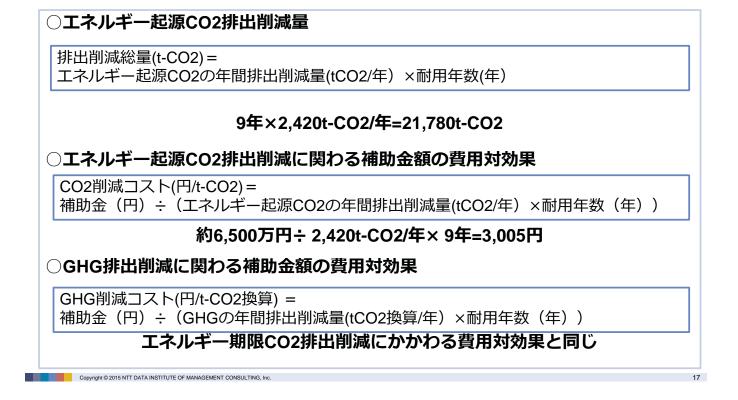
# ○実績表(JCM設備補助事業によるもの)

納入年月	納入場所	概要説明
2015年	ベトナム	鋳物工場への高効率電気炉の導入

## 4-2. 排出削減総量及び補助金の見込み額、費用対効果

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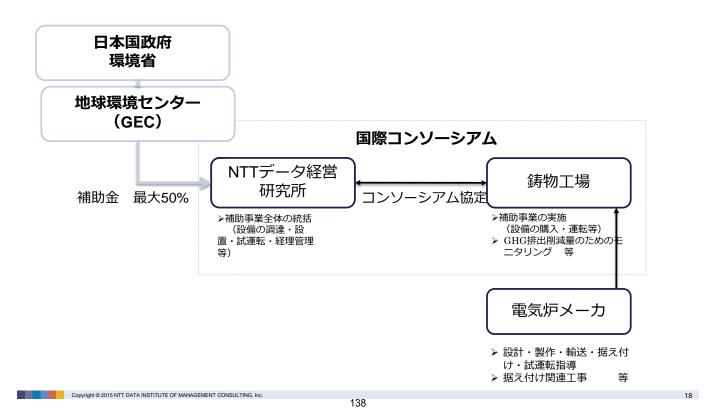
鋳物工場への高効率な電気炉導入プロジェクト実施時のCO2排出削減量と費用対効果について、以下のように試算しました。(2工場に対し計3基の炉を導入した場合)



4-3.想定している事業実施スキーム

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"ベトナムにおける鋳物工場への電気炉導入事業"の実施スキームは以下の通りです。



# 4-4.その他要調整事項、調査上の課題等

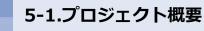
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No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	ハイフォン市人民委員 会へのJCM事業化の成 果アピール	設備導入後	北九州市 NTT	HPPC	ハイフォン市人民委員会に対して 事業採択の報告とともに事業の成 果をアピールする
2	横展開可能な鋳物工場 の抽出・働きかけ	2017年2月	NTT	鋳物工 場群	今後電気炉を導入予定の鋳物工場 の抽出ならびに働きかけを行う
3	鋳物工場群に対する中 国製電気炉メーカの価 格攻勢	ミドン地区の他の鋳物工場 でのJCM事業化に向けた合 意形成	NTT	鋳物工 場群	JCM設備補助制度を活用すること で初期投資額を抑えられることや 長期的な視点で見た際の優位性を 説明する 長期的には、ベトナム仕様の炉の 開発をするための方向性検討をお こなう
4	資金調達方法の確認、 JCM事業主体となる企業 の財務状況の確認	JCM事業化に向けた資金調達方 法の確認とともに、JCM事業主 体となる企業の財務状況を確認 する(2月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認とともに、JCM事業主体となる企業の財務状況を確認する
5	発注・契約方式の確認	設備導入の契約に当たり入札が 必要か、随意契約が可能か確認 (2月まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認

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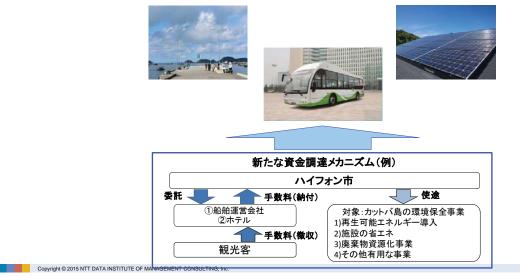
# 5. 離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの構築

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- 観光を主な産業とするカットバ島において、観光手数料を用いた環境保全等のための新しい資金調達メカニズムの導入を2014年度から検討している。
- これまでの活動では、カットバ島の低炭素化事業の1つとして、カットバ島内を走るディーゼルバスのEV化を検討した。EVバスについては現在、GECの「途上国向け低炭素技術イノベーション事業」の中で、実証車1台の走行に向けた準備を行っているところである。
- 今後、EVバス普及を含むカットバ島の低炭素化事業の面的拡大を進めるために、観光手数料を 用いた新たな資金メカニズムの導入を検討する。



## 5-2.調査上の課題等

### NTTDATA

No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	観光手数料の徴収制度 検討	関係機関との合意形成を目 指し観光手数料の徴収制度 (案)作成	北九州市 NTT	HPPC、 関係部 局	カットバ島における観光手数料の 徴収制度について、HPPC、関係 部局と定期的な協議を行う。
2	低炭素型事業に対する 観光手数料活用の仕組 み検討	関係機関との合意形成、観 光手数料活用の仕組み (案)作成	北九州市 NTT	HPPC、 関係部 局	カットバ島で想定するEVバスな ど低炭素型事業に観光手数料を活 用するための仕組みについて、 HPPC、関係部局と定期的な協議 を行う。

6. 調査実施スケジュール

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## 本年度の調査実施スケジュールについて、以下のように想定しております。

活動項目	2016年								2017年		
伯劉共曰	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2排 出削減効果の高い事業の発掘	現地協 検討	議によ	る技行	<b>析検討</b>	経済性	+#===\	CO2削测 効果試算	5 5	意思決定に 支援	:向け	
2. エネルギー起源CO2排出削減効果の高い事業のJCM化	設備補	助申請	同一1	企業の他	江場、	他企業	<u> へのマ-</u>	-ケティ	ング		
3. "ベトナムにおける鋳物工場への 電気炉導入事業"の横展開		フ:	オローフ	マップ			導入効果				
							の検証	見习	会開催		
4. 離島におけるEVバス導入に向けた 観光手数料と組合せた仕組みの構築	直接 協議				直接 協議				直接 協議		
○ 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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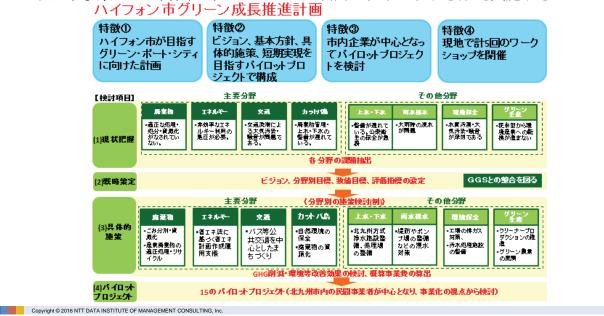


6. 調査実施スケジュール

# 0.事業の背景

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- 2015年5月に北九州市の支援のもと、ハイフォン市のGreen Growth Strategy Action Plan: 1463/QD-UBNDの具体的な行動計画を明示した実践編である「ハイフォン市グ リーン成長推進計画」を策定した。同計画は、ハイフォン市と北九州市が協議を重ねた 上で策定され、ハイフォン市人民委員会から法的にも認めらてれている。
- 2015年度以降、この計画に沿った15の課題について具体的なプロジェクトを進めてきており、本事業もこの計画の中のいくつかの項目をサポートする形で実施する。



# 1. 本年度想定している事業内容概要

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本年度実施予定の4つの事業の概要について、以下のように整理しました。

想定事業	1. 従来にないエネル ギー起源CO2排出削減 効果の高い事業の発掘	2. エネルギー起源 CO2排出削減効果の高 い事業のJCM化	3. "ベトナムにおける 鋳物工場への電気炉導 入事業"の横展開	4. 離島におけるEVバス 導入に向けた観光手数料 と組合せた仕組みの構築			
プロジェクト 内容	ハイフォン市を中心と するベトナム北部の工 業団地を対象に、CNG を活用したコジェネ レーションや燃料転換 プロジェクト等の発掘 を行う	セメント工場の廃熱回 収発電事業について、 JCM設備補助事業への 申請準備を進める。ま た、類似案件の横展開 を検討する	ミドン地区を中心に幅 広くベトナム全土を対 象として、我が国の高 効率な電気炉を導入す るJCM設備補助対象事 業の創出に向けた活動 を実施	過去2年間、観光手数料 の導入可能性を議論して きたものを引き続き、観 光手数料の仕組みを用い た離島の低炭素化のモデ ル構築を目指す			
導入技術	コジェネレーション等	廃熱回収発電システム	高効率型電気炉	EVバス			
実施スキーム	別表参照						
想定している 契約方式/事業 形式	随意契約 物売りのみを想定	随意契約 物売りのみを想定	随意契約 物売りのみを想定	制度検討のため 該当なし			
補助金見込額、 費用対効果	調査結果を踏まえ検討	5.5億円(50%想定) 2000円/1tCO2	調査結果を踏まえ検討				
要調整事項	プロジェクト実施企業 発掘	なし	プロジェクト実施企業 発掘	制度構築に向けた関係各 局との調整			
課題	燃転は石炭とCNGの価 格競争が課題	2016年4月設備補助事 業に申請済	現地企業の与信確認 中国製炉との価格競争	利害関係者との調整			

# 2. 従来にないエネルギー起源CO2排出削減効果の高い事業の発掘

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# 2-1. 想定している技術①

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### ● 本年度は新しく以下の事業の実現可能性調査を進めることを想定しております。

	燃転+高効率機器の導入	コジェネ導入	(交通)
想定メニュー	石炭、重油等 →天然ガス	コジェネレーション システム	(CNG車) (バス・タクシー)
概要・基礎情報	○現在石炭を使用している ボイラや炉などの設備の燃料を天然ガスに転換 ○2016/1の首相の声明で 2030年までに石炭中心の電 源構成見直しが決定	<ul> <li>ホテルや化学系工場な ど、熱と電気の需要がある設備に対してコジェネレーションシステムを導入する</li> <li>中央制御型のボイラを使用しているホテルリストあり</li> </ul>	<ul> <li>新規導入されるバスやタクシーをCNG車にする</li> <li>既存のバスやタクシーをCNG車に更改</li> <li>ハノイではタクシー25,000台、バス1,200台が稼働</li> <li>HCMCでは2016年3月に23台のCNGバスが導入された</li> </ul>
JCM事業化案	○高効率機器導入時の初期 費用に対して最大50%の補 助 (※燃転のための設備は対 象外)	○コジェネシステムの導 入に係る初期費用に対し て最大50%の補助	○既存のバスを更改しCNG化す るための費用に対して最大50% の補助
課題	○石炭の価格が安い	○大規模な熱需要につい て要調査	○過去の調査報告書を参考に JCM事業化の可能性を検討



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## ○プロジェクト概要

電気と熱の需要のある工場やホテル等に対して、コジェネレーションシステム を導入する。

○技術の概要

コジェネレーションシステム

○特徴

コジェネレーションシステムは、発電時に発生する排熱を熱エネルギーとして回収し、 電熱併給とすることで高いエネルギー効率を実現することができる設備である。中でもガス タービン型コジェネレーションは、熱需要の変動が少ない運用に有意であることから、常時 稼働の工場での利用に適している。

## ○実績表(JCM設備補助事業として)

納入年月	納入場所	概要説明
2015年	インドネシア	自動車製造工場におけるガスコージェネレーションシステムの 導入(川崎重工製 7.8MW高効率ガスエンジン)
2015年	タイ	二輪車製造工場におけるオンサイトエネルギー供給のた めのガスコージェネレーションシステムの導入(新日鉄住金工 ンジニアリング製 7MW級ガスエンジン)

## 2-2.排出削減総量及び補助金の見込み額、費用対効果

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- プロジェクト実施時のCO2排出削減量と費用対効果についてはいずれも未定です。
- 要求仕様や制約となる事項を確認し、導入機器の検討を行います。
- その後、既存方法論などを参考に、リファレンスシナリオとの比較を行うことでCO2排出 削減量を計算する予定です。

## ○エネルギー起源CO2排出削減量

排出削減総量(t-CO2) =

エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年)

## ○エネルギー起源CO2排出削減に関わる補助金額の費用対効果

CO2削減コスト(円/t-CO2)= 補助金(円)÷(エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年))

## ○GHG排出削減に関わる補助金額の費用対効果

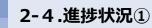
GHG削減コスト(円/t-CO2換算) = 補助金(円)÷(GHGの年間排出削減量(tCO2換算/年)×耐用年数(年))

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# 2-3.調査上の課題等

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No.	調査で解決したい課題	獲得目標(いつまでに)	担当	相手方	
1	現地企業の抽出・働きかけ ⇒進行中	JCM事業実施の候補となる企業 を抽出する(2月まで)	ハイフォン 市 北九州市 NTT	現地企業	東京ガス様の調査をもとにした個別の企 業へのアプローチにより、JCM事業実施 に向けた働きかけを行う
2	要求仕様に基づく技術検討 の実施 <mark>⇒進行中</mark>	現地企業の要求仕様を満たし、 CO2排出削減に資する省エネ/低 炭素型な機器を選定する(11月)	NTT	国内ベン ダ等	現地企業の要求仕様をもとに、各ベンダ に仕様を満たす機器のスペックを確認す る
3	設備導入にかかる経済性検 討 <b>⇒進行中</b>	設備導入による省エネに伴い、投 資回収期間等の条件が許容範囲で あることを確認する(2月まで)	NTT	国内ベン ダ等	ベンダから得た見積もりならびに省エネ 性能をもとに、投資回収期間の算定を行 う
4	CO2削減効果算出方法、モ ニタリング方法に関する検 討	設備導入によるCO2排出削減量の 算出を行う(2月まで)	NTT	国内ベン ダ等	ベンダから得た省エネ性能と既存の承認 済みMRV 方法論をもとに、CO2排出削 減量の計算を行う
5	代表事業者の抽出・働きか け	JCM事業化の際、国際コンソーシ アムの代表事業者となる日本企業 を発掘する(2月まで)	NTT	国内企業	JCM事業実施に向けた、代表事業者となりうる企業の抽出し、働きかけを行う
6	現地企業のJCM事業実施に 向けた意思決定	現地企業がJCM事業実施する旨意 思決定する(2月まで)	NTT	現地企業	現地企業に対してJCM制度の説明、2~ 4で検討した内容の説明を行うことで JCM事業実施に向けた意思決定をサポー トする
7	資金調達方法の確認、JCM 事業主体となる企業の財務 状況の確認	JCM事業化に向けた資金調達方法 の確認とともに、JCM事業主体と なる企業の財務状況を確認する(2 月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認 とともに、JCM事業主体となる企業の財 務状況を確認する
8	発注・契約方式の確認	設備導入の契約に当たり入札が必 要か、随意契約が可能か確認(2月 まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認
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候補事業2

- ◆ ハイフォン市、ハノイ市等の北部地域を中心に幅広くポテンシャルを有する顧客を 開拓中。
- ◆ 現在までの活動で、発掘したポテンシャルのある候補は次のとおり。

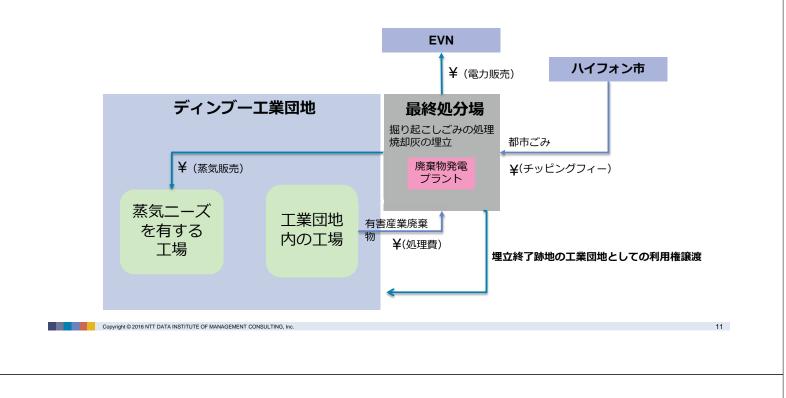
候補事業1

対象事業者	ハノイ市郊外で二輪車の タイヤ等を製造する工場	ハイフォン市内の大規模工業団地 の運営事業者及びハイフォン市
状況	事業拡大に伴い工場を拡大する計 画があり、新工場の建設を検討中	工業団地に隣接する一般廃棄物の埋め 立て処分場が工業団地の価値を低下さ せていることから、工業団地運営事業 者としてビジネスベースで廃棄物処理
可能性	現工場では、C重油焚きのボイラを 使用しているが、経済性があえば新 工場では天然ガスへの転換やコー ジェネレーションの導入を検討した いとの意向	事業を検討中 ハイフォン市からのチッピングフィー だけで廃棄物発電事業を実施すること は困難なため、新たなビジネスモデル を検討中(次ページ参照)
今後の計画	JCMの詳細説明を行うとともに、 事業成立のために必要な条件等を 把握し、詳細検討への意向を目指 す予定	継続的な検討を実施予定

### 2-4.進捗状況② ディンブー工業団地における廃棄物発電

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◆ "収入(チッピングフィー+売電収入+売蒸気収入+有害廃棄物処理費) – 原価" に将来の工業団地用地の販売メリットを加えることで民間投資を引き込めるか否か 等の可能性を検討中。





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- ◆ ベトナムにおけるCNG車導入プロジェクト
  - ベトナムで産業部門に対してパイプラインやCNGでガス供給を行っている
     Petro Vietnam Low Pressure Gas Distribution (PVGD)より東京ガス様へCNGタ クシー導入検討への支援依頼あり
    - PVGD社は、CNGステーションの運営も行う意向
    - 同社の簡易試算によると、CNGはガソリンに対して有利な価格で販売可能
       で、スタンド建設費も数年で回収可能
    - 現在、日系の大手自動車メーカ様との協議もスタート

検討条件:タクシー会社がCNG対応の新車(タイで流通しているものと同等モデルを想定)を導入する。スタンド設置費用についてはJCM事業化の際の検討対象外とする。
 ⇒タイで普及しているCNG車を導入することで、20%程度のCO2排出削減を実現可能との試算。

### 今後の方針:

PVGD社、タクシー会社、自動車メーカの3社が協働し、短期的には実証的に CNG車を少数導入し、経済性を含む評価を行う。その上で投資が進むようであれ ばJCM事業化を視野に入れて具体的な検討を行う。

# 3. エネルギー起源CO2排出削減効果の高い事業のJCM化

# 3-1.想定している技術

### ○技術の概要

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セメント工場での廃熱回収発電システム

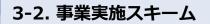
### ○特徴

廃熱回収発電システムは、セメント工場、高炉、コークス炉などの排ガスから 熱回収し発電を行う設備である。特にセメント工場では、廃熱発電システムの設 置により、工場全体の電力消費量の約30%をまかなうことが出来る省エネルギー 設備であり、CO2排出量削減にも貢献している。

## ○実績表

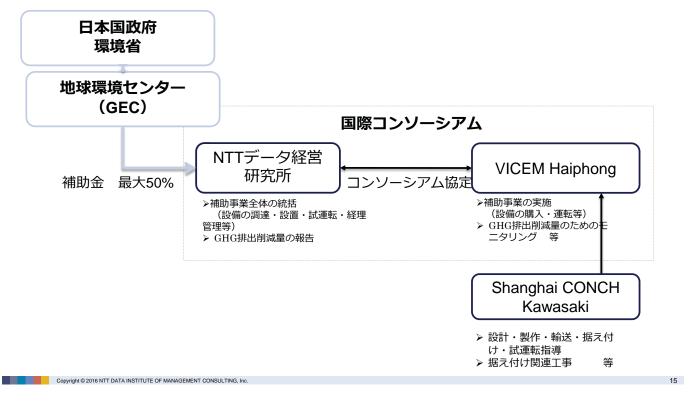
納入年月	納入場所	概要説明
2013年11月受注 2015年3月施工完了	インドネシア	<ul> <li>セメント焼成プロセスから排出される廃熱を排熱回収発 電設備によって電力エネルギーに転換し、現在使用している電力会社からの電力と代替するNEDOのエネルギー 有効モデル事業。</li> <li>具体的には、インドネシア・PTセメンパダン社内に発電容量8.5MWのセメント排熱回収発電設備を日本・インドネシア共同で建設。</li> <li>発電所での化石燃料の使用を減らし、発電所からの温室効果ガスの排出を削減した。CO2削減量は43,117t/年。</li> </ul>

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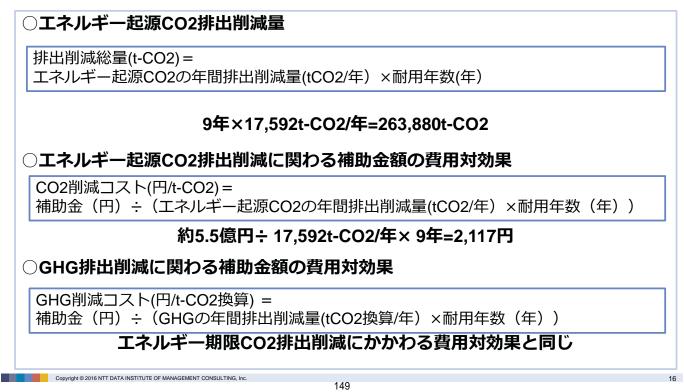
セメント工場への廃熱回収システム導入事業の実施スキームについて、以下のように検討しました。



## 3-3. 排出削減総量及び補助金の見込み額、費用対効果

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セメント工場での廃熱回収発電プロジェクト実施時のCO2排出削減量と費用対効果について、以下のように試算しました。



# 3-4.その他要調整事項、調査上の課題等

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1       ハイフォン市人民委員 会へのJCM事業化の成 果アピール       設備補助事業採択後、工事 着工後(11~2月まで)       北九州市 NTT       HPPC       ハイフォン市人民委 事業採択の報告とと る成果をアピールす         2       同一企業の別工場への 横展開 →進行中       設備補助事業採択後、工事 着工後(11~2月まで)       NTT       VICEM       設備補助申請後のサ とともに、同一企業 て、まだ廃熱回収発	もに期待され
横展開 着工後(11~2月まで) とともに、同一企業	3
→進行中 ここので、また焼熱回収先 されていない生産ラ 検討支援	きの他工場内に を電設備が導入
3 横展開可能なセメント 設備補助事業採択後(7~2月 NTT - 国内の廃熱回収プラ 工場の抽出・働きかけ まで) →進行中 - ちびに働きかけを行	工場の抽出な
4       資金調達方法の確認、       JCM事業化に向けた資金調達方       NTT       現地企業       JCM事業化に向けた資金         JCM事業主体となる企業       法の確認とともに、JCM事業主体となる企業の財務状況を確認       NTT       現地企業       JCM事業化に向けた資金         の財務状況の確認       体となる企業の財務状況を確認       の財務状況を確認する       の財務状況を確認する	
5 発注・契約方式の確認 設備導入の契約に当たり入札が NTT 現地企業 設備導入の契約に当たり 必要か、随意契約が可能か確認 (2月まで)	

# 3-5.進捗状況

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- ◆ EPC販売ではなく、SPCを設立し、SPCからセメント会社へ電力販売を行うビジネ スモデルの検討を行うことで現地セメント会社と合意。(BOT型をベースに検討の 予定)
- ◆ 現在、VICEMグループとして、グループ全体で廃熱回収発電事業に取り組んでいく 姿勢を見せ始めており、成功すればかなりのポテンシャルが期待できる。





# 4-1.想定している技術

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## ○プロジェクト概要

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ハイフォン市・ミドン地区に存する140程度の工場のうち、規模が大きく、地域の リーダー的存在である2つの企業の鋳物工場に、我が国の高効率な電気炉を導入す る。

### ○技術の概要

鋳物を製造する際、材料の金属を溶融するための炉である。

### ○特徴

日本製の炉は、1kgの溶融にかかるエネルギー消費率は0.55 kWh程度と、ベトナム国内で普及が進んでいる中国製の電気炉(1kgの溶融に1.0kWh程度)の半分近い省エネ効果がある。加えて、故障が少なく、20年以上の稼働が可能である。

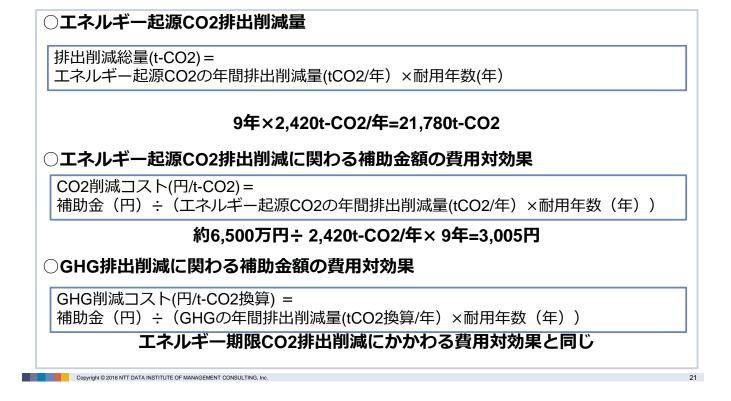
## ○実績表(JCM設備補助事業によるもの)

納入年月	納入場所	概要説明
2015年	ベトナム	鋳物工場への高効率電気炉の導入

## 4-2. 排出削減総量及び補助金の見込み額、費用対効果

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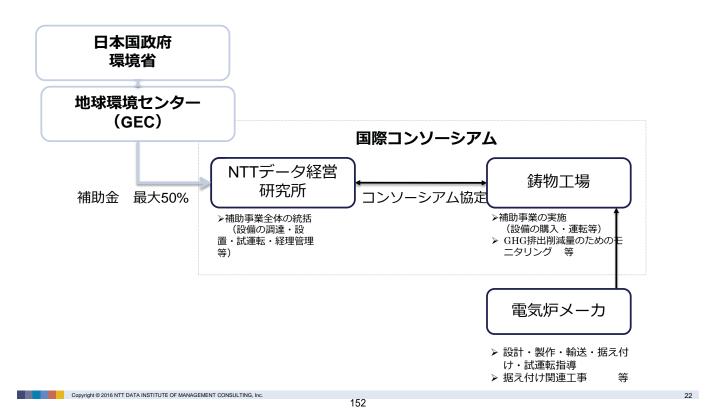
鋳物工場への高効率な電気炉導入プロジェクト実施時のCO2排出削減量と費用対効果について、以下のように試算しました。(2工場に対し計3基の炉を導入した場合)



4-3.想定している事業実施スキーム

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"ベトナムにおける鋳物工場への電気炉導入事業"の実施スキームは以下の通りです。



# 4-4.その他要調整事項、調査上の課題等

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No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	ハイフォン市人民委員 会へのJCM事業化の成 果アピール	設備導入後	北九州市 NTT	HPPC	ハイフォン市人民委員会に対して 事業採択の報告とともに事業の成 果をアピールする
2	横展開可能な鋳物工場 の抽出・働きかけ	2017年2月	NTT	鋳物工 場群	今後電気炉を導入予定の鋳物工場 の抽出ならびに働きかけを行う
3	鋳物工場群に対する中 国製電気炉メーカの価 格攻勢	ミドン地区の他の鋳物工場 でのJCM事業化に向けた合 意形成	NTT	鋳物工 場群	JCM設備補助制度を活用すること で初期投資額を抑えられることや 長期的な視点で見た際の優位性を 説明する 長期的には、ベトナム仕様の炉の 開発をするための方向性検討をお こなう
4	資金調達方法の確認、 JCM事業主体となる企業 の財務状況の確認	JCM事業化に向けた資金調達方 法の確認とともに、JCM事業主 体となる企業の財務状況を確認 する(2月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認とともに、JCM事業主体となる企業の財務状況を確認する
5	発注・契約方式の確認	設備導入の契約に当たり入札が 必要か、随意契約が可能か確認 (2月まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認

## 4-5.進捗状況

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## 前回ご報告時までの活動

- ◆ ハイフォン市を含む北部地域における電気炉導入ニーズを有する会社を個別訪問
- ◆ 日系企業2社から高効率な電気炉の導入ニーズを発掘
  - ▶ 1社は工作機械メーカで既に日系メーカの電気炉を導入済み。
  - ▶ 工場稼働がひっ迫しており、追加の電気炉を導入したいとの意向。
  - ▶ 但し、現在の電気炉のバックアップ用として、るつぼ部分(炉体部分)を既に 購入済みで、今後は、電気設備等を調達し、新たな電気炉システムを増設した いとの意向
  - ⇒GEC様にご相談の結果、既に炉体部分を日系メーカから購入済みであり、 J CMの対象として取り上げるのは難しいのではないかとの指摘あり
  - ▶ 他の1社は中国製電気炉を導入し、そのパフォーマンスの悪さから日系メーカ あるいは世界的に有名な米国メーカの電気炉導入を希望
  - ▶ 現在、導入に向けた可能性を協議中

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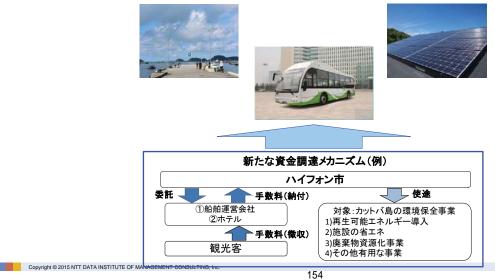
# 5. 離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの構築



# 5-1.プロジェクト概要

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- 観光を主な産業とするカットバ島において、観光手数料を用いた環境保全等のための新しい資金調達メカニズムの導入を2014年度から検討している。
- これまでの活動では、カットバ島の低炭素化事業の1つとして、カットバ島内を走るディーゼルバスのEV化を検討した。EVバスについては現在、GECの「途上国向け低炭素技術イノベーション事業」の中で、実証車1台の走行に向けた準備を行っているところである。
- 今後、EVバス普及を含むカットバ島の低炭素化事業の面的拡大を進めるために、観光手数料を 用いた新たな資金メカニズムの導入を検討する。



# 5-2.調査上の課題等

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	No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
	1	観光手数料の徴収制度 検討	関係機関との合意形成を目 指し観光手数料の徴収制度 (案)作成 ⇒関係機関との協議を進め ている。カットハイ県の人 民委員会の反対票が多いも のの、ハイフォン市外務局 を中心に、前向きに検討進 める動きがある。	北九州市 NTT	HPPC、 関係部 局	カットバ島における観光手数料の 徴収制度について、HPPC、関係 部局と定期的な協議を行う。
2	2	低炭素型事業に対する 観光手数料活用の仕組 み検討	関係機関との合意形成、観 光手数料活用の仕組み (案)作成	北九州市 NTT	HPPC、 関係部 局	カットバ島で想定するEVバスな ど低炭素型事業に観光手数料を活 用するための仕組みについて、 HPPC、関係部局と定期的な協議 を行う。

6. 調査実施スケジュール

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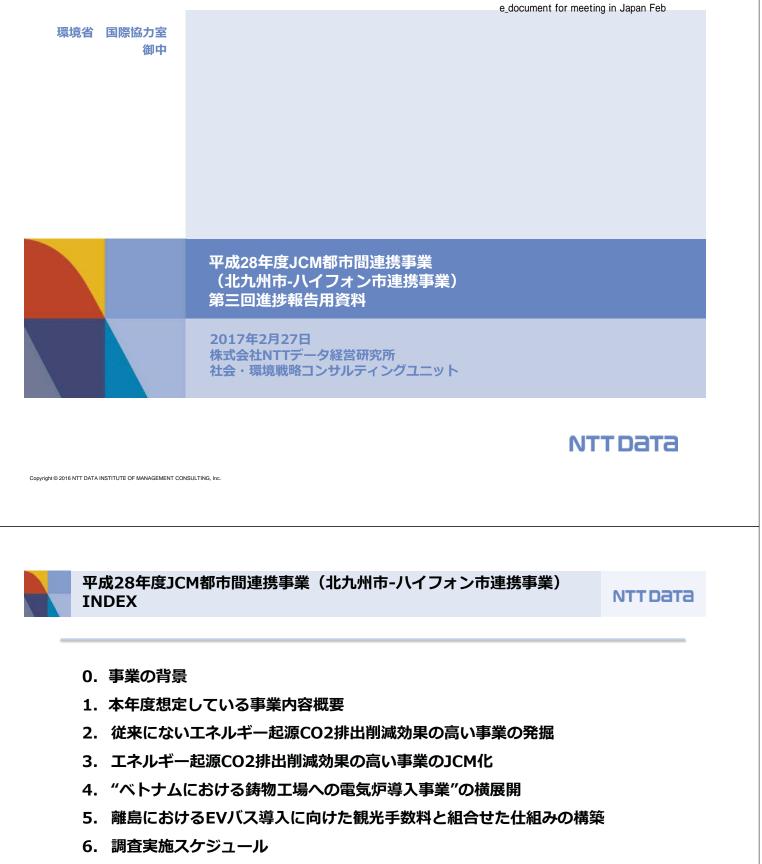
## 本年度の調査実施スケジュールについて、以下のように想定しております。

活動項目				201	6年					2017年	
伯劉央口	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2排 出削減効果の高い事業の発掘	現地協 検討	議によ	る技術	析検討	経済性	+ # # 3\	CO2削》 効果試算	<del>五</del>	意思決定に 支援	向け	
2. エネルギー起源CO2排出削減効果 の高い事業のJCM化	設備補	訪申請	同一1	全業の他	也工場、	他企業	<u> へのマ-</u>	-ケティ	ング		
3. "ベトナムにおける鋳物工場への 電気炉導入事業"の横展開		フ:	オローフ	マップ			導入効果		会、		
4. 離島におけるEVバス導入に向けた 観光手数料と組合せた仕組みの構築	直接 協議			直接協議			の検証	見习	<b>会開催</b> 直接 協議		
	•		•				•		•		
○ 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										● 最終版	

d\_document for meeting in Japan Dec





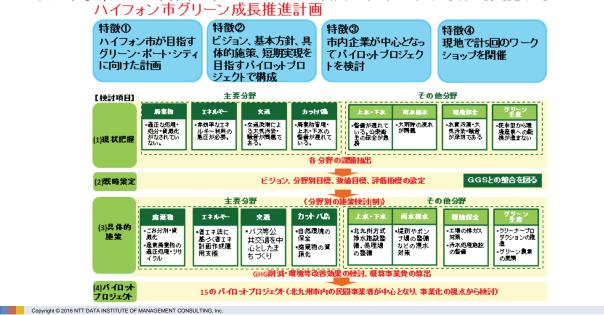


7. 来年度以降のポテンシャル案件

# 0.事業の背景

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- 2015年5月に北九州市の支援のもと、ハイフォン市のGreen Growth Strategy Action Plan: 1463/QD-UBNDの具体的な行動計画を明示した実践編である「ハイフォン市グ リーン成長推進計画」を策定した。同計画は、ハイフォン市と北九州市が協議を重ねた 上で策定され、ハイフォン市人民委員会から法的にも認めらてれている。
- 2015年度以降、この計画に沿った15の課題について具体的なプロジェクトを進めてきており、本事業もこの計画の中のいくつかの項目をサポートする形で実施する。



# 1. 本年度想定している事業内容概要

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本年度実施予定の4つの事業の概要について、以下のように整理しました。

想定事業	1. 従来にないエネル ギー起源CO2排出削減 効果の高い事業の発掘	2. エネルギー起源 CO2排出削減効果の高 い事業のJCM化	3. "ベトナムにおける 鋳物工場への電気炉導 入事業"の横展開	4. 離島におけるEVバス 導入に向けた観光手数料 と組合せた仕組みの構築	
プロジェクト 内容	ハイフォン市を中心と するベトナム北部の工 業団地を対象に、CNG を活用したコジェネ レーションや燃料転換 プロジェクト等の発掘 を行う	セメント工場の廃熱回 収発電事業について、 JCM設備補助事業への 申請準備を進める。ま た、類似案件の横展開 を検討する	ミドン地区を中心に幅 広くベトナム全土を対 象として、我が国の高 効率な電気炉を導入す るJCM設備補助対象事 業の創出に向けた活動 を実施	過去2年間、観光手数料 の導入可能性を議論して きたものを引き続き、観 光手数料の仕組みを用い た離島の低炭素化のモデ ル構築を目指す	
導入技術	コジェネレーション等 廃熱回収発電システム 高効率型電気炉		高効率型電気炉	EVバス	
実施スキーム		別表参照			
想定している 契約方式/事業 形式	随意契約 物売りのみを想定	随意契約 物売りのみを想定	随意契約 物売りのみを想定	制度検討のため 該当なし	
補助金見込額、 費用対効果	調査結果を踏まえ検討     5.5億円(50%想定)     調査結果を踏まえ検討       2000円/1tCO2     調査結果を踏まえ検討		調査結果を踏まえ検討		
要調整事項	プロジェクト実施企業 発掘	なし	プロジェクト実施企業 発掘	制度構築に向けた関係各 局との調整	
課題	燃転は石炭とCNGの価 格競争が課題	2016年4月設備補助事 業に申請済	現地企業の与信確認 中国製炉との価格競争	利害関係者との調整	

# 2. 従来にないエネルギー起源CO2排出削減効果の高い事業の発掘

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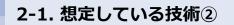
# 2-1. 想定している技術①

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### ● 本年度は新しく以下の事業の実現可能性調査を進めることを想定しております。

	燃転+高効率機器の導入	コジェネ導入	(交通)
想定メニュー	石炭、重油等 →天然ガス	コジェネレーション システム	(CNG車) (バス・タクシー)
概要・基礎情報	○現在石炭を使用している ボイラや炉などの設備の燃料を天然ガスに転換 ○2016/1の首相の声明で 2030年までに石炭中心の電 源構成見直しが決定	<ul> <li>ホテルや化学系工場な ど、熱と電気の需要がある設備に対してコジェネレーションシステムを導入する</li> <li>中央制御型のボイラを使用しているホテルリストあり</li> </ul>	<ul> <li>新規導入されるバスやタクシーをCNG車にする</li> <li>既存のバスやタクシーをCNG車に更改</li> <li>ハノイではタクシー25,000台、バス1,200台が稼働</li> <li>HCMCでは2016年3月に23台のCNGバスが導入された</li> </ul>
JCM事業化案	○高効率機器導入時の初期 費用に対して最大50%の補 助 (※燃転のための設備は対 象外)	○コジェネシステムの導 入に係る初期費用に対し て最大50%の補助	○既存のバスを更改しCNG化す るための費用に対して最大50% の補助
課題	○石炭の価格が安い	○大規模な熱需要につい て要調査	○過去の調査報告書を参考に JCM事業化の可能性を検討



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## ○プロジェクト概要

電気と熱の需要のある工場やホテル等に対して、コジェネレーションシステム を導入する。

### ○技術の概要

コジェネレーションシステム

○特徴

コジェネレーションシステムは、発電時に発生する排熱を熱エネルギーとして回収し、 電熱併給とすることで高いエネルギー効率を実現することができる設備である。中でもガス タービン型コジェネレーションは、熱需要の変動が少ない運用に有意であることから、常時 稼働の工場での利用に適している。

## ○実績表(JCM設備補助事業として)

納入年月	納入場所	概要説明
2015年	インドネシア	自動車製造工場におけるガスコージェネレーションシステムの 導入(川崎重工製 7.8MW高効率ガスエンジン)
2015年	タイ	二輪車製造工場におけるオンサイトエネルギー供給のた めのガスコージェネレーションシステムの導入(新日鉄住金工 ンジニアリング製 7MW級ガスエンジン)

## 2-2.排出削減総量及び補助金の見込み額、費用対効果

NTTDATA

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- プロジェクト実施時のCO2排出削減量と費用対効果についてはいずれも未定です。
- 要求仕様や制約となる事項を確認し、導入機器の検討を行います。
- その後、既存方法論などを参考に、リファレンスシナリオとの比較を行うことでCO2排出 削減量を計算する予定です。

## ○エネルギー起源CO2排出削減量

排出削減総量(t-CO2) =

エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年)

## ○エネルギー起源CO2排出削減に関わる補助金額の費用対効果

CO2削減コスト(円/t-CO2)= 補助金(円)÷(エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年))

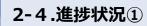
## ○GHG排出削減に関わる補助金額の費用対効果

GHG削減コスト(円/t-CO2換算) = 補助金(円)÷(GHGの年間排出削減量(tCO2換算/年)×耐用年数(年))

# 2-3.調査上の課題等

NTTDATA

No.	調査で解決したい課題	獲得目標(いつまでに)	担当	相手方	
1	現地企業の抽出・働きかけ ⇒完了	JCM事業実施の候補となる企業 を抽出する(2月まで)	ハイフォン 市 北九州市 NTT	現地企業	東京ガス様の調査をもとにした個別の企 業へのアプローチにより、JCM事業実施 に向けた働きかけを行う
2	要求仕様に基づく技術検討 の実施 <mark>⇒完了</mark>	現地企業の要求仕様を満たし、 CO2排出削減に資する省エネ/低 炭素型な機器を選定する(11月)	NTT	国内ベン ダ等	現地企業の要求仕様をもとに、各ベンダ に仕様を満たす機器のスペックを確認す る
3	設備導入にかかる経済性検 討⇒ <mark>完了</mark>	設備導入による省エネに伴い、投 資回収期間等の条件が許容範囲で あることを確認する(2月まで)	NTT	国内ベン <i>ダ</i> 等	ベンダから得た見積もりならびに省エネ 性能をもとに、投資回収期間の算定を行 う
4	CO2削減効果算出方法、モ ニタリング方法に関する検 討⇒JCM応募意思確認と あわせて進行	設備導入によるCO2排出削減量の 算出を行う(2月まで)	NTT	国内ベン <i>ダ</i> 等	ベンダから得た省エネ性能と既存の承認 済みMRV 方法論をもとに、CO2排出削 減量の計算を行う
5	代表事業者の抽出・働きか け⇒JCM応募意思確認と あわせて進行	JCM事業化の際、国際コンソーシ アムの代表事業者となる日本企業 を発掘する(2月まで)	NTT	国内企業	JCM事業実施に向けた、代表事業者とな りうる企業の抽出し、働きかけを行う
6	現地企業のJCM事業実施に 向けた意思決定 <mark>⇒進行中</mark>	現地企業がJCM事業実施する旨意 思決定する(2月まで)	NTT	現地企業	現地企業に対してJCM制度の説明、2~ 4で検討した内容の説明を行うことで JCM事業実施に向けた意思決定をサポー トする
7	資金調達方法の確認、JCM 事業主体となる企業の財務 状況の確認 <mark>⇒進行中</mark>	JCM事業化に向けた資金調達方法 の確認とともに、JCM事業主体と なる企業の財務状況を確認する(2 月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認 とともに、JCM事業主体となる企業の財 務状況を確認する
8	発注・契約方式の確認⇒進 行中	設備導入の契約に当たり入札が必 要か、随意契約が可能か確認(2月 まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認



### NTTDATA

候補事業2

- ◆ ハイフォン市、ハノイ市等の北部地域を中心に幅広くポテンシャルを有する顧客を 開拓した。
- ◆ 現在までの活動で、発掘したポテンシャルのある候補は次のとおり。

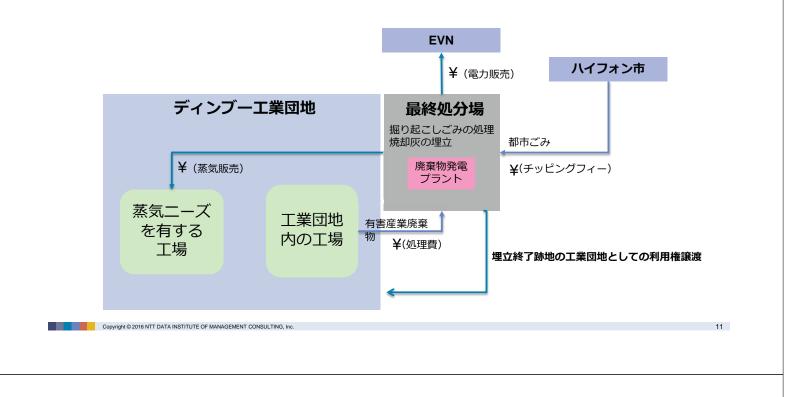
候補事業1

対象事業者	ハノイ市郊外で二輪車の タイヤ等を製造する工場	ハイフォン市内の大規模工業団地 の運営事業者及びハイフォン市
状況	事業拡大に伴い工場を拡大する計 画があり、新工場の建設を検討中	工業団地に隣接する一般廃棄物の埋め 立て処分場が工業団地の価値を低下さ せていることから、工業団地運営事業 者としてビジネスベースで廃棄物処理
可能性	現工場では、C重油焚きのボイラを 使用しているが、経済性があえば新 工場では天然ガスへの転換やコー ジェネレーションの導入を検討した いとの意向	事業を検討中 ハイフォン市からのチッピングフィー だけで廃棄物発電事業を実施すること は困難なため、新たなビジネスモデル を検討中(次ページ参照)
今後の計画	JCMの詳細説明を行うとともに、 事業成立のために必要な条件等を 把握し、詳細検討への意向を目指 す予定	継続的な検討を実施予定

### 2-4.進捗状況② ディンブー工業団地における廃棄物発電

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◆ "収入(チッピングフィー+売電収入+売蒸気収入+有害廃棄物処理費) – 原価" に将来の工業団地用地の販売メリットを加えることで民間投資を引き込めるか否か 等の可能性を検討中。





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- ◆ ベトナムにおけるCNG車導入プロジェクト
  - ベトナムで産業部門に対してパイプラインやCNGでガス供給を行っている Petro Vietnam Low Pressure Gas Distribution (PVGD)より東京ガス様へCNGタ クシー導入検討への支援依頼あり
    - PVGD社は、CNGステーションの運営も行う意向
    - 同社の簡易試算によると、CNGはガソリンに対して有利な価格で販売可能
       で、スタンド建設費も数年で回収可能
    - 現在、日系の大手自動車メーカ様との協議もスタート

検討条件:タクシー会社がCNG対応の新車(タイで流通しているものと同等モデルを想定)を導入する。スタンド設置費用についてはJCM事業化の際の検討対象外とする。
 ⇒タイで普及しているCNG車を導入することで、20%程度のCO2排出削減を実現可能との試算。

### 今後の方針:

PVGD社、タクシー会社、自動車メーカの3社が協働し、短期的には実証的に CNG車を少数導入し、経済性を含む評価を行う。その上で投資が進むようであれ ばJCM事業化を視野に入れて具体的な検討を行う。

# 3. エネルギー起源CO2排出削減効果の高い事業のJCM化

# 3-1.想定している技術

### ○技術の概要

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セメント工場での廃熱回収発電システム

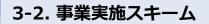
### ○特徴

廃熱回収発電システムは、セメント工場、高炉、コークス炉などの排ガスから 熱回収し発電を行う設備である。特にセメント工場では、廃熱発電システムの設 置により、工場全体の電力消費量の約30%をまかなうことが出来る省エネルギー 設備であり、CO2排出量削減にも貢献している。

## ○実績表

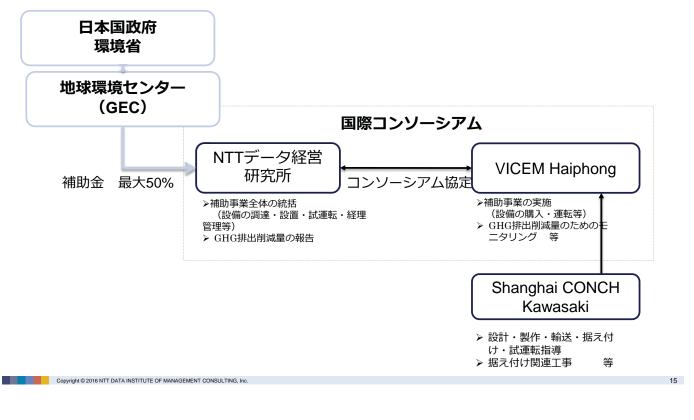
納入年月	納入場所	概要説明
2013年11月受注 2015年3月施工完了	インドネシア	<ul> <li>セメント焼成プロセスから排出される廃熱を排熱回収発 電設備によって電力エネルギーに転換し、現在使用している電力会社からの電力と代替するNEDOのエネルギー 有効モデル事業。</li> <li>具体的には、インドネシア・PTセメンパダン社内に発電容量8.5MWのセメント排熱回収発電設備を日本・インドネシア共同で建設。</li> <li>発電所での化石燃料の使用を減らし、発電所からの温室効果ガスの排出を削減した。CO2削減量は43,117t/年。</li> </ul>

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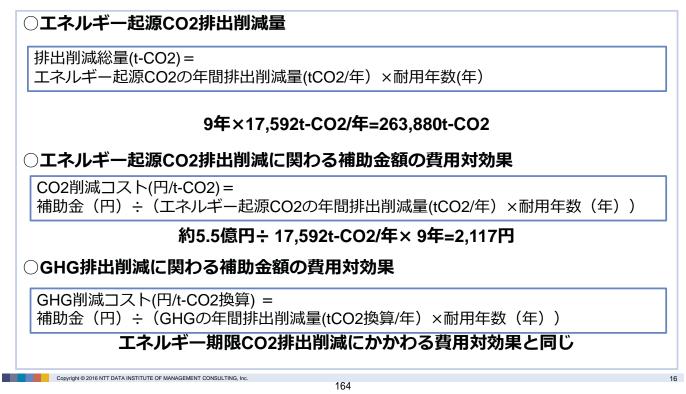
セメント工場への廃熱回収システム導入事業の実施スキームについて、以下のように検討しました。



## 3-3. 排出削減総量及び補助金の見込み額、費用対効果

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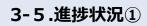
セメント工場での廃熱回収発電プロジェクト実施時のCO2排出削減量と費用対効果について、以下のように試算しました。



# 3-4.その他要調整事項、調査上の課題等

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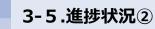
	解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
	ハイフォン市人民委員 会へのJCM事業化の成 果アピール	設備補助事業採択後、工事 着工後(11~2月まで)	北九州市 NTT	HPPC	ハイフォン市人民委員会に対して 事業採択の報告とともに期待され る成果をアピールする
	同一企業の別工場への 横展開 ⇒BOT型モデル提案中 進行中	設備補助事業採択後、工事 着工後(11~2月まで)	NTT	VICEM	設備補助申請後のサポートを行う とともに、同一企業の他工場内に て、まだ廃熱回収発電設備が導入 されていない生産ラインに対する 検討支援
	横展開可能なセメント 工場の抽出・働きかけ <mark>⇒提案活動開始</mark>	設備補助事業採択後(7~2月 まで)	NTT	-	国内の廃熱回収プラントの設置されていないセメント工場の抽出ならびに働きかけを行う
·	資金調達方法の確認、 JCM事業主体となる企業 の財務状況の確認 ⇒継続的に確認	JCM事業化に向けた資金調達方 法の確認とともに、JCM事業主 体となる企業の財務状況を確認 する(2月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認とともに、JCM事業主体となる企業の財務状況を確認する
	発注・契約方式の確認 ⇒継続的に確認	設備導入の契約に当たり入札が 必要か、随意契約が可能か確認 (2月まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認



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- ◆ EPC販売ではなく、SPCを設立し、SPCからセメント会社へ電力販売を行うビジネ スモデルの検討を行うことで現地セメント会社と合意。(BOT型をベースに検討の 予定)
- ◆ 現在、VICEMグループとして、グループ全体で廃熱回収発電事業に取り組んでいく 姿勢を見せ始めており、成功すればかなりのポテンシャルが期待できる。





- ◆ 2017年1月に、ハイフォン市副市長ならびに関係各局の出席する公式会合にて VICEMグループとセメント工場への排熱回収発電を検討している旨報告したところ、 ハイフォン市側から、新しくセメント工場を建設する企業があるとの情報を得た。
- ◆ 2月に同社を訪問し、JCM設備補助制度の紹介を行い、工場建設のスケジュールを 確認した。得られた情報について以下に整理する。

企業名	Bach Dang Cement				
企業概要	建設、交通、運輸を主たる事業としていたが、このた びセメント工場を設立。				
想定セメント生産量	120万トン/年				
工場稼動予定	2019年4月				
想定発電容量	4MW				
許認可	取得済み	-			
現場イメージ	右の写真が工場建設予定地				

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4. "ベトナムにおける鋳物工場への電気炉導入事業"の横展開

## ○プロジェクト概要

ハイフォン市・ミドン地区に存する140程度の工場のうち、規模が大きく、地域の リーダー的存在である2つの企業の鋳物工場に、我が国の高効率な電気炉を導入す る。

## ○技術の概要

鋳物を製造する際、材料の金属を溶融するための炉である。

### ○特徴

日本製の炉は、1kgの溶融にかかるエネルギー消費率は0.55 kWh程度と、ベトナ ム国内で普及が進んでいる中国製の電気炉(1kgの溶融に1.0kWh程度)の半分近い 省エネ効果がある。加えて、故障が少なく、20年以上の稼働が可能である。

## ○実績表(JCM設備補助事業によるもの)

納入年月	納入場所	概要説明
2015年	ベトナム	鋳物工場への高効率電気炉の導入

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## 4-2. 排出削減総量及び補助金の見込み額、費用対効果

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鋳物工場への高効率な電気炉導入プロジェクト実施時のCO2排出削減量と費用対効果について、以下のように試算しました。(2工場に対し計3基の炉を導入した場合)

## ○エネルギー起源CO2排出削減量

排出削減総量(t-CO2) = エネルギー起源CO2の年間排出削減量(tCO2/年) ×耐用年数(年)

## 9年×2,420t-CO2/年=21,780t-CO2

## ○エネルギー起源CO2排出削減に関わる補助金額の費用対効果

CO2削減コスト(円/t-CO2)=

補助金(円)÷(エネルギー起源CO2の年間排出削減量(tCO2/年)×耐用年数(年))

## 約6,500万円÷2,420t-CO2/年×9年=3,005円

○GHG排出削減に関わる補助金額の費用対効果

GHG削減コスト(円/t-CO2換算) =

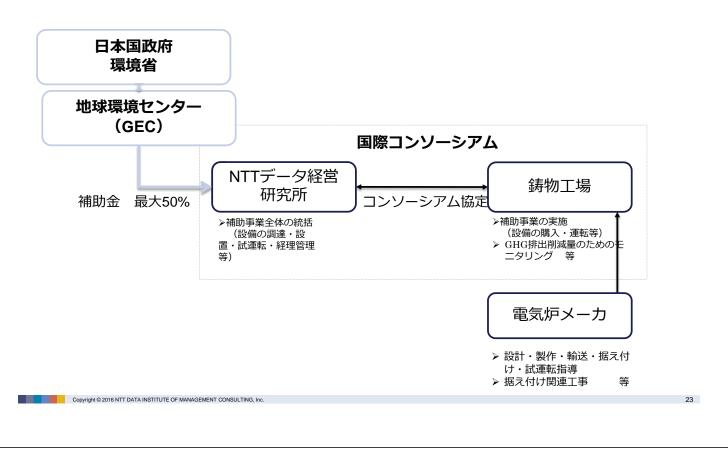
補助金(円)÷(GHGの年間排出削減量(tCO2換算/年)×耐用年数(年))

## エネルギー期限CO2排出削減にかかわる費用対効果と同じ

## 4-3.想定している事業実施スキーム

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"ベトナムにおける鋳物工場への電気炉導入事業"の実施スキームは以下の通りです。



# 4-4.その他要調整事項、調査上の課題等

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No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	ハイフォン市人民委員 会へのJCM事業化の成 果アピール	設備導入後	北九州市 NTT	HPPC	ハイフォン市人民委員会に対して 事業採択の報告とともに事業の成 果をアピールする
2	横展開可能な鋳物工場 の抽出・働きかけ	2017年2月	NTT	鋳物工 場群	今後電気炉を導入予定の鋳物工場 の抽出ならびに働きかけを行う
3	鋳物工場群に対する中 国製電気炉メーカの価 格攻勢	ミドン地区の他の鋳物工場 でのJCM事業化に向けた合 意形成	NTT	鋳物工 場群	JCM設備補助制度を活用すること で初期投資額を抑えられることや 長期的な視点で見た際の優位性を 説明する 長期的には、ベトナム仕様の炉の 開発をするための方向性検討をお こなう
4	資金調達方法の確認、 JCM事業主体となる企業 の財務状況の確認	JCM事業化に向けた資金調達方 法の確認とともに、JCM事業主 体となる企業の財務状況を確認 する(2月まで)	NTT	現地企業	JCM事業化に向けた資金調達方法の確認とともに、JCM事業主体となる企業の財務状況を確認する
5	発注・契約方式の確認	設備導入の契約に当たり入札が 必要か、随意契約が可能か確認 (2月まで)	NTT	現地企業	設備導入の契約に当たり入札が必要か、 随意契約が可能か確認





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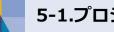
### 前回ご報告時までの活動

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- ◆ ハイフォン市を含む北部地域における電気炉導入ニーズを有する会社を個別訪問
- ◆ 日系企業2社から高効率な電気炉の導入ニーズを発掘
  - ▶ 1社は工作機械メーカで既に日系メーカの電気炉を導入済み。
  - ▶ 工場稼働がひっ迫しており、追加の電気炉を導入したいとの意向。
  - ▶ 但し、現在の電気炉のバックアップ用として、るつぼ部分(炉体部分)を既に 購入済みで、今後は、電気設備等を調達し、新たな電気炉システムを増設した いとの意向
  - ⇒GEC様にご相談の結果、既に炉体部分を日系メーカから購入済みであり、J CMの対象として取り上げるのは難しいのではないかとの指摘あり
  - ▶ 他の1社は中国製電気炉を導入し、そのパフォーマンスの悪さから日系メーカ あるいは世界的に有名な米国メーカの電気炉導入を希望
  - ▶ 現在、導入に向けた可能性を協議中



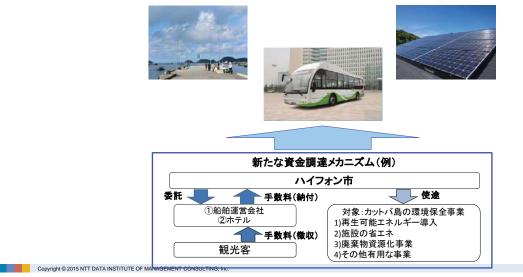
5. 離島におけるEVバス導入に向けた観光手数料と組合せた仕組みの構築



### 5-1.プロジェクト概要

NTTDATA

- 観光を主な産業とするカットバ島において、観光手数料を用いた環境保全等のための新しい資金調達メカニズムの導入を2014年度から検討している。
- これまでの活動では、カットバ島の低炭素化事業の1つとして、カットバ島内を走るディーゼルバスのEV化を検討した。EVバスについては現在、GECの「途上国向け低炭素技術イノベーション事業」の中で、実証車1台の走行に向けた準備を行っているところである。
- 今後、EVバス普及を含むカットバ島の低炭素化事業の面的拡大を進めるために、観光手数料を 用いた新たな資金メカニズムの導入を検討する。



## 5-2.調査上の課題等

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No.	調査で 解決したい課題	獲得目標(いつまでに)	担当	相手方	調査の内容
1	観光手数料の徴収制度 検討	関係機関との合意形成を目 指し観光手数料の徴収制度 (案)作成 ⇒関係機関との協議を進め ている。カットハイ県の人 民委員会の反対票が多いも のの、ハイフォン市外務局 を中心に、前向きに検討進 める動きがある。	北九州市 NTT	HPPC、 関係部 局	カットバ島における観光手数料の 徴収制度について、HPPC、関係 部局と定期的な協議を行う。
2	低炭素型事業に対する 観光手数料活用の仕組 み検討	関係機関との合意形成、観 光手数料活用の仕組み (案)作成	北九州市 NTT	HPPC、 関係部 局	カットバ島で想定するEVバスな ど低炭素型事業に観光手数料を活 用するための仕組みについて、 HPPC、関係部局と定期的な協議 を行う。

6. 調査実施スケジュール

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## 本年度の調査実施スケジュールについて、以下のように想定しております。

活動項目		2016年						2017年			
位劉垻日	5月	6月	7月	8月	9月	10月	11月	12月	1月	2月	3月
1. 従来にないエネルギー起源CO2排 出削減効果の高い事業の発掘	現地協 検討	議によ	る技行	<b>析検討</b>	経済性	+#===	CO2削》 効果試算	- 12	:思決定に :支援	向け	
2. エネルギー起源CO2排出削減効果の高い事業のJCM化	設備補	助申請	同一1	全業の他	」 也工場、	他企業	<u>へのマ-</u>	-ケティ -	ング		
3. "ベトナムにおける鋳物工場への 電気炉導入事業"の横展開		כ:	オローフ	アップ			導入効 の検証		会、 会開催		
4. 離島におけるEVバス導入に向けた 観光手数料と組合せた仕組みの構築	直接 協議			直接 協議					直接 協議		
○ 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											● 最終版
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# 7.来年度以降のポテンシャル案件

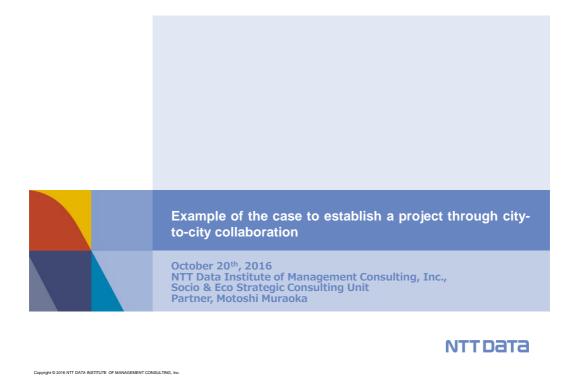
	想定事業	1. セメント工場への排熱回 収発電事業	2. 都市固形廃棄物・産業廃棄 物を燃料とした廃棄物発電事 業	3. 離島におけるEVバス導入 に向けた観光手数料と組合せ た仕組みの構築			
	プロジェクト内容	セメント工場の廃熱回収発 電事業について、JCM設備 補助事業への申請準備を進 める。また、類似案件の横 展開を検討する。	Dinh Vu 工業団地脇に立地す る廃棄物処分場ではオープン ダンピングが行われており、 悪臭等の問題を引き起こして いる。	過去3年間、観光手数料の導入 可能性を議論してきたもの。 引き続き、観光手数料の仕組 みを用いた離島の低炭素化の モデル構築を目指す。			
	導入技術	排熱回収発電システム	廃棄物発電プラント	EVバス			
	想定している現地 事業者	Bach Dang Cement (4MW規模)、 VICEMグループ	Dinh Vu工業団地				
	想定している契約/ 事業形式	Bach Dang Cementは入札 が必要。 物売りのみを想定	随意契約 物売りを想定	制度検討のため 該当なし			
	補助金見込額、 費用対効果	5.5億円程度 (50%補助を想定)、 2000円/1tCO2	プラント建設費用(50億円程 度を想定)のうち、発電にか かる部分の50%相当額				
	要調整事項	条件付入札となること	チッピングフィー価格交渉、 産廃排出業者との調整 蒸気売りの可能性検討	制度構築に向けた関係各局と の調整			
	備考	2019年4月に工場の稼動開 始を予定	静脈メジャーも視野に入れて いる	大手デベSun Groupによる カットバ島の大規模リゾート 開発計画あり			
-			171				

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e\_document for meeting in Japan Feb









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- 1. Introduction of our company
- 2. Project Introduction

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3. Point & Challenges to Realize Projects

#### 1. Introduction of our activity



#### 1. Introduction of our company

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#### Corporate outline

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Name	NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.
Date of Establishment	April 12, 1991
Shareholder	NTT DATA Corporation 100%
Capital	¥450 million
Head Office	10th floor, JA Kyosai Building, 7-9, Hirakawa-cho 2-chome, Chiyoda-ku, Tokyo 102-0093, Japan Tel +81-3-3221-7011 (main number) Fax +81-3-3221-7022
Office Toyosu	25th floor, Toyosu Center Building, 3-3, Toyosu 3-chome, Koto-ku, Tokyo 135-6025, Japan Tel +81-3-3221-7011 (main number)    Fax +81-3-3534-3880
Office Singapore Branch	20 Pasir Panjang Road, #11-28 Mapletree Business City, Singapore 117439
URL	http://www.keieiken.co.jp/english/



The environmental and energy sectors continue to be the scene of dynamic developments exemplified by the revision of energy policy, approaches to global warming, and recycling of dwindling resources. They also hold much promise for industrial activity. We promote client approaches through activities including support for smart community development, assistance with export of infrastructural elements, and creation of new business by private-sector consortiums. consortiums.

# Development of environmental business and environmental management Social and environmental communication Building of recycling-oriented social systems Measures to mitigate global warming New energy and energy conservation Systems for assurance of safety/security and management of chemical substances Smart communities Infrastructural export

2. Experience of JCM related Projects(1/2)
dustrial Sector

#### NTTDATA

Outline of Activity	Purpose	Phase
Installation of Co-generation System into the Factory and Industrial Estate (Indonesia, Vietnam)	Reduce CO2 Emission & Energy Cost	Study
Installation of Economizer for the Existing Boiler in Factory (Malaysia)	Reduce CO2 Emission & Energy Cost	Study
Installation of Exhaust Heat Recovery & Electricity Generation System into the Existing Cement Factory (Vietnam and Thailand)	Reduce CO2 Emission & Energy Cost	Study, Implementation
Replacement or Installation of Saving Energy Type of Electrical Furnace into Casting Companies (Vietnam)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Electricity Generation System using Rice Husk (Indonesia)	Reduce CO2 Emission & Energy Cost	Study
Installation of Solar Electricity Generation System on the Roof of the Existing Cold Storage Warehouse (Malaysia)	Reduce CO2 Emission & Energy Cost	Study
Replacement of Existing Lighting System into LED Lighting System (Indonesia)	Reduce CO2 Emission & Energy Cost	Implementation
Changing Fuel Type from Oil to Natural Gas in a Factory (Malaysia)	Reduce CO2 Emission & Energy Cost	Study
Installation of Mini-hydro Electricity Generation System in Isolated Area (Kenya and Ethiopia)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Mega Solar Electricity Generation System (Costa Rica)	Reduce CO2 Emission & Energy Security Increase	Implementation
Installation of Landfill Gas Recovery & Electricity Generation System (Mexico)	Reduce CO2 Emission & Energy Cost	Implementation

#### 2. Experience of JCM related Projects(2/2)

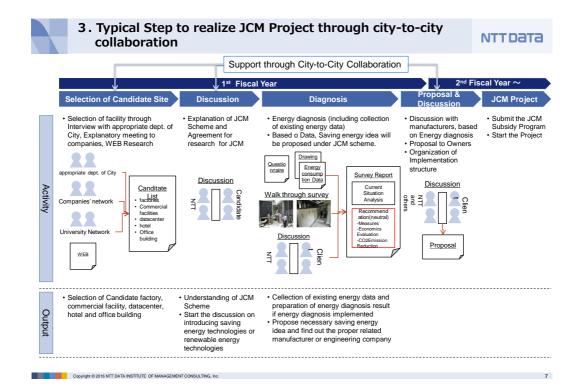
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#### Commercial Sector

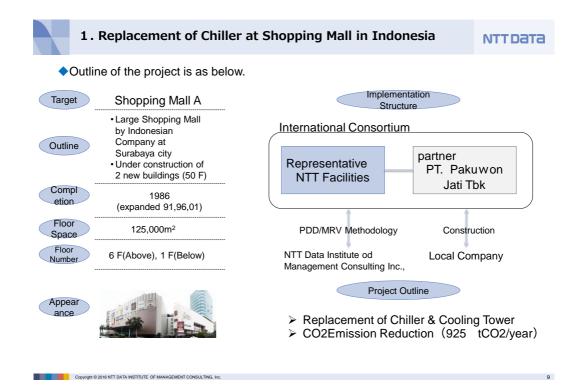
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Outline of Activity	Purpose	Phase
Replacement or Installation of Saving Energy Type of Chiller or Air-conditioning System into Hotel, Commercial Building and Shopping Mall (Indonesia, Vietnam, Cambodia, Costa Rica)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Mini Co-generation System into Hotel (Indonesia)	Reduce CO2 Emission & Energy Cost	Study
Replacement of Refrigerated Show Case into Saving Energy Type (Vietnam)	Reduce CO2 Emission & Energy Cost	Study
Replacement of Air-conditioning System, Lighting System and Refrigerated Show Case of Convenience Store into Saving Energy Type (Vietnam, Thailand)	Reduce CO2 Emission & Energy Cost	Implementation
Installation of Solar Electricity Generation System on the Roof of the New Building (Malaysia, Thailand), Hospital (Cambodia) and Shopping Mall (Vietnam)	Reduce CO2 Emission & Energy Cost	Implementation, Study
Introduction of EV Bus & Solar Electricity Generation System with Funding Mechanism in an Isolated Island (Vietnam)	Keep Environment and Reduce CO2 Emission	Study
Installation of Solar System & Saving Energy Equipments into the Existing School, Building and Hotel, using Environmental Fund & ESCO + Leasing System (Costa Rica)	Reduce CO2 Emission & Energy Cost	Study



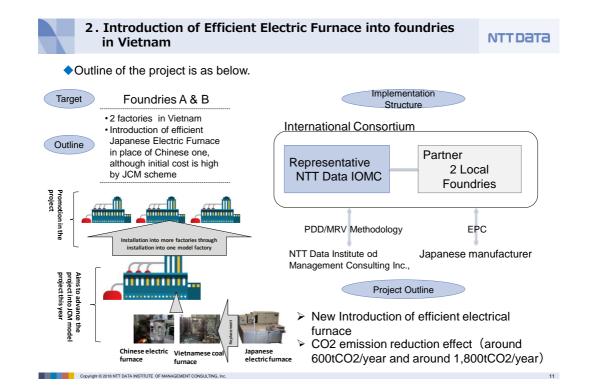
#### 2. Project Introduction

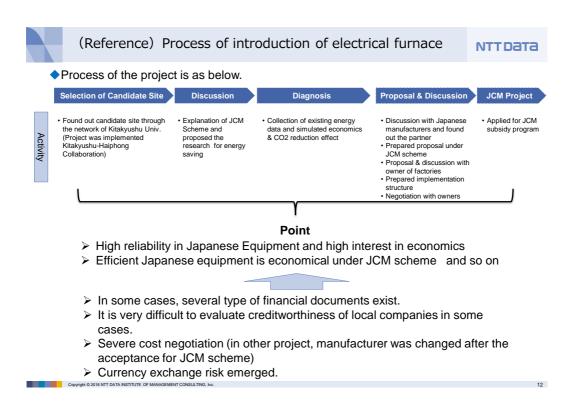
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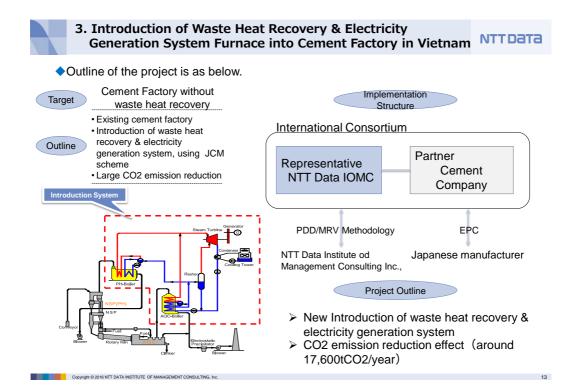


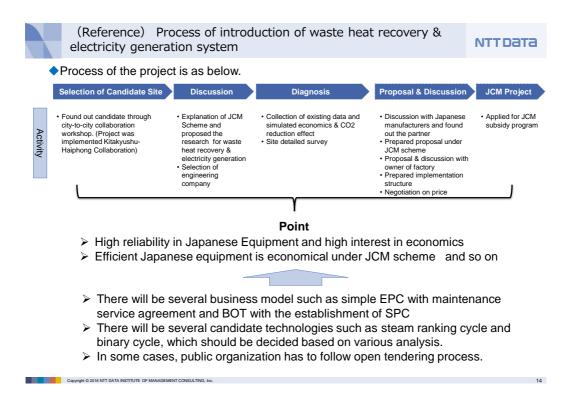
	(Reference) Process of Chiller Replacement								
	Process of the project is as below.								
	Selection of Candidate Site	Discussion	Diagnosis	Proposal & Discussion	JCM Project				
Activity	Based on Kitakyushu-Surabaya Collaboration, we found out the company through interview to Surabaya City	<ul> <li>Explanation of JCM Scheme and proposed the research for energy saving</li> </ul>	Energy Diagnosis (Cellection of the existing Energy data)     Based on the Energy Diagnosis result, proposed saving energy action using JCM Scheme	Contacted with manufacturer based on diagnosis result Manufacturer prepared proposal Proposal was submitted to Owner Prepared implementation structure	Applied for JCM subsidy program     Starting Project				
			γ						
			Point						
<ul> <li>Owner of Mall have an interest in saving energy.</li> <li>Replacement to efficient system is economical when using JCM scheme.</li> <li><u>Owner company which is Indonesian company, have already prepared financial</u></li> <li><u>Owner company accepted monitoring &amp; reporting of CO2 emission reduction for legal durable years in Japan</u> and so on</li> </ul>									
~	Somotimon financial a	looumonto word	bord to be submitted						

- Sometimes, financial documents were hard to be submitted.
- Buildings which passed several ten years have the possibility to be reconstructed and have the possibility not to match the legal durable years rule.



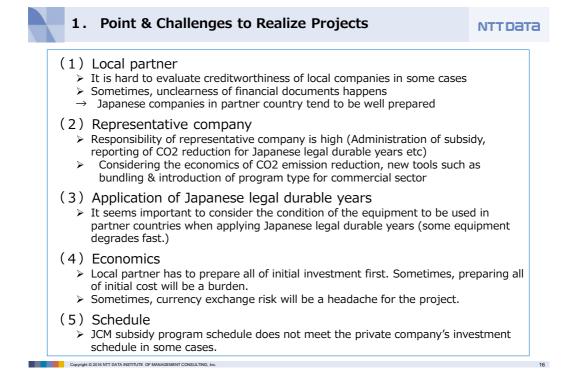






#### 3. Point & Challenges to Realize Projects

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FY 2016 JCM City-to-City Collaboration Projects between Kitakyushu City and Hai Phong City Material for Activities Introduction

January 23rd, 2017 NTT Data Institute of Management Consulting, Inc., Socio & Eco Strategic Consulting Unit

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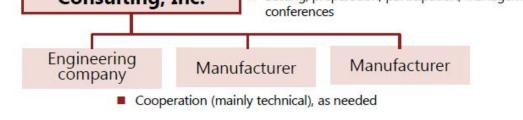


#### 1.Background

- It formulated the "Program for the promotion of Hai Phong City Green Growth" which is a practical edition that clearly shows the concrete action plan of the Green Growth Strategy Action Plan: 1463 / QD-UBND in Haiphong City did under the support of Kitakyushu City in May 2015. The plan was formulated after consultation between Haiphong City and Kitakyushu City, and has been legally accepted from Hai Phong Municipal People's Committee.
- It has advanced concrete projects on 15 issues according to this plan since FY 2015, and this project will also be implemented in support of several items in this plan.







**3.Business Summary of This Fiscal Year** 

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• The outline of the four projects to be implemented this fiscal year is as follows.

Expected businesses	1. Finding potential businesses that have been unprecedented in high energy- saving CO2 emission reduction effect from energy origin	2. JCM application of Highly effective business of CO2 GHGs reduced from energy sources	3. Expanding "Electric furnace introduction business in casting factory in Vietnam" sideways	4. Construction of a mechanism combined with tourist fee for introduction of EV bus at remote island
Content	Finding potential cogeneration and fuel conversion projects that utilize CNG for the industrial park in northern Vietnam, centering on the city of Haiphong.	preparation for application to Financing Programme for JCM on waste heat recovery power generation project of cement factory. Also, consider apply this to similar projects.	Implement activities targeting the creation of Financing Programme for JCM Projects that will introduce Japan's highly efficient electric furnace for the whole of Vietnames, mainly in the Midon district.	Continue to discuss the feasibility of introducing tourist fees over the past two years, aim to build a model of low carbonization of remote islands using the mechanism of tourism fee.
Introductory Technology	cogeneration	waste heat recovery power generation system	high-efficiency electric furnace	EV bus
Scheme		B2B		G2G
Image	T DATA INSTITUTE OF MANAGEMENT CONSULTING, H	183		Bito (2020 4

g\_presentation material for workshop in Jan

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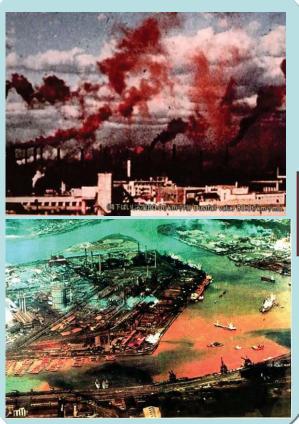


# **Creating Green Cities in Asia through Intercity Cooperation**

# Overcoming Severe Pollution: Kitakyushu's Experience

City of Kitakyushu

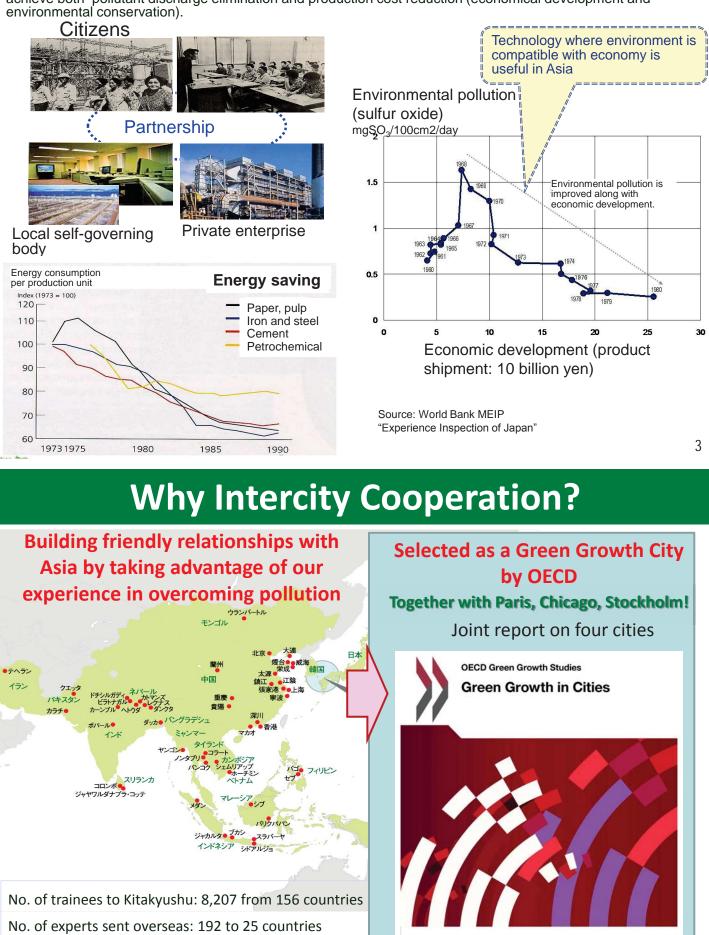






# Factors of environmental improvement

Environmental pollution control is started by initiatives of citizens' groups, and conquered by measures taken in cooperation with enterprises, universities and administration. Throughout energy saving done by enterprises achieve both pollutant discharge elimination and production cost reduction (economical development and environmental conservation).



OECD

(As of the end of March 2016)

Promotion of environmental improvement projects 186

# G7 Kitakyushu Energy Ministeria Meeting



### Kitakyushu Initiative on Energy Security for Global Growth Joint Statement

- Energy Investment for Global Growth Gas Security
- Nuclear Energy and Safety
   Cyber Security ,Electricity Security
- Innovation and Development of Energy Technologies

# Kitakyushu Asian Center for Low Carbon Society

#### Center established as engine for green growth activities

**Concept** : Developing interactions that place value on the relationship between cities and that will help Japan gain respect from international society in order to contribute to the creation of green cities in Asia



Compile the experiences and know-how of the city from the process of overcoming pollution and becoming an environmental city in order to Create the "Kitakyushu Model"

141 projects in cooperation with 106 Japanese companies and universities in 1577 Asian cities

### Exporting Green Cities Using the Kitakyushu Wooder22

Create the "Kitakyushu Model," which is a systematic compilation of the technology and know-how of the city from the process of overcoming pollution to becoming an <u>environmental city</u>.

Support tools to create sustainable green cities that integrate waste, energy, water and sewage, and environmental protection.



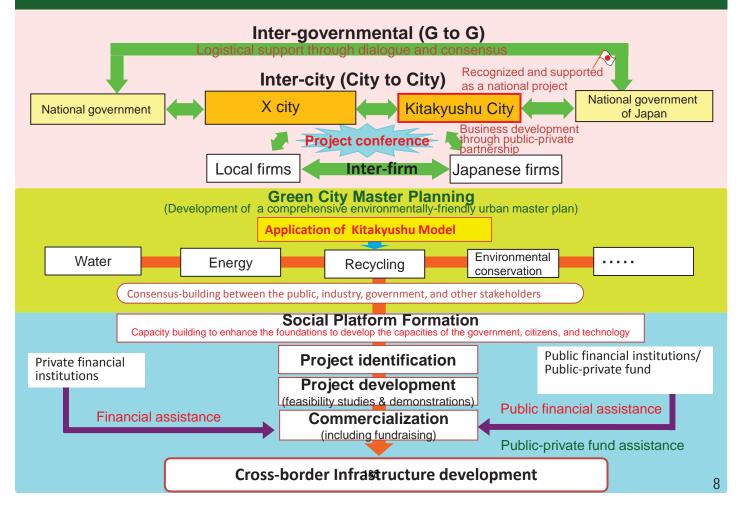




-Organization of the Kitakyushu Model-



### **Development Scheme for Exporting Green Cities**



### Kitakyushu's Involvement in Large-Scale JCM Project Development

#### Promotion of low-carbon development of entire cities using intercity cooperation

Surabaya, Indonesia: 2 <sup>nd</sup> largest city in Indonesia with a population of 3 million <fy 2013-="" 2015=""> Low Carbon City Planning Project in Surabaya, Indonesia Target areas: Energy, waste management, transportation, water resources Participating Japanese companies: 13</fy>	reement signed (Nov 2012)
Haiphong, Viet Nam: Major port city in Viet Nam with a population of 1.9 million <fy 2014-2016="">Green Growth Promotion Plan of the City of Hai Phong Target areas: Low-carbon city planning, energy, waste management, conservation of Cat Ba island Participating Japanese companies: 10</fy>	eement signed (Apr 2014)
Iskandar, Malaysia: 2 <sup>nd</sup> largest economic zone in Malaysia <fy 2014-2016=""> GHG Emissions Reduction Project in Iskandar Target areas: Waste-to-energy, energy savings and industrial waste recycling in an industrial estate Participating Japanese companies: 4</fy>	sir Gudang City (Feb 2015)
Rayong Province, Thailand: Major heavy chemical industrial zone in Thailand with 2 large industrial parks <fy 2015-2016="">GHG Emissions Reduction Project in Rayong Province Target areas: Waste-to-energy project, energy savings, total recycling of industrial waste in an industrial zone Participating Japanese companies: 4 MOU signed with Department of In</fy>	dustrial Works (Dec 2014)
Phnom Penh, Cambodia: Capital City of Cambodia with a population of 1.7 million <fy 2016="">Action Plan for the climate change strategy in Phnom Penh Capital City Target areas: Low-carbon city planning, energy Participating Japanese companies: 4</fy>	ment signed (Mar 2016)

### Green Sister City : Surabaya, Indonesia

#### International cooperation for composting household waste started in 2004





30% reduction of waste Streets decorated with flowers Improvement of public environmental awareness

Building a re<mark>lationship of</mark> trust

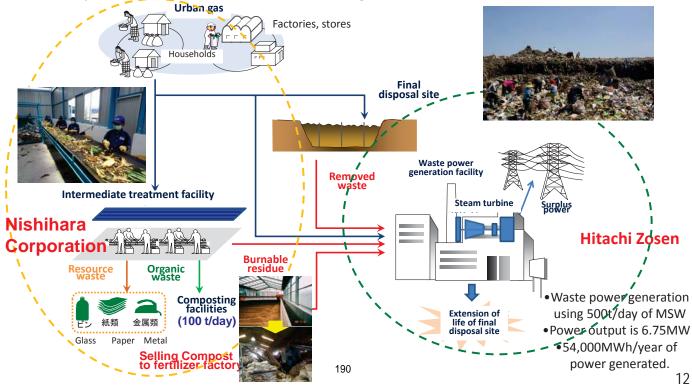


"Green Sister City" agreement was signed in November 2012 between Surabaya and Kitakyushu



### Intermediate Treatment Facility for Recycling & Power Generation from Urban Waste Nishihara Corporation & Hitachi Zosen

By combining high-calorie waste (Separation and composting of residue, waste removed by Nishihara Corporation) and general urban waste, it is anticipated that 500t/day of 1,500-2,000kcal waste can be guaranteed.



# Energy Saving in Commercial Establishments<sup>0P22</sup>

### Introduction of High-Efficiency Air Conditioner System

This project was adopted as one of the financing program for JCM model projects in FY2015.

- ✓ Participating company: NTT FACILITIES, INC.
- Target: Tunjungan Plaza in Surabaya, Indonesia
- ✓ Business expenses: about 230 million yen

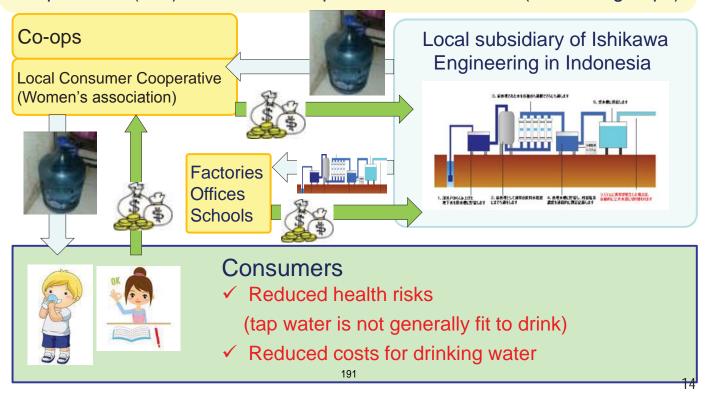


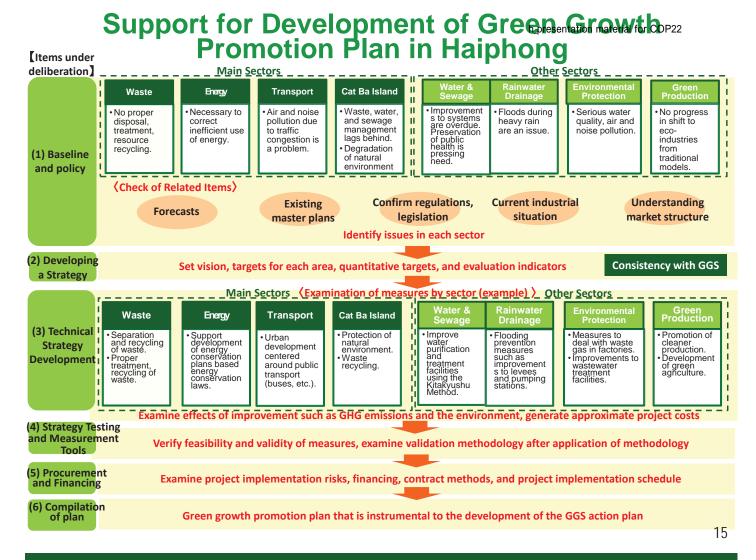
High-efficiency turbo, chiller, pumps, cooling towers, EMS

# **Drinking Water Supply**

#### Ishikawa Engineering

Sale of inexpensive, good quality, and delicious drinking water through cooperatives (150) that are made up of local communities (women's groups)





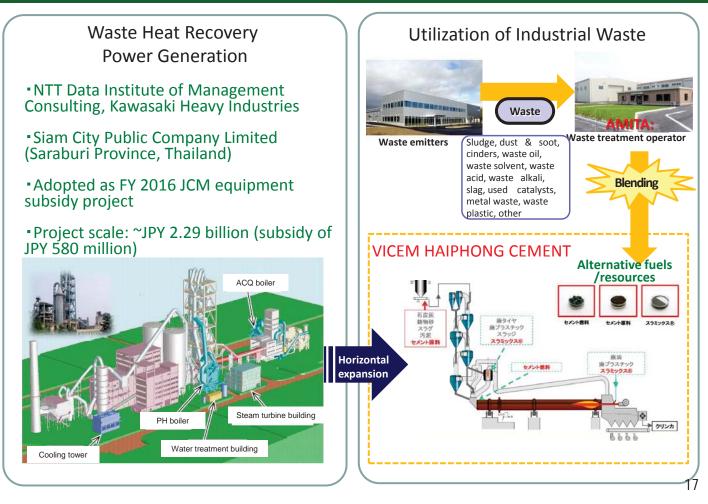
### Hai Phong Green Growth Promotion Plan



# **Promoting 15 Pilot Projects**

100 March 100 Ma	
	①Separation and composting of household waste
Waste	②Waste heat recovery power generation & utilization of industrial waste
	③Recycling of e-waste
Energy	④Energy savings and introduction of decentralized energy systems in factories & buildings
Tropoportation	SIntroduction of low-emission buses
Transportation	6 Promotion of the use of public transportation
Cat Da Jaland	⑦Development of comprehensive resource recycling system
Cat Ba Island	®Energy savings and introduction of renewable energy and EV buses in Cat Ba Island
Water &	(9)U-BCF expansion project
Sewage, Rainwater	Handicraft village wastewater measures
Drainage	Introduction of sewerage registry system
Environmental	Restoration of Tay Nam canal
Protection	Development of air and noise monitoring systems
Green	Installation of high-efficiency furnaces in foundries
Production	The second
	192

# Creation of Eco-Friendly Cement Factory COP22



# **Conservation Projects on Cat Ba Island**



Low-carbon technical innovation creation project for developing countries

Demonstration period: Dec 2015 to Feb 2020

Joint development by local company, Soft Energy Controls, with a Chinese company (provider of technologies to control storage batteries)

- Introduction of first EV bus in Viet Nam ■ Temporary import measures → Approved by
  - prime minister
  - Demonstration run→Development of guidelines by the Ministry of Transport



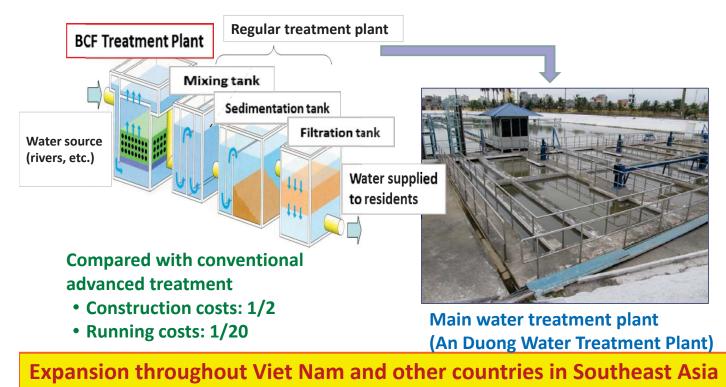


Production of biogas from wet waste and sludge
 Ecological agriculture using liquid fertilizer
 Processing solid fuel from dry waste



# Introduction of U-BCF to Main Water Treatment Plant

### Introduction of U-BCF from small-scale water treatment plant in Hai Phong to main water treatment plant (using grant aid)



### The Phnom Penh Miracle: Creating a Sister City Relationship

Transfer of water distribution block technology (Phnom Penh, Cambodia)



Rate of non-revenue water (leakage, theft) 72%→8%

2005: Water declared potable (The Phnom Penh Miracle) Visit by Prime Minister Hun Sen in July 2015 Proposal by the Prime Minister to "conclude a sister city relationship with Phnom Penh"

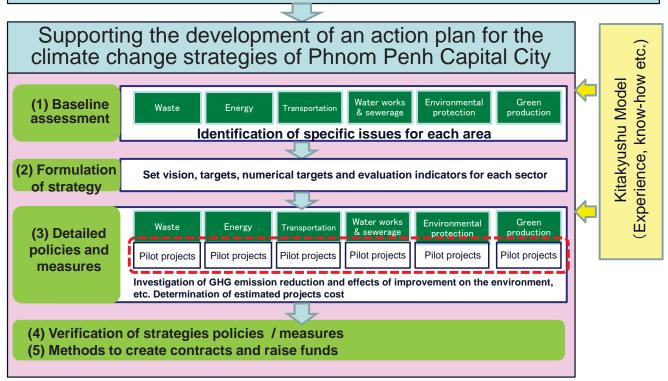


March 29, 2016 Linked as sister cities



# Project with Phnom Penh Capital City

### Cambodia Climate Change Strategic Plan (2014 – 2023)



# **Energy Savings in Large Shopping Mall**

Aeon Mall Cambodia will introduce "solar power" and "high efficiency chillers" in Aeon Mall II Phnom Penh (PPC, tentative name, scheduled to open in summer 2018).

• Adopted as a FY 2016 JCM equipment subsidy project

• Project scale: ~JPY 580 million (subsidy of JPY 230 million)



# Benefits of Using Intercity Cooperation Frameworks

# Cities are the stage for exporting urban environmental infrastructure.

# By taking advantage of intercity cooperation:



- ✓ It is possible to develop comprehensive projects from initial stages.
- ✓ Long-term follow-up can be carried out after the project ends.
- Direct access to partner city governments is possible and activities of Japanese companies can be supported.
- Human resources can be developed for the management and operations of urban environmental infrastructure.
- ✓ Objectives can be achieved in partner cities with fewer administrative costs by facilitating the entry of private companies through public-private partnerships (PPP).

# **Sharing Benefits as Part of Asia**

#### Kitakyushu: Economic benefits

- Activate the local economy
- Create new industries by learning from Asia
- Asian Cities: Social benefits

  Improved lifestyles
  Solutions for environmental
  - issuesImproved energy efficiency

### A relationship of mutual learning and support!



# ハイフォン市グリーン成長推進計画における パイロットプロジェクトの課題解決に向けた プラットホーム会合

第1回協議資料

## 2016年4月

北九州市アジア低炭素化センター



### 協議事項

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◆カットバ島でのEVバス実証に係る課税措置の保留と通関	10

# 課題解決に向けたプラットホーム会会の概要 □す™

#### <u>1. 目的</u>

◆ハイフォン市と北九州市が共同で策定した「グリーン成長推進計画」におけるパイロットプロジェ クトの着実な実施に向けて、ハイフォン市人民委員会を中心とした関係機関と北九州市が集中的 に課題を協議するためのプラットホームを構築する。

#### <u>2. メンバー</u>

 ◆ハイフォン市人民委員会、商工局、ECC、建設局、URENCO、財務局、交通局、 計画投資局、カットハイ県人民委員会、天然資源環境局、外務局など
 ◆北九州市、NTTデータ経営研究所など

#### 3. 議題

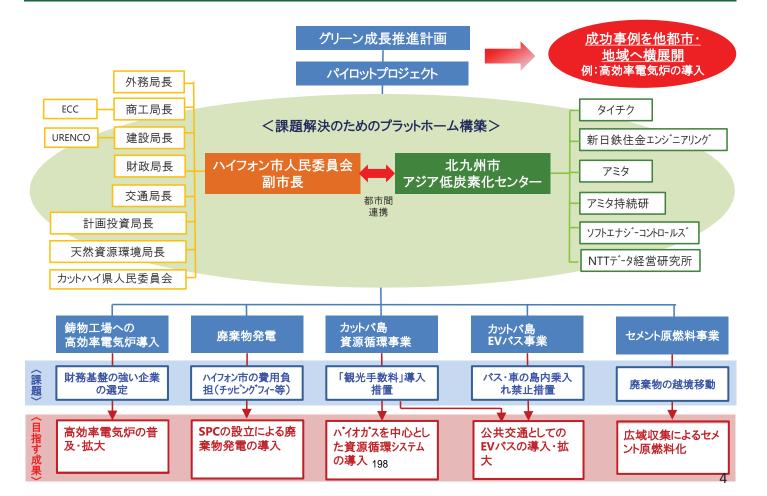
①鋳物工場における高効率電気炉の普及
②廃棄物発電の導入に向けたチッピングフィーの設定
③カットバ島への入島に係る観光手数料の導入
④カットバ島へのディーゼルバス乗入禁止措置の実施
⑤カットバ島でのEVバス実証に係る課税措置の保留と通関

#### <u>4. 年間スケジュール</u>

- ◆2016年4月 第1回プラットホーム会合
- ◆2016年8月 第2回プラットホーム会合
- ◆2017年1月 第3回プラットホーム会合

※北九州市は、必要に応じて上記3回の会合に向けた追加調査を実施する。

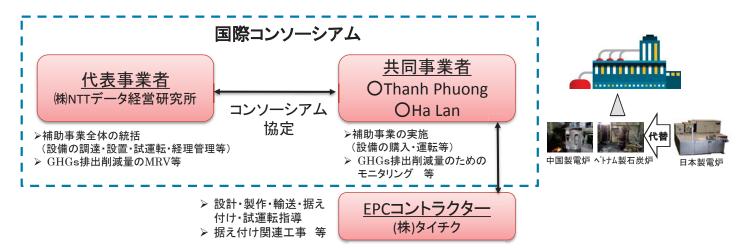
# 課題解決に向けたプラットホーム会合の検討体制



# 鋳物工場における高効率電気炉の<br /> 管及<sup>civ m</sup>

#### 1. パイロットプロジェクト 第1号成功案件

◆2016年1月、鋳物工場への高効率電気炉導入事業がJCM設備補助事業に採択された。



#### <u>2. 今後の活動</u>

- ◆ミドン地区を中心にハイフォン市内へ日本製高効率電気炉の普及を図る。
- ◆そのため、ハイフォン市には以下の条件を有する企業をご紹介いただきたい。
  - ・石炭炉や電気炉を活用している企業
  - ・生産規模の大きい企業
  - ・財務基盤が強い企業

5

# 廃棄物発電の導入に向けたチッピングフィー設定

#### 試算結果

◆処理規模が小さいほどハイフォン市負担総額は軽くなるが、単価は割高。
 ◆処理規模が小さいほど発電による売電収入が減るため、チッピングフィーが増加。
 ⇒廃棄物発電事業の効果を得るには、まずは500t/dの処理規模の導入が望ましい。

#### 【試算ケース】

- ・ケース1:JICA海外投融資+JCM活用の場合
- ・ケース2:世界銀行借入+JCM活用の場合
- ・ケース3:世界銀行借入+NEDO補助活用の場合

#### 【資金調達額の前提】

- ・JICA海外投融資:設備費×最大70%、金利6.5%に設定
- ・JCM:発電関連施設の50%、総額の25%相当に設定
- ・世界銀行借入:金利1.5%に設定
- ・NEDO設備補助:最大20億円。ただし負担は①基本設計と②対象国で入手困難な機器

[	\$ R	f	+	

- ・ごみカロリー : 1,800 kcal/kg
- FIT : 10.05 US cent/KWh
- ・為替:120 JPY/USD
- ・大規模修繕:7年毎
- ・年330日稼動、20年間

NEDO設備補助,取入ZUは1。たたU共担体U本本設計とUNが国て八子困難な機能												
			5	500t/d × 1			250t/d × 1			100t/d × 1		
			CASE 1	CASE 2	CASE 3	CASE 1	CASE 2	CASE 3	CASE 1	CASE 2	CASE 3	
	設備費	M USD	50	50	50	35.4	35.4	35.4	22.5	22.5	22.5	
建設費	諸経費	M USD	8.3	3.3	3.3	6.7	2.9	2.9	5	2.5	2.5	
	合計	M USD	58.3	53.3	53.3	42.1	38.3	38.3	27.5	25	25	
資金調達	資金借入	M USD	35	30	25.8	25	21.3	16.3	15.8	13.3	7.6	
	設備補助	M USD	12.5	12.5	16.7	8.8	8.8	13.8	5.6	5.6	11.3	
	自己資本(民間)	M USD	5.4	5.4	5.4	4.2	4.2	4.2	3.1	3.1	3.1	
	自己資本(URENCO)	M USD	5.4	5.4	5.4	4.2	4.2	4.2	3.1	3.1	3.1	
	合計	M USD	58.3	53.3	53.3	42.1	38.3	38.3	27.5	25	25	
チッヒ゜ンク゛フィー		USD/t	38	33	29	70	62	56	136	122	115	
ハイフォン市 負担総額		M USD	131	114	199 101	120	106	97	93	84	79	

# カットバ島への入島に係る観光手数料の導入

#### <u>1. 目的</u>

◆カットバ島における資源循環システム構築やEVバス導入など環境保全に資する取組 みを促進するため、環境保護に特化した新たな財源確保を行う。

#### 2. 見直しの方向性

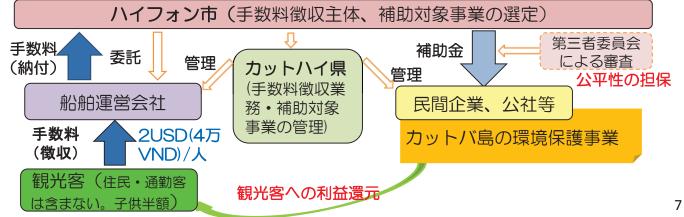
◆カットバ島への入島に係る観光手数料を徴収する(入島手数料の新設)

◆現行の観光手数料を廃止し(施設毎に徴収、4万VND/人、約150億VND/年)、入島 手数料に一本化すると、年間400億VNDが見込める(4万VND/人×100万人=400億 VND)。

◆観光客から徴収。(カットバ島に住所を有する者、職を有する者は対象外)

#### <u>3. 徴収方法</u>

◆ カットバ島行きのフェリー及びボートの乗船チケットに、1人40,000VNDの観光 手数料を上乗せして徴収。船舶運営会社が徴収しハイフォン市に納める。



# カットバ島への入島に係る観光手数料の導入

#### O収入、支出の試算結果

・観光客1人あたりに手数料・費用として40,000 VNDを課した場合の収入は約40,000 mil VND。

・バイオガスと固形燃料事業にはTipping Fee、EVバスと太陽光発電事業には初期費用の補助として手数料・費用を活用。

・上記以外はハイフォン市関係機関に納入する(15,000→26,700 mil VNDに増額)。

	单位:mil VNI							立:mil VND		
		2017	2018	2019	2020	2021	2022	2023	2024	2025
収入	手数料·費用	徴収 開始	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
支出	バイオガス化 <mark>(Tipping Fee)</mark>			4,100	4,100	4,100	4,100	4,100	4,100	4,100
	固形燃料化 (Tipping Fee)			9,200	9,200	9,200	9,200	9,200	9,200	9,200
	<sub>EVバス</sub> (初期費用補助)		18,900	0	0	0	0	0	0	0
	太陽光発電 <b>(初期費用補助</b> )		9,100	0	0	0	0	0	0	0
	小計		28,000	13,300	13,300	13,300	13,300	13,300	13,300	13,300
	ハイフォン市関係機関 へ納入		12,000	26,700	26,700	26,700	26,700	26,700	26,700	26,700
	合 計		40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000

# カットバ島へのディーゼルバス乗入禁止措置の実施

#### 1. 目的

◆世界遺産を目指すカットバ島において環境配慮型交通の実現を図る。

#### 2. 現在の取組み

◆EVバス開発実証事業

- ・カットバ島において太陽光発電と連動したEVバス実証走行実験を実施。
- ·実証期間:2015年11月~2020年3月

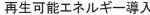
#### 3. 今後の取組み

◆2017年5月にタンブー橋が完成する。 ◆ハイフォン市が導入予定のカットバ島へのディー ゼルバス乗入禁止措置を計画どおりに実施する。 ◆ハイフォン市の交通計画にカットバ島でのEVバス 普及事業を明確に位置づける。











# カットバ島でのEVバス実証に係る課税措置の保留と通関

#### 1 確認事項

カットバ島でのEVバス実証事業が成功するためには、EVバスの輸入に係る課税措 置の保留と通関の実施が不可欠である。

既に北九州市はハイフォン市人民委員会に対して、課税措置の保留と通関の実施に 係る依頼文を2度にわたり送付させていただいたが、今のところ通関は実施されてい ない。

一方、課税措置の保留と通関に係る権限はベトナム国財務省の所管であるとの情報 も得ている。

そこで確認であるが、EVバスの輸入に係る課税措置の保留と通関に関する権限はベ トナム国財務省が有するのか、それともハイフォン市人民委員会が有するのか?

#### 2 確認事項

カットバ島でのEVバス実証事業は日本国・環境省の補助金を活用して実施するもの であり、環境省の規則に沿って実証事業を完了するためには、2016年5月18日までに EVバスの輸入に係る課税措置の保留と通関が実施されなければならない。

課税措置の保留と通関に係る権限がベトナム国財務省が有する場合、ハイフォン市 人民委員会から財務省に当該措置の依頼文を早急に提出していただきたい。 ハイフォン市人民委員会に権限がある場合は、至急、当該措置を実施していただき たい。

# ハイフォン市グリーン成長推進計画における パイロットプロジェクトの課題解決に向けた プラットホーム会合

第2回協議資料

### 2016年8月

北九州市アジア低炭素化センター



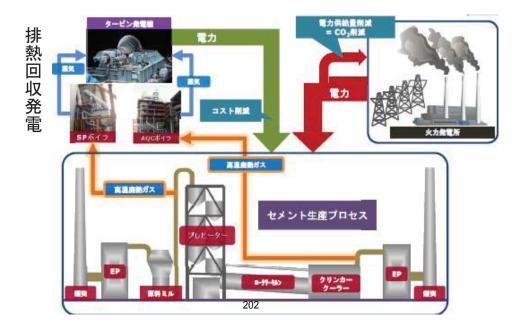
# セメント工場における廃熱回収発電システムの導入

#### <JCM設備補助採択>

◆2016年6月、ハイフォン市グリーン成長推進計画のパイロットプロジェクトの1つ である「VICEMハイフォンを対象とした廃熱回収発電システム導入事業」がJCM設 備補助事業に採択された。

◆本システムの導入により、年間約18,000トンのCO2排出量が削減される。

◆総事業額は約 14 M USD、補助額は約 5.6 M USD。



# カットバ島への入島に係る観光手数料の導入

#### <u>1. 目的</u>

◆カットバ島における資源循環システム構築やEVバス導入など環境保全に資する取組 みを促進するため、環境保護に特化した新たな財源確保を行う。

#### 2. 見直しの方向性

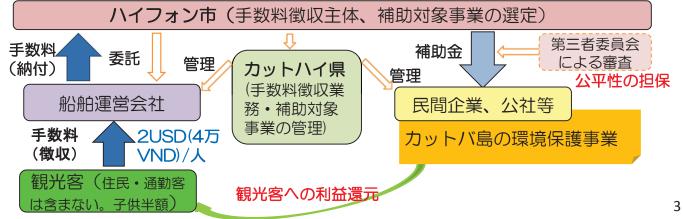
◆カットバ島への入島に係る観光手数料を徴収する(入島手数料の新設)

◆現行の観光手数料を廃止し(施設毎に徴収、4万VND/人、約150億VND/年)、入島 手数料に一本化すると、年間400億VNDが見込める(4万VND/人×100万人=400億 VND)。

◆観光客から徴収。(カットバ島に住所を有する者、職を有する者は対象外)

#### <u>3. 徴収方法</u>

◆ カットバ島行きのフェリー及びボートの乗船チケットに、1人40,000VNDの観光 手数料を上乗せして徴収。船舶運営会社が徴収しハイフォン市に納める。



### カットバ島への入島に係る観光手数料の活用方法 ①EVバスの普及事業

### <観光手数料の活用方法>

◆環境配慮型交通の実現を図るため、EVバスの普及事業に活用。

- ◆資源循環システムを構築するため、バイオガスを中心としたリサイクル事業に活用。
- ◆観光客数の増加を図るため、観光振興策に活用。

### <<br /> <br />

◆入島に係る観光手数料の導入後、ハイフォン市の公募 により選定された企業が、10台のEVバス及び太陽光 発電を導入し、既存のバス路線などに投入

### <<br /> <br />

◆現在、日本国環境省の資金を活用して、カットバ島においてEVバス及び太陽光発電の実証事業を展開。
◆これはベトナム国初の取組。
◆実証期間は2015年12月~2020年2月。



ソフトエナシ゛ーコントロールス゛社のEVバス



再生可能エネルギー導入









### Trang Cat廃棄物処理施設におけるコンポスド及び廃棄物発電

#### 1. コンポスト試作 ①これまでの取組み

◆北九州市とURENCOは、Trang Cat廃棄物処理施設において、2015年11月より市場から発生する生ごみを活用して高倉式コンポストの試作を行った。

◆2016年5月にコンポスト成分の分析を行ったところ、ベトナ ム国農業農村開発省が定める有機肥料の基準を概ね良好に満た すことが分かった。

#### 2 今後の取組み

◆Trang Cat廃棄物処理施設において、高倉式コンポストの生産拡大を目指すため、北九州市とURENCOは生ごみの分別収集、コンポスト生産拡大等について協議を進める。

#### <u>2. 廃棄物発電</u>

◆北九州市とURENCOは、Trang Cat廃棄物処理施設への廃棄 物発電導入を想定して、継続的に協議を行っている。

◆前回、北九州市が提案したチッピングフィーについて、ハイフォン市関係機関から割高であるとのコメントを受けた。
◆現在、北九州市はURENCOとともに、現在の廃棄物処理費用と廃棄物発電を導入した場合の費用などを比較・検討しているところである。



コンポストに生ごみを投入



コンポストの攪拌 (発酵が順調なため湯気が発生)

# ハイフォン市グリーン成長推進計画における パイロットプロジェクトの課題解決に向けた プラットホーム会合

第3回協議資料

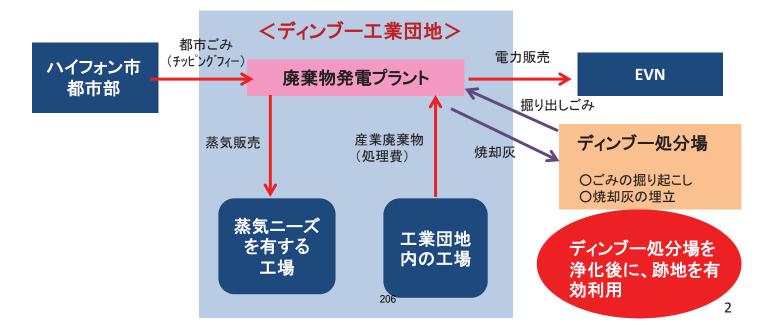
## 2017年1月

北九州市アジア低炭素化センターター

# ディンブーエ業団地での廃棄物発電事業①

 ◆ハイフォン市を代表するディンブー工業団地の隣にディンブー処分場が立地している。処分場からの臭気などについて立地企業から苦情が出ており、企業誘致の障害となっている。
 ◆本事業は、<u>ディンブー工業団地に廃棄物発電施設を導入して、ディンブー処分場の問題を</u> 解決し、工業団地の価値を高める事業。さらには、ディンブー処分場の浄化(回復)を行い、跡地の有効活用を図る。

◆事業採算性を高めるため、産業廃棄物の受入、廃棄物発電施設より発生する蒸気の売却 などを含めて総合的に検討する。



# 

#### <u>1. 目的</u>

◆世界遺産を目指すカットバ島において環境配慮型交通の実現を図る。

#### <u>2.現在の取組み</u>

◆EVバス開発実証事業(ベトナム初の取組み)

- ・カットバ島において太陽光発電と連動したEVバス実証走行実験を実施。
- ・実証期間:2015年11月~2020年3月

◆2017年2月にカットバ島にて記者発表(計画中)

#### <u>3. 今後の取組み</u>

◆EVバスの走行データの収集・解析・検証を実施。
 ◆EVバスの効果を確認後、カットバ島へのディーゼルバス乗入禁止措置を検討。
 ◆EVバスの普及など環境保全に資する取組みを推進

するため、カットバ島への入島に係る観光手数料の 導入について継続的に検討。



# カットバ島でのEVバス実証事業②

太陽光発電 (CIGS薄膜ソーラー) 51KW	太陽光発電不能時 の系統電力(バック アップ)	バス型式 提案走行距離 登坂角度	バッテリー交換式(138kwh) 160km(空調有り) 7.5%以上(連続340m)
		座席 その他	ベンチ式で乗員50名ほど 高湿などベトナム国に適した対応
		バッテリー あるときの (バックアッ	直接充電
		,	パック交換
太陽光発電PCS 51KW(DC/AC)	バスおよび バッテリーパック 充電ステーション	バッテリーパック 207	電池種類 リチウムイオン電池 電圧 576V 電流値 240A(5パック)

# Trang Cat廃棄物処理施設におけるコンポスや事業

#### 1. これまでの取組み

◆北九州市とURENCOは、Trang Cat廃棄物処理施設において、 2015年11月より市場から発生する生ごみを活用して高倉式コ ンポストの試作を行った。

◆2016年5月にコンポスト成分の分析を行ったところ、ベトナ ム国農業農村開発省が定める有機肥料の基準を概ね良好に満た すことが分かった。

#### 2. 現在の取組み

- ◆生ごみ収集量:50 t/d
- ◆収集場所: Do市場, Cau Rao市場, Ben Binh市場など レストラン、ホテル

◆現在は、"コンポストのもと"になるオリジナル・シード・コンポスト(Original Seed Compost)を作成するため、多量のもみ殻や米ぬかを調達中



コンポストに生ごみを投入



コンポストの攪拌 (発酵が順調なため湯気が発生)



# VICEMハイフォンの排熱回収発電システム

◆ VICEMグループでは、排熱回収発電システムを導入するにあたり、SPCを設立し、 SPCからセメント会社へ電力販売を行うビジネスモデルの検討を進めている(BOT型を ベースに検討の予定)。

◆現在、VICEMグループとして、グループ全体で排熱回収発電事業に取り組んでいく 姿勢を見せており、成功すればかなりのCO2排出削減ポテンシャルが期待できる。

◆なお、VICEMグループとしては、VICEMハイフォンは3番目に排熱回収発電を導入する予定とのこと。1番目、2番目は他のセメント工場で検討を進めているとの情報を得ている。

 セメント製造プラント
 蒸気(購入)

 第気(販売)
 SPC

 北熱回収発電システム
 ステム

# H28年 (北方 201 株式 社会

#### H28年度JCM都市間連携事業 (北九州市-ハイフォン市連携事業)に関するお打合せ資料

2016年4月25日 株式会社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.ご訪問の背景
 2.JCMについて
 3.JCM事業に関するご提案

#### 1.ご訪問の背景

- 環境省のJCM都市間連携事業は、低炭素社会形成のノウハウを有する日本国内の自治体とともに、都市間連携に基づいて国外の都市・地域において、JCMクレジット獲得を目指し、多岐に渡る分野で継続的にエネルギー起源二酸化炭素削減を見込める案件形成を通じて都市の低炭素化を目指すものです。
- 公募の結果、 北九州市と弊社にてH28年度の環境省JCM都市間連携事業を受託する ことが決定しました。

#### 平成28年度低炭素社会実現のための都市間連携に基づくJCM案件形成可能性願査事業委託業務 授祝婦補案件一覧表

提案者	共同応募者	対象分野	対象国	対象都市·地域	事業名	事業概要
検)エヌ・ティ・ティ・データ経営研究所	北九州市(アジア低炭素化センター)	ESCO、再エネ、低炭素都市づく り、相手国ニーズ把握	夕イ王国	ラヨン県	の美視及び普及推進季集(北九州市一フェン東連携手	本語変は、北九州市と今江東省工作局にDWD 及びRPPO社(パニ工業団体ら社(IEAT)の通貨関係に基づ き、エコーインダストリアルウラン化を進めるようの工業団体を中心に、を通じて、大幅な温度効果がス基ホ肉 進歩のざい、ミストムの建築、具売業用ホルイーの導入、数合エネルギー利用効率の高い発電システム の導入などの実質可能性質素を行う。
<b>朱)エス・ティ・ティ・デーク経営研究所</b>	北九州市(アジア低炭素化センター)	ESCO、再エネ、交通インフラ、低 皮素都市づくり、相手国ニーズ把 握		ハイフォン市		本類査は、北九州市とハイフォン市の始結都市の枠組に基づき、北九州市がΈ定支援した「ハイフォン市 グリーン規長計画」の実現のため、エネルギー分野を中心とした「工事等の症状素の促進業業員及び「動鳥」 おける歴史素型専調専人に向けた新たな資金領導メカニズム」構築の実現可能性調査を行う。
検〕エヌ・ティ・ティ・データ経営研究所	北九州市(アジア低炭素化センター)	ESCO、再エネ、低炭素都市づく り、相手国ニーズ把握	マレーシア国	イスカンダル開発区	JOM推進に向けたイスカンダル・モデルプロジェクト推 進事業(北九州市一IRDA連携事業)	本課業は、北九州市とイスカンダル地域開発庁(IRDA)の接機に基づきの下、IRDAが接進するflow Carbon Society Blausenet,実際に向けた活動と足並みをそろえ、工場の症状素化実際に向けた現れた症状 素技術事人の実質可能性検索と行う。

http://www.env.go.jp/press/102233.html

#### 1-2.H28年度活動内容

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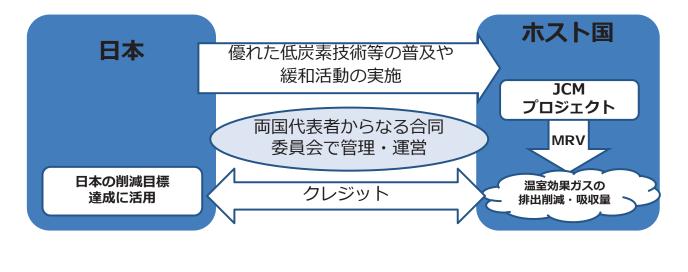
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● 姉妹都市である北九州市とハイフォン市間の協力関係に基づき、ハイフォン市を中心にベトナム北部の低炭素化に資するプロジェクトの発掘に向け、1年間調査を実施します。

活動内容	調査の進め方	調査の手法・手段
1.従来にない エネルギー起源CO2排出 削減効果の高い事業の 発掘	ペトロベトナムガスと提携している 東京ガスと連携し、CNGを活用した コジェネや燃料転換PJを大規模工業 団地に提案	<ul> <li>○工業団地のうち重工業が集中しているものから優先順位づけ</li> <li>○ハイフォン市の協力を得て運営会社への説明、続いて説明会の開催等</li> <li>○可能性のある企業向けの個別協議を実施</li> <li>○エネルギー診断</li> <li>○診断結果に基づく技術評価及び経済性評価</li> <li>○診断結果に基づくCO2排出削減量評価</li> <li>○JCM化に向けた提案及び協議等</li> </ul>
2.エネルギー起源CO2排 出削減効果の高い事業 のJCM化	共同事業者候補企業とは、1年以上、 共同検討を進めていることから、 これまでの蓄積を生かし、補助事 業の申請を展開。あわせて、他工 場への展開可能性を模索	○直接協議により準備を進め、設備補助事業を申請 ○同じ国営企業の他工場への展開可能性を協議 ○他セメント工場への直接働きかけ 等
3.類似事業の横展開 (CO2排出削減効果の 比較的、高かった"鋳物 工場への電気炉導入事 業"の横展開)	J C M設備補助事業として実施中の 鋳物工場への高効率電気炉の導入 事業の成果を踏まえた、他の鋳物 工場への働きかけ	<ul> <li>○実施中の事業の成果の取りまとめ</li> <li>○成果を踏まえた鋳物工場経営者を集めた説明会等の開催</li> <li>○必要に応じて、電気炉導入済み工場への見学会の開催 等</li> </ul>
4.離島におけるEVバス導 入に向けた観光手数料 と組合せた仕組みの構 築	ハイフォン市及び人民委員会と「観 光手数料」及び「自動車等乗り入 れ禁止措置」に関する協議を実施	○ハイフォン市(カットハイ県人民委員会、交通局、財務局、 天然資源環境局、人民委員会等)との直接協議

2-1.JCMとは

- 途上国への優れた低炭素技術等の普及を通じ、地球規模での温暖化対策に貢献するとともに、日本からの温室効果ガス排出削減等への貢献を適切に評価し、我が国の削減目標の達成に活用する。
- CDMを補完し、地球規模での温室効果ガス排出削減・吸収行動を促進することにより、国連気候変動枠組条約の究極的な目的の達成に貢献する。



出典:GEC資料

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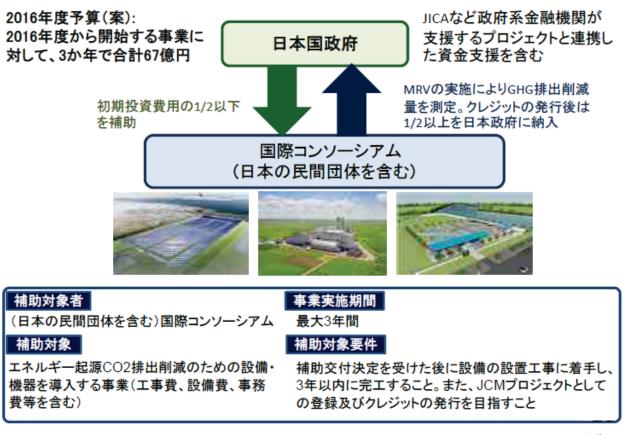
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#### 2-2.JCM署名国(2016年4月時点 16か国)

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モンゴル、バングラデシュ、エチオピア、ケニア、モルディブ、ベトナム、ラオス、インドネシア、コ スタリカ、パラオ、カンボジア、メキシコ、チリ、サウジアラビア、ミャンマー、タイ が署名済み。 今後フィリピンの署名に向け活動を進めています。





出典:GEC資料

#### 2-4.JCM設備補助事業の新設ルール

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● H28年度から、類似案件の有無によって補助率の上限が変わるルールが導入されました。加えて、補助額とCO2削減量の費用対効果に関しても具体的な評価基準が設けられました。

#### > 新規性があり、CO2削減量の大きいプロジェクト発掘が期待されています。

#### 補助率の上限について

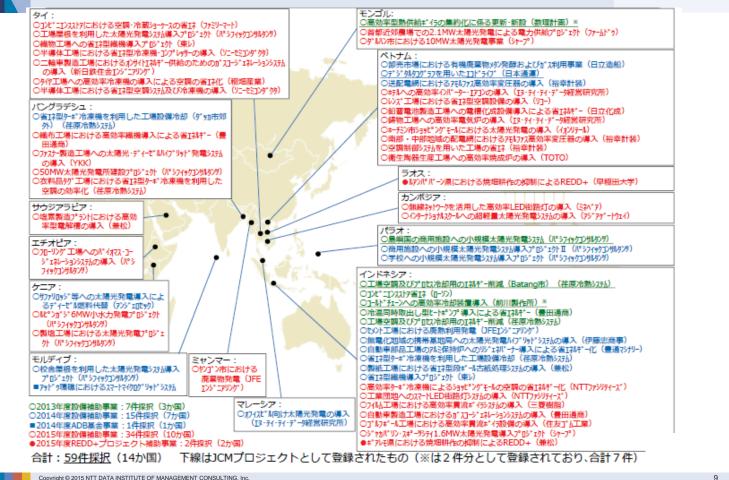
事業実施国における 過去の類似事業件数	0件	1~3件	4件以上
補助率の上限	50%	40%	30%

#### 費用対効果について

- 費用対効果については、補助金5億円以上の案件は5,000円/1t-CO2、補助金 五億円未満の案件は1万円/1t-CO2を目安とする。
- 投資回収年数については補助金を用いて3年以上を目安とする。

※GEC資料より





#### 3-1.想定されるJCM事業化メニュー

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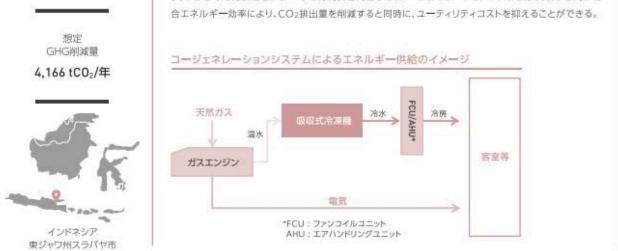
#### ● 本年度は新しく以下の事業の実現可能性調査を進めることを想定しております。

	燃転+高効率機器の導入	コジェネ導入	交通
想定メニュー	石炭、重油等 →天然ガス	コジェネレーション システム	CNG車 (バス・タクシー)
概要・基礎情報	○現在石炭を使用している ボイラや炉などの設備の燃料を天然ガスに転換 ○2016/1の首相の声明で 2030年までに石炭中心の電 源構成見直しが決定	<ul> <li>ホテルや化学系工場な ど、熱と電気の需要がある設備に対してコジェネレーションシステムを導入する</li> <li>中央制御型のボイラを使用しているホテルリストあり</li> </ul>	<ul> <li>○新規導入されるバスやタクシーをCNG車にする</li> <li>○既存のバスやタクシーをCNG車に更改</li> <li>○ハノイではタクシー25,000台、 バス1,200台が稼働</li> <li>○HCMCでは2016年3月に23台のCNGバスが導入された</li> </ul>
JCM事業化案	<ul> <li>○高効率機器導入時の初期 費用に対して最大50%の補助</li> <li>(※燃転のための設備は対 象外)</li> </ul>	○コジェネシステムの導 入に係る初期費用に対し て最大50%の補助	○CNG車の導入に係る初期費用 に対して最大50%の補助
課題	○石炭の価格が安い	○大規模な熱需要につい て要調査	<ul> <li>CNG車の導入に係る初期費用</li> <li>に対して補助がでるか?</li> <li>ハノイ市内のドル箱路線を運</li> <li>航する国営バス会社</li> <li>TRANSERCOは構造的な赤字が</li> <li>続き、設備投資できるか不明</li> </ul>

## (ご参考) 自動車部品工場におけるアルミ保持炉の省エネルギー化 with TG

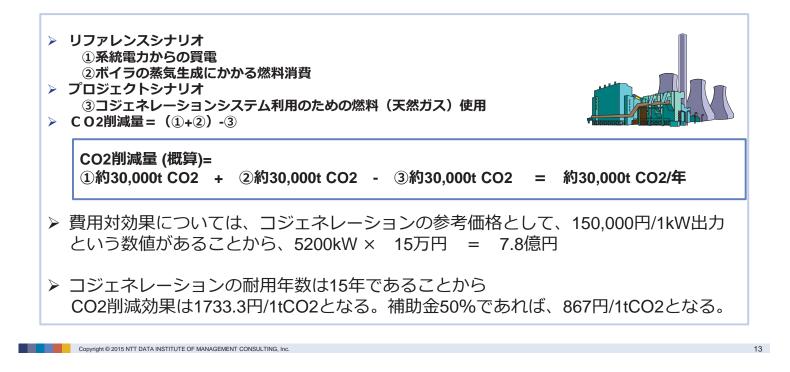
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## (ご参考)マレーシアにおける化学工場へのコジェネレーション導入検討 NTT Data

- H27年度のマレーシアにおける調査にて、熱と電気の需要がある化学工場へのコジェ ネレーションシステム導入を検討しました。
- コジェネレーション導入によるCO2削減効果について、以下のように試算しました。



#### (ご参考) ベトナムの温室ガス削減策

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### ベトナム、石炭火力「新設しない」 温室ガス削減策

ハノイ=佐々木学2016年2月13日01時21分朝日新聞

ベトナム政府が、国内で新たな石炭火力発電所を建設しない方針を打ち出した。温室効果ガス削減に各国が取り組むことを決めた昨年末の「パリ協定」に沿った動きだ。温室ガスの排出が多い石炭火力に依存しがちな途上国の積極的な動きとして注目される。

ベトナム国営メディアによると、グエン・タン・ズン首相が1月下旬に あった政府内の会議で、新規の石炭火力発電所に建設許可を出さず、エネル ギー政策を見直すよう指示した。

ベトナムは海岸浸食など温暖化の影響が深刻。「2030年までにエネル ギー部門での温室ガス排出を、特段の対策をしない場合と比べて20~3 0%削減」、「20年の期間で、国内総生産(GDP)当たりのエネルギー 消費量を前年比1~1・5%削減」などの目標を掲げる。目標達成には、約 35%とされる石炭火力発電への依存度を下げることが不可欠と判断した。

# (ご参考)石炭鉱山における重機の燃料転換またはハイブリッド利用のTT Date

- 石炭鉱山で石炭の積込輸送に使われるダンプトラックの 燃料を、軽油から天然ガスへの転換あるいは軽油と天然 ガスのハイブリッド利用にすることで、低炭素化に寄与 します。
- ベトナムの石炭は主に北部ハロン湾に近いクアンニン炭
   田などから産出されています。



http://www.komatsu-kenki.co.jp/products/dump\_truck/HD465\_605-7E0.html

燃料の種類の例	排出係数	単位発熱量	単位当たり二酸化炭素排出量
原料炭	0.0245 tC/GJ	28.9 GJ/t	2.596 kg-CO2/kg
一般炭	0.0247 tC/GJ	26.6 GJ/t	2.409 kg-CO2/kg
原油	0.0187 tC/GJ	38.2 GJ/kl	2.619 kg-CO2/I
ガソリン	0.0183 tC/GJ	34.6 GJ/kl	2.322 kg-CO2/I
<del>ジェット<mark>燃料油</mark></del>	0.0183 tC/GJ	36.7 GJ/kl	2.463 kg-CO2/I
灯油	0.0185 tC/GJ	36.7 GJ/kl	2.489 kg-CO2/I
軽油	0.0187 tC/GJ	38.2 GJ/kl	2.619 kg-CO2/I
A重油	0.0189 tC/GJ	39.1 GJ/kl	2.710 kg-CO2/I
液化天然ガス(LNG)	0.0135 tC/GJ	54.5 GJ/t	2.698 kg-CO2/kg

原料炭:鉄鋼生産の原料になるもの

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- 般炭:発電ボイラ-燃料やセメント回転炉燃料などに使われるもの

単位当たり二酸化炭素排出量の算出方法

単位発熱量(GJ/t GJ/kl)×排出係数(tC/GJ)×44/12=単位当たり 二酸化炭素排出量(kg CO2/kg kg CO2/l)

#### (ご参考)ドンナイ省、ホーチミン市におけるCNGバス導入の動き

東南部ドンナイ省ビエンホア市アンビン街区に本社を置くビエンホア工業団地開発総公社 (Sonadezi=ソナデジ)は、ディーゼル自動車の排出ガス削減を目的として、2016年までに公 共旅客輸送用や工場作業員送迎用のCNG(Compressed Natural Gas=圧縮天然ガス)バス555 台に投資する計画を明らかにした。投資総額は6300億VND(約35億8000万円)の見通し。

同計画が同省人民委員会に承認されれば、ソナデジは2015年末までにCNGバス162台を新 規購入し、天然ガススタンド2か所を整備する。2016~2020年には、車両393台を購入し、 天然ガススタンド5か所を新たに整備する計画だ。



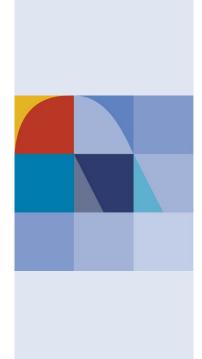
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ホーチミン市人民委員会は2014年、市内で運行する老朽化したバスを 新しい車両に買い替えると共に、市内のバス台数を増やすため、2017 年までにCNGバス300台を含むバス1680台を購入する投資プロジェ クトを承認した。

2016年3月1日、CNGを使用したバスが、路線バスの33番(ホックモン郡アンスオンバスターミナル〜国家大学間)に導入された。

http://www.viet-jo.com/news/economy/150601055803.html

http://news.finance.yahoo.co.jp/detail/20160303-00000076-scnf-world





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