FY2019 Project for Ministry of the Environment Japan

# FY2019
# City-to-City Collaboration Programme for Low-Carbon Society

## Project to accelerate low carbonization in Hai Phong City (Feasibility study on low carbonization project mainly through Eco-Industrial Park Program in Vietnam)/ Kitakyushu-Hai Phong Cooperation

# Report

February 2020

NTT Data Institute of Management Consulting, Inc.

# Contents

Accompanying Materials

Reference a：201910JCM_Introduction_Seminar_in_Kitakyusy

Reference b：JCM_Project_in_Vietnam_Seminar_Kitakyusyu

Reference c：20191225Meeting_Material of Interim_Report_for_MOEJ

Reference d：20200227Meeting_Material_of_Final_Report_for_MOEJ

# Chapter 1: Background and Objectives of the Project

## Chapter 1 Contents

## 1.1 General Outline of Hai Phong

Hai Phong City is a centrally-controlled city (Municipalities of Vietnam) with a population of about 2.0 million (as of 2019), 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 up most in Vietnam, the economic growth rate of 2018 reached about 16%. The per capita GDP exceeded 2,900 USD in 2018, approaching 3,000 USD. There are 11 industrial parks in the city, and more than 50 Japanese companies have entered the market. It is expected that more companies will enter for its smoother economic growth and the importance as a logistics base. In particular, Hai Phong City is also known as the area with a 100 year plus history of having many foundries located in itself. Currently approximately 140 foundries are based in the area.

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

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

Basic Plan on Climate Change in Vietnam

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

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

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

（1） Outline of Economy

Vietnam has been promoting its transition toward market economy since the late 1980s, through ways of joining ASEAN and the WTO and others. In the 2000s, Vietnam achieved an economic growth of more than 7% on average, with a per capita income exceeded 2,500 USD in 2018. It became one of the lower middle income countries. Since the possibility of economic growth in Vietnam is high in the future as a country adding to the economic growth of the world, the importance of Vietnam is increasing. However, such economic growth in Vietnam brings issues, such as the inadequate development of social infrastructure and the deterioration of environmental problems.

Figure1-2 Major economic indicators and others in Vietnam
(1990, 2011, 2012,2017,2018)

| index | 1990 | 2011 | 2012 | 2017 | 2018 |
|---|---|---|---|---|---|
| population | 6.602 million | 8,784million | 8,877milion | 9.459 million | 9.554 million |
| Gross national income | 6,595 million USD | 117,758 million USD | 148,961 million USD | 213,00597 million USD | 245,214 million USD |
| Gross national income(per person) | 130USD | 1,270USD | 1,550USD | 2,160 USD | 2,566 USD |

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.

Figures 1-1 and 1-2 show the annual final energy consumption by fuel type (2006-2015) in Vietnam and GDP growth rate by industry (2006-2015), 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.

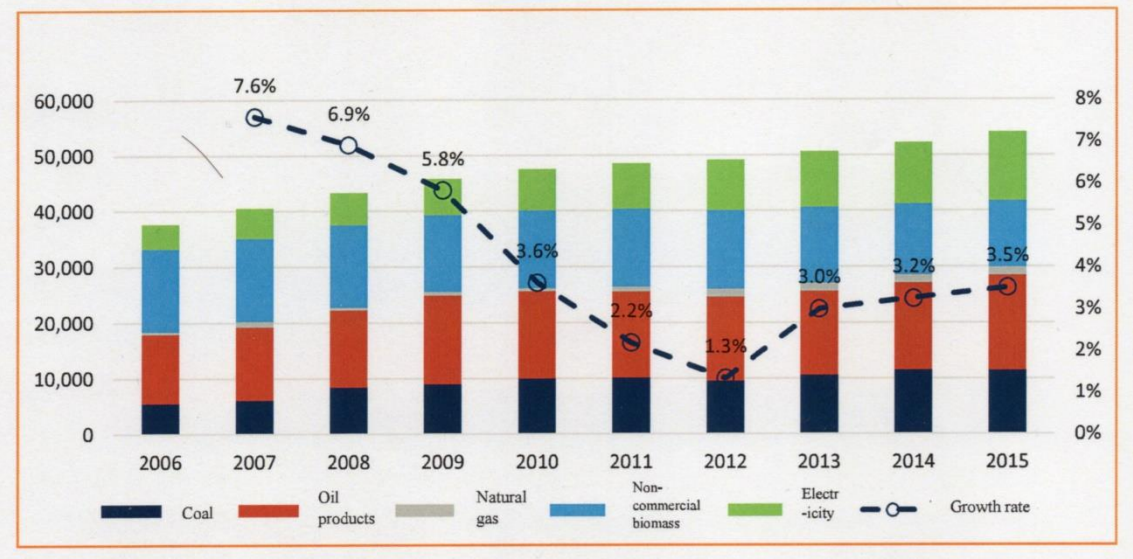


Figure 1-1 Primary energy consumption by resource in Vietnam (2006-20015)

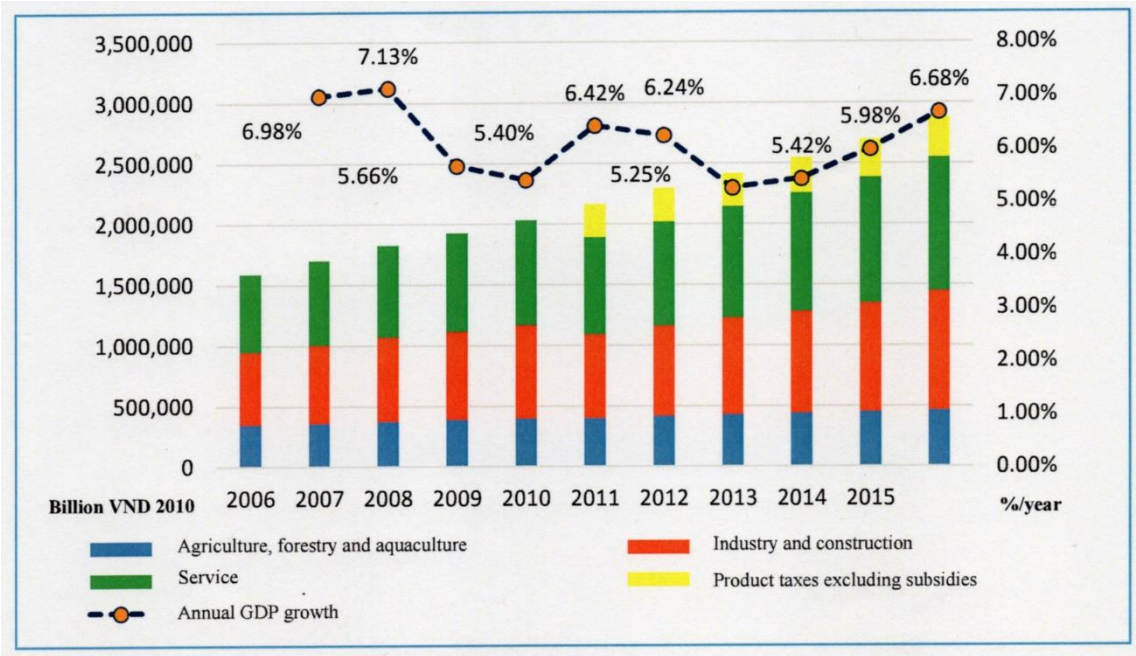


Figure 1-2 Industry composition and transition of GDP in Vietnam

Source：Ministry of Industry and Trade, "VIETNAM ENERGY OUTLOOK REPORT 2017"(Excerpt)

Figure 1-3 shows the annual CO2 emissions in Vietnam and annual electric power consumption per capita. Although the annual CO2 emissions have repeatedly increased and decreased from the 1960s to 1990, the annual per-capita electric power consumption and annual CO2 emissions have grown remarkably since 1990. Implementing measures to reduce electric power consumption in Vietnam (where economic growth is expected in the future), would be an effective measure to not only secure a stable electric power supply, but to also reduce CO2 emissions.

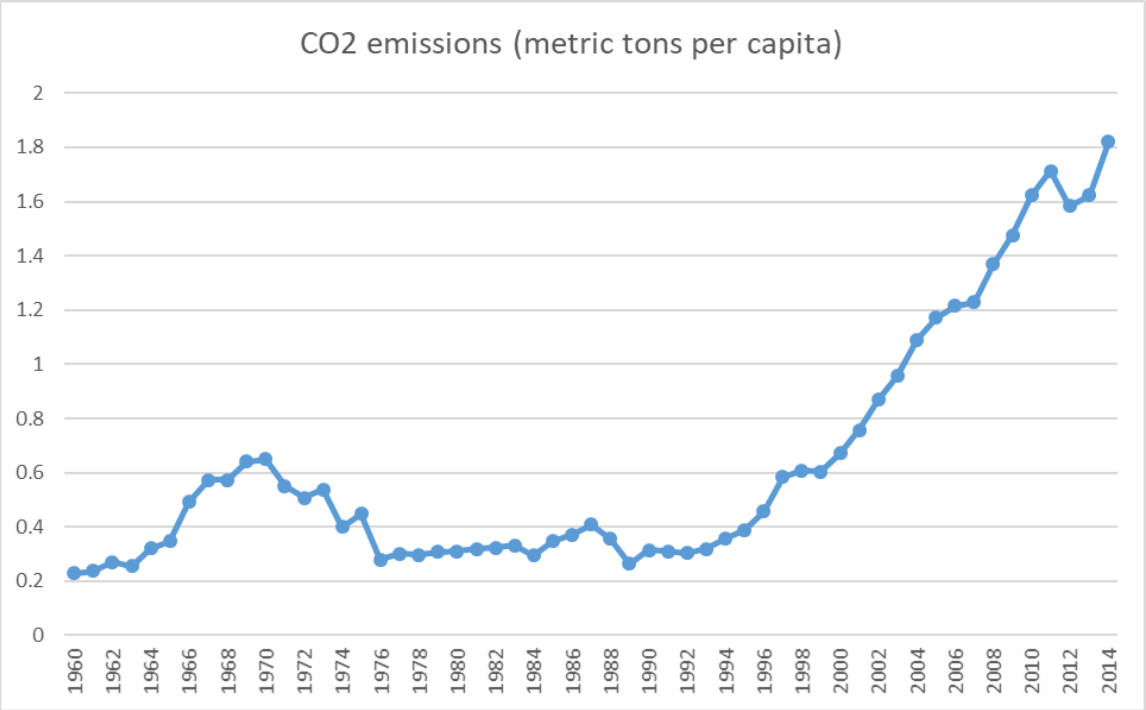


Figure 1-3 CO2 emissions in Vietnam (t)

Source: World Bank World Open Data

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

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

① Formulation of the Green Growth Strategy Action Plan

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

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

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

① Formulation of the Green Growth Strategy Action Plan

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

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

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

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

Figure 1-3 Main roles of major departments (Hai Phong City Green Growth Strategy Action Plan)

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

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

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

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

(A) Relationship with HPHHSAP

In 2014, with the support of Kitakyushu City, "Green Growth Promotion Plan in Hai Phong City" was formulated as a practical edition that clearly shows the concrete action plan of HPGGSAP. The relationship between the plan and HPGGSAP is shown in Figure 1-4. The plan was formulated after a discussion between Hai phong City and Kitakyushu City, and has been legally permitted by the Hai Phong People's Committee.

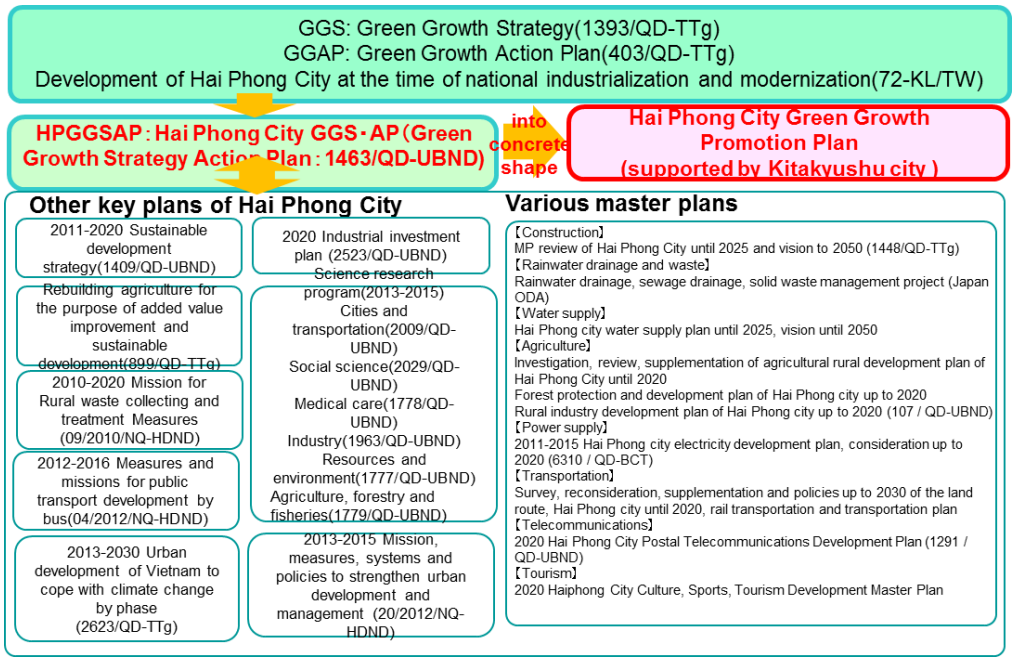


Figure1.4 Relationship between legal position of HPGGSAP and green growth promotion plan

(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 (Figure 1-5).

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

Figure 1-5 Flow of Hai Phong City Green Growth Plan Formulation

Flow of plan development (figure1-6) support flow ③ In the concrete measures, the details of specific measures implemented by Hai Phong City, its implementing body, implementation time, and evaluation index were clarified. For reference, specific concrete measures in the energy field are shown as an example in Figure1-4.

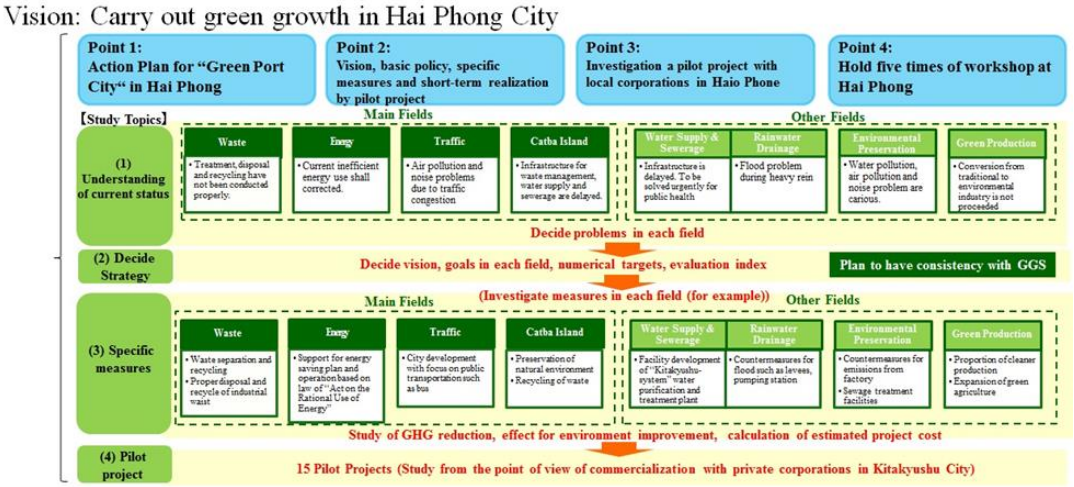


Figure 1-6 Flow of Hai Phong City Green Growth Promotion Plan Formulation Support

Figure 1-4 Specific measures in the energy field

| Business classification | Contents | Main Actor | Project term | KPI |
|---|---|---|---|---|
| 1. Efficient use of energy at factories | ・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, DOIT | Short | Energy saving amount GHG reduction amount |
| | ・Propose concrete measures such as energy saving and energy reuse that can be applied to small and medium enterprises, and aim for more efficient use of energy. | | Medium | |
| 2. Efficient use of energy in commercial facilities, office buildings, etc. | ・ promoting energy conservation diagnosis in large commercial facilities and office buildings with an annual energy consumption of over 500 TOE, which is the object of the Energy Conservation Law, energy conservation such as lighting and air conditioning equipment with large electricity consumption, introduction of distributed power sources such as renewable energy etc. , We propose a method of efficient use of energy. | Company, DOIT | short | Energy saving amount GHG reduction amount |
| | ・Specific examples of energy conservation and introduction of renewable energy such as newly constructed and remodeled buildings with a floor space of over 2,500 m 2, which is subject to the building energy saving standard (QCVN 09: 2013 / BXD) We propose measures to make energy use more efficient. | | Medium | |
| 3. Introduction of cleaner production in | ・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 |

| | | | | |
|---|---|---|---|---|
| factories | | | | |
| 4. Promotion of introduction of renewable energy | ・In order to cope with the shortage of basic electric power, as part of the introduction of distributed type power supply, promote the introduction of renewable energy such as solar power generation, solar heat, small scale wind power generation, geothermal energy use. | Company citizen | Short | Energy saving amount GHG reduction amount |
| 5. Energy saving of public facilities | ・Hai Phong Municipalities will promote energy saving and energy efficient use of the facilities related to the city, People's Committee, etc. | Administrative agency | Short | Energy saving amount GHG reduction amount |
| | ・Promote energy saving lighting such as LEDs for existing and new road lights and street lights. | DOT | | |
| 6. Promotion of energy management | ・Introduce a system of energy management utilizing smart meters etc. in factories, office buildings, commercial facilities, and homes to promote optimization of energy use such as peak cut response. | Company citizen | Medium | Energy saving amount GHG reduction amount |
| | ・For stable operation in industrial estates and the like, we introduce a system that collectively receives power and perform voltage control, and aim to stabilize the voltage in the main power. | company | | |
| 7. Enhancement of energy conservation promotion system | ・In order to promote efficient use of energy, we will examine and evaluate energy use situation of priority energy use agencies and support improvement of usage efficiency. | Company, DOIT | Short | Energy saving amount GHG reduction amount |
| | ・In order to introduce and disseminate green production methods in the industrial field, we set indicators (greening indicators) to evaluate energy conservation and environmental load reduction. | | | |
| | ・Regarding energy conservation and efficient use of energy, we conduct educational activities for corporations and citizens, while building energy-saving models in each household, disseminate energy conservation. | Company citizen DOIT | | |

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

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

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


Figure 1-7 Brochure of promoting energy saving at home

A. 2011 年度の電気の節約・有効的利用のコンテスト

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

I. 参加者

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

・1 つのチームは 5 人のメンバーを含む。

II. 招待者

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

・約 350 人

III. コンテストの目的

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

・宣伝者、協力者の宣伝能力を確認する。

・節約的・効果的な電気利用モデル・発想を紹介する。

IV. コンテストの内容

4.1. 挨拶

形式：ステージでのドラマのように、チーム全体の紹介

時間：5 分

点数：10 点

4.2. 節約的・効果的な電気利用に関する知識のコンペ

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

時間：5 分

点数：10 点

4.3. 芸コンペ

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

時間：10～20 分

点数：20 点

4.4. スピーチコンペ

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

合計で最も高い点数を取ったチームは優勝。

**B. 2014 年度の「グリーン世界のため」の黄金鐘鳴らしコンテスト**

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

**I. 参加者**

ハイフォン市の LeChan 中学校の学生と教員

**II. 招待者**

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

**III. コンテストの目的**

・省エネと環境保全意識を学校の生徒に身に着けさせる。

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

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

**IV. コンテストの内容**

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

**V.** 資金：省エネセンターの資金

Figure 1-8 Energy saving contest Program overview

(2) Issues

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

① Administrative Issues

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

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

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

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

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

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

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

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

low (the administration is satisfied with only making plans).

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

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

② Issues in the waste field

(A) Inappropriate sorting and recycling of household waste

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

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

Figure 1-9 Trang Cat repository Current status of composting facility

(B) Improper treatment ofwaste produced in daily life

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

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

pollution in the surrounding fields.

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

。

Figure 1-10 Incineration facility in Kien Thuy Province

(C) Traceability of industrial/medical/harbor waste

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

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

Figure 1-11 Illegal dumping

(D) Actual situation of recycling business

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

(E) Waste generation volume

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

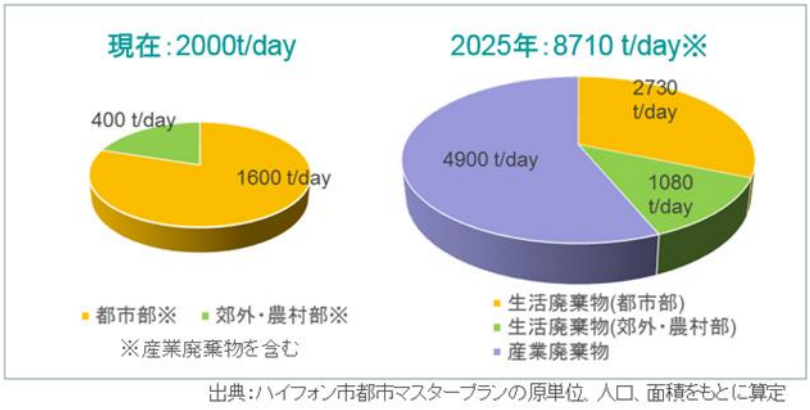


Figure 1-12 Amount of current and future waste generation

(F) Waste incineration capacity

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

Figure1-5 Ability of incineration facilities in Hai Phong city and others

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

※When operating for 8 hours

(G) Waste circumstances of Hai Phong City

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

③ Issues in the energy field

(A) High dependence on fossil fuels

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

(B) Electric power problems

There is a power outage about twice a month, and a single power outage lasts for several hours to half a day. Therefore, many factories are equipped with private power generation facilities. Voltage in Hai Phong City is unstable, and

electric power is in low quality, so it may hamper the operational stability and sophistication of industry. The power transmission loss is large, and it is necessary to take action to ensure efficiency of transmission and distribution systems.

(C) Promotion of energy saving measures

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

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

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

・In factories and hospitals with steam needs, coal-fired boilers are mainly used and cause environmental pollution.

・The efficient utilization of energy, such as the utilization of waste heat, is rarely carried out.

・In office buildings and commercial facilities, energy conservation measures are not taken regarding lighting and air conditioning equipment which consume high power.

・Many companies lack funds to implement energy conservation systems.

・ Although energy conservation labeling system have been established, the implementation system of energy saving performance tests of products has not yet been fully implemented.

・ Comprehensive energy management is not available at factories, offices, commercial facilities, etc.

(D) Use of renewable energy

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

(E) Electric power consumption

・On the other hand, power consumption has increased greatly, and it is expected

that the trend will be stronger in the future.

・Figure 1-14 shows a comparison of the energy consumption per GDP (in 2013) for Hai Phong City and Japan as a whole. Since Hai Phong City has lower energy efficiency than Japan, it is important to promote efficient energy use.

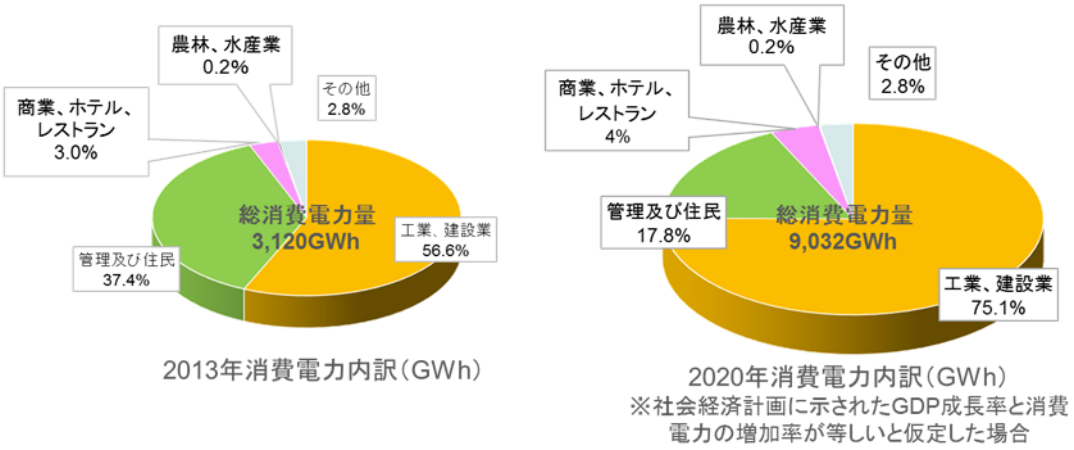


Figure 1-14　Breakdown of current and future power consumption

Figure1-15　Energy consumption per GDP (2013)

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

日本のエネルギー効率は6倍

※1　2010年　1USD＝21,000VNDで換算、※2　2012年度

① Issues in transportation

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


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

(B) Elimination of traffic congestion

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

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

| | |
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|  |  |
| Traffic jam on arterial road | Congestion of National Highway No. 5[1] |

Figure 1-17 Traffic situation of Hai Phong City

(C) Modal shift to mass transit

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

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

[1] 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.

| | |
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|  |  |
| Bus used in Haiphong city | Electric motorcycle |

Figure 1-18 Transportation network in Hai Phong city

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

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

(F) Town planning and transport policy

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

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

## 1.4 Cooperative relationship between Hai Phong city and Kitakyushu city

(1) Overview

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

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

Figure1-6　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"<br>(Contents of Friendship and Cooperation Agreement)<br>Training acceptance of Hai Phong city staff<br>Distribution of Vietnamese business information centering on Haiphong City<br>Dispatch of economic mission team<br>International cooperation such as environment · water supply and sewerage |
| September,2009 | Hai Phong Municipal People's Committee Du Chun · Toi Vice Chairman visited Kitakyushu City |
| May, 2010 | Mayor Kitahashi · President of Sasaki city council representative visited Hai Phong city (Hai Phong city liberation 55th anniversary commemorative ceremony participation) |
| July, 2010 | Hashimoto deputy mayor led an economic mission team to visit Hai Phong city (holding an economic exchange seminar) |
| August, 2010 | Hai Phong Municipal People's Council Chairman Nguyen Bang Tsuang visits Kitakyushu City (holding an economic exchange seminar) |
| Nobemver,2010 | Deputy Mayor Shiga led Kitakyushu Overseas Water Business Promotion Council to visit Hai Phong City (Hai Phong city water supply exhibition participation)<br>Citizen Orchestra held concert at Hai Phong Opera House |
| October,2011 | Hai Phong Municipal People's Committee Vice Chairman Dan Zuc Hiep visited Kitakyushu City (100th Anniversary Event of the Kitakyushu Water Supply) |
| May,2013 | Deputy Mayor Umemoto visited Hai Phong City, City Federation Hita Hayasaki Ai Kai "Hibiki" performed in Hai Phong City (Vietnam Tourism Year · Hong Hong Festival Opening Ceremony) |
| April, 2014 | Chairman of the Hai Phong People's Committee Zhon Ain Dien (Mayor) visited Kitakyushu City and signed a "sister city agreement" |
| September,2014 | Secretary General Secretary Gwen van Tyne of Haiphong visits Kitakyushu |
| April, 2015 | Deputy Mayor of Haiphong City Du Chun · Toi visited Kitakyushu City |
| May, 2015 | A visit team representing Mayor Kitabashi and Chairman of Tomachi City Council visited Hai Phong City (participate in the ceremony for the 60th anniversary of Hai Phong Liberation) |


Figure1-19　Hai Phong Green Growth Plan

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

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

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

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


Figure 1-20 Cooperation history of Kitakyushu city water service

# Chapter 2 Project Feasibility Study Objectives and Implementation Framework

## Chapter 2 Contents

## 2.1 Project overview

The 21st Session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 21) was held in a suburb of Paris, France in December 2015. Attended by all nations that make up the United Nations Framework on Climate Change, the session saw the adoption of the Paris Agreement, a legal framework for taking fair and effective measures to combat climate change in 2020 and beyond. After the Marrakech conference in 2016 (COP22) and the Bonn conference in 2017 (COP23), the "Katowice climate package", a rulebook that codifies the specific duties of each country from 2020, was adopted at the Katowice conference held December 2018 in Poland (COP24).

At COP21 where the Paris Agreement was adopted, it was decided that stakeholders would be asked to be aware of the actions of non-state actors such as municipalities, welcome the efforts of all non-governmental actors (municipalities and other local public bodies), and scale up their efforts. Cities are densely-populated where people engage in activities that support social and economic development. Although urban areas account for only 2% of the world's entire area, they are home to roughly half of the world's population. This is expected to rise to 70% by 2050. Therefore, urban areas have a large role to play in alleviating climate change, and are important in achieving the goals of the Paris Agreement, such as steady efforts by cities to combat climate change and reduce greenhouse gas emissions.

On the other hand, Vietnam is home to over 300 industrial parks, and while they contribute significantly to the economic development of the country, industrial activities in the country result in severe environmental pollution, threatening the health of the people who live there. Seventy percent of discharged industrial waste water is untreated, 20% of industrial waste is hazardous, and inefficient resource management results in increased greenhouse effect gases. The Vietnamese government faces various difficulties, making them unable to implement effective measures to combat this situation, and the number of industrial parks continues to grow.

To help solve such problems and make industrial parks more

environmentally friendly, an Eco-Industrial Park (EIP) pilot project is to be launched with the help of donors such as the United Nations Industrial Development Organization (UNIDO), Global Environment Facility (GEF), and the Swiss State Secretariat for Economic Affairs (SECO). A visualization of the Eco-Industrial Park is shown in Figure 2-1.

Figure 2-1 Eco-Industrial Park concept

In 2015, UNIDO and the Ministry of Planning and Investment of Vietnam (MPI) began pilot projects at industrial parks in Hanoi, Ninh Bình, Da Nang, and Can Tho. Rather than trying to cover the entire industrial park, the pilot projects targeted individual factories, conducting verification projects that focused mainly on introducing waste recycling and waste water treatment technologies, which showed certain results. Along with the verification projects, the MPI worked with UNIDO to establish government Decree 82 for the proliferation of EIP, which was announced in 2018. Government Decree 82 merely illustrates the EIP concept, and it is expected that guidelines will be released, detailing what kind of standards need to be met in order to achieve EIP certification. The MPI is currently requesting entire industrial parks as model project candidates in order to create these guidelines.

Hai Phong, Vietnam's third largest city, has established the Green Growth Strategy Action Plan (1463/QD-UBND, hereafter referred to as "HPGGSAP") in order to attain sustainable economic growth while preserving the environment and reducing greenhouse effect gas output,

in other words, to promote green growth. Hai Phong is the sister city of Kitakyushu, which is famous as an Eco-Town. Kitakyushu has helped support the establishment of the Hai Phong Green Growth Promotion Plan as a concrete measure to achieve HPGGSAP. Kitakyushu is currently supporting a number of pilot projects in Hai Phong based on the promotion plan, and has supported the formation of many low-carbon projects through City-to-City Collaboration.

Furthermore, MPI staff members who participated in the Eco-Town Manager Training program were thoroughly impressed with Kitakyushu's environmental efforts and their Eco-Town. The program, which has been conducted since 2011, is based on a memorandum between Kitakyushu and UNIDO, and communicates Eco-Town construction experience and knowledge. Utilizing the experience and knowledge of Kitakyushu, the MPI requested support in establishing an Eco Industrial Park model project, with the MPI, the city of Hai Phong, and Kitakyushu working together to sign an MOU in March 2019. The MOU notes utilizing a JCM equipment subsidy system to help popularize low-carbon technologies.

Among these various activities, Kitakyushu is working to transform industrial parks in Hai Phong into Eco-Towns. Nam Cau Kien, an industrial park in Hai Phong, aims to become an EIP model industrial park, and is actively engaged in following the example of Kitakyushu. Pham Hong Diep, the president of the industrial park, visited Kitakyushu in April 2019, learning a great deal on his trip.

Kitakyushu was selected as an "SDG Future City" and "Local Government SDG Model Project" by the Japanese government, and as Asia's first "World Model City for SDG Promotion" by OECD, with expectations that support in line with SDGs will be obtained from the MPI and Hai Phong.

With this background in mind, the Hai Phong Nam, Cau Kien industrial park serves as an EIP model case with the entire industrial park aiming for low-carbonization. In this regard, high-efficiency equipment is being introduced at two steel production factories that use electric furnaces, which consume the most energy. A study will be conducted that uses the results of this initiative to roll out similar

high-efficiency equipment will be across the entire industrial park, forming and expanding a JCM project. Furthermore, based on the extensive knowledge of SDGs in Kitakyushu, SDG support will be provided at the Nam Cau Kien industrial park and in Hai Phong.

## 2.2 Target areas and applied technologies

(1) Target areas

This fiscal year's study consists of the following three main activities, with the actions of Kitakyushu and Hai Phong, the Nam Cau Kien industrial park, and the MPI Eco-Industrial concept in mind.

(a) Introduction of high efficiency blowers + high voltage inverters and high efficiency pumps + high voltage inverters at the two steel producing companies aiming for low carbonization at the Nam Cau Kien industrial park

The electric furnaces that melt down iron scrap use the most energy in the Nam Cau Kien industrial park and discharge a massive amount of CO2. These furnaces are used by Vietnam-Italy Steel (VIS) and Vietnam-Japan Steel (VJS), the two companies in the park that produce iron and steel products. At the iron works where iron scrap is used as a raw material, a massive amount of electricity is used for the electric furnace and dust collectors (blowers) and a large amount of water is used in their large-scale pumping system to cool down the materials and produce iron and steel products. Because energy-saving measures can directly link to reduced product costs, the incentive to introduce such measures is quite high, along with significant CO2 reduction effects. The two companies with electric furnaces that utilize dust collectors in the plant to improve the working environment are being considered as candidates to receive high efficiency dust collectors + high voltage inverters for the JCM project. Introduction of high efficiency pumps + high voltage inverters are also being considered for the pump system in the two plants.

| | |
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|  |  |
| July 2019 conference at VIS<br>(VIS Hai Phong plant conference room) | Existing dust collector at VIS Hai Phong plant<br>(blower) |

Figure 2-2 Advance consultation on introducing the high efficiency dust collector + high voltage inverter

(b) Introduction of high efficiency blowers + high voltage inverters and high efficiency pumps + high voltage inverters at companies in the Nam Cau Kien industrial park

Development at the Nam Cau Kien industrial park is split into 108 ha during the first phase and 155 ha during the second phase. The first phase is already complete, with a 100% occupancy rate. The second phase with an area of 155 ha is currently in development. There are currently 47 companies occupying the industrial park, and in addition to the two iron scrap recycling companies (which use electric furnaces), there are businesses involved in facilities and machinery, new materials, drugs, and foods.

Although different in scale, many of the companies in the park use blowers and pumps.

The president of the Nam Cau Kien industrial park managing company is actively involved in introducing environmental measures, including complying with government Decree 82, regarding eco-industrial parks as announced by the MPI. Such efforts have been highly praised by Hai Phong, resulting in

Nam Cau Kien being recommended by the MPI as the first eco-industrial park candidate.

If introduction of equipment according to the JCM equipment subsidy proceeds at the two scrap iron companies, similar technologies utilizing the JCM equipment subsidy can be rolled out to other companies in the industrial park. In order to examine the feasibility of such an initiative, this study conducted briefing sessions on the JCM equipment subsidy and door-to-door surveys for the companies in the industrial park.


Briefing session for the managing company of the industrial park

Door-to-door survey of candidate companies at the park

Figure 2-3 Explaining the JCM system to companies at the Nam Cau Kien industrial park

(3) Supporting activities contributing to SDGs for Nam Cau Kien industrial park, which aims to become an eco-industrial park model

Nam Cau Kien industrial park aims to become a model eco-industrial park case, and have requested that Kitakyushu send experts that can provide advice and guidance in the following three areas in order to achieve environmental preservation in the park and the surrounding areas.

- Exhaust gas from the factories in the industrial park

- Waste water treatment from the factories in the industrial park
- Maintenance of industrial park infrastructure

Activities on (a) exhaust gas and (b) waste water treatment in this study are in line with SDG "7 Affordable and clean energy", "11 Sustainable cities and communities", "13 Climate action" and "17 Partnerships for the goals". In cooperation with Kitakyushu, the importance of dealing with these areas was communicated, and an expert staff dispatch program was put into place in response to the request from the industrial park. Also, MPI staff members that are currently in the midst of establishing the eco-industrial park guidelines were invited to Kitakyushu to learn about SDGs at Eco-Town as a reference for considering guidelines and conformity to SDGs.

(2) Applicable technologies

The technologies applicable to the study have been selected after a discussion between Kitakyushu, Hai Phong, and the Nam Cau Kien industrial park, then proposed.

Table 2-1 Applicable facilities and technologies

| Category | Applicable facilities | Applicable technologies |
|---|---|---|
| Activity 1 | Two iron and steel producing plants in the Nam Cau Kien industrial park that use iron scrap | High efficiency blowers + high voltage inverters<br>High efficiency pumps + high voltage inverters |
| Activity 2 | Companies in the Nam Cau Kien industrial park (Companies that use high voltage blowers or pumps) | High efficiency blowers + high voltage inverters<br>High efficiency pumps + high voltage inverters |
| Activity 3 | Waste water treatment | Advice on waste water treatment |

| | | |
|---|---|---|
| | facilities and environmental education center in Nam Cau Kien industrial park | technologies and on establishing and running an environmental education center |

## 2.3 Action framework

The study implementation framework for this project is shown in Figure 2-4. This project studies the feasibility of JCM equipment subsidies based on City-to-City Collaboration between Kitakyushu, which possesses the knowledge to form a Zero-Carbon Society and partner city Hai Phong, which aims to become a Zero-Carbon Society.

Kitakyushu and Hai Phong worked together based on City-to-City Collaboration to make arrangements with, work with, and introduce the relevant departments in Hai Phong as well as related agencies in the Vietnamese government.

NTT Data Institute of Management Consulting negotiated directly with the study targets of each activity, studied technologies and the economic potential of the project, and evaluated the amount of CO2 reduction, then made proposals to the study targets and listened to their feedback, etc. DHOWA TECHNOS Co., Ltd. is conducting a local survey from a technological standpoint on the feasibility of introducing high efficiency blowers + high voltage inverters as well as high efficiency pumps + high voltage inverters. MURAKAMI M.F.G. Co., LTD. and Yaskawa Automation & Drives Corp. will provide DHOWA TECHNOS with information from a technological standpoint on the various blower, fan, and high voltage inverters required. Based on the information from these three companies, NTT Data Institute of Management Consulting will consider applying for a JCM equipment subsidy.

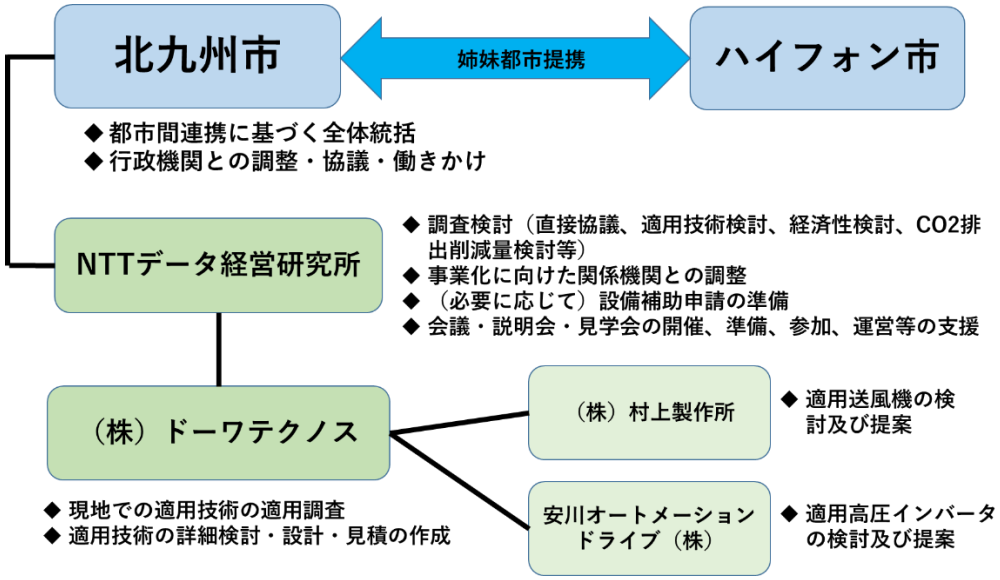



Figure 2-4 Study implementation framework

## 2.4 Study method and schedule

(1) Study method

The study to find a JCM equipment subsidy candidate in this project was conducted according to the four steps shown in Figure 2-5.

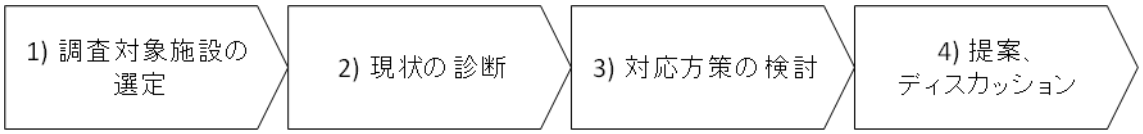



Figure 2-5 Study steps

1) In addition to the Nam Cau Kien industrial park, selection of facilities as targets of this study was based on introduction of projects utilizing the City-to-City Collaboration environment between Kitakyushu and Hai Phong, or direct appointment according to unique studies, making arrangements with facilities that could feasibly reduce CO2 output.
2) In the current diagnosis, facility visits were utilized during local surveys to obtain direct feedback and identify the challenges and needs faced by each target facility.
3) In consideration of various measures, introduction of high efficiency blowers + high voltage inverters and high efficiency pumps + high voltage inverters as well as introduction of equipment for feasible energy-saving measures, energy regenerating equipment along with economic potential and reduced CO2 output were studied, based on the above local surveys.
4) In proposals and discussions, the results of studies were shared with persons in charge at each of the facilities, feedback on further opinions and challenges was collected, and procedures in going forward were taken into consideration.

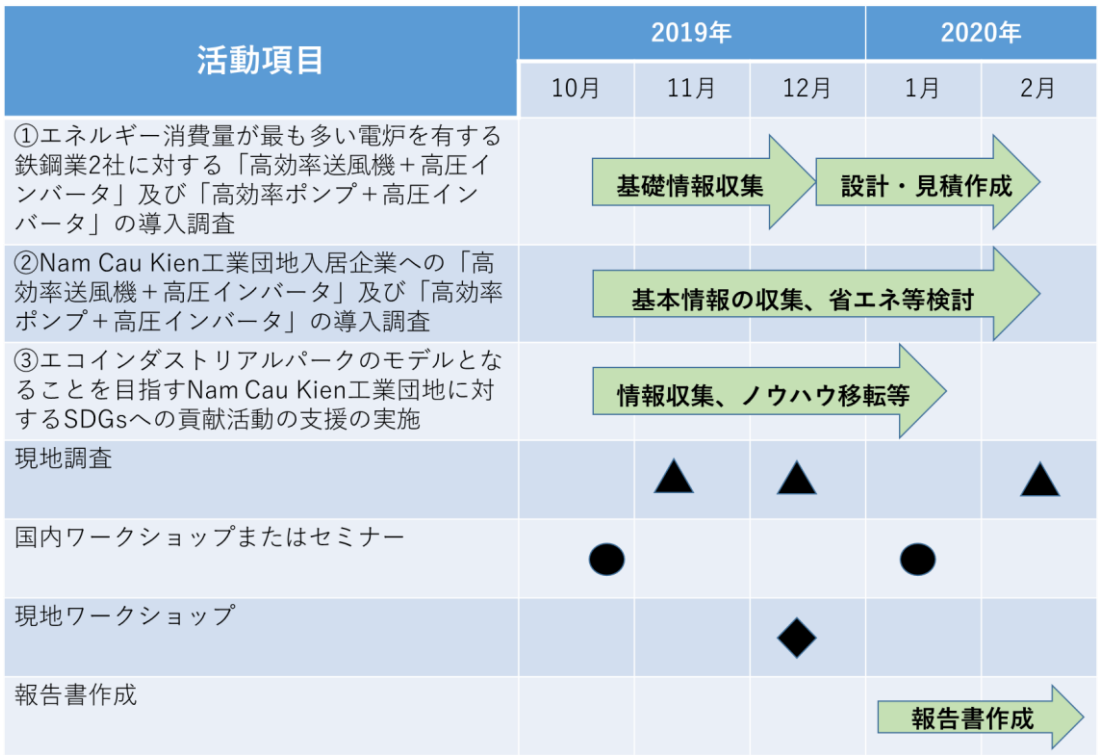
(2) Schedule

The schedule for this study is shown in Figure 2-6. Local surveys are to be conducted three times. The October domestic workshop was conducted at Kitakyushu Eco-Town along with workshops for SDGs and JCM for

representatives of the Nam Cau Kien industrial park. The January seminar sponsored by the MOE and IGES is on City-to-City Collaboration. The December local workshop co-sponsored by the Nam Cau Kien industrial park is entitled "Workshop on Enhancing the Hai Phong Green Growth Promotion Plan and Eco-Industrial Park Promotion".

The mid-term report was issued December 2019 and the final report in February 2020.

Figure 2-6 Study schedule



# Chapter 3 Report on Project Feasibility Study

## Chapter 3 Contents

## 3.1 Summary of field survey

This section summarizes the schedule of the first to third field surveys conducted this year and the main agenda and activities of each visit survey.

The details of the discussions at each site, the content of the activities, and the results based on the activities will be described in the sections following Section 3.2.

### 3.1.1 First field survey

Period: November 10 (Sun) to November 15 (Fri), 2019

Places visited:

- Ministry of Planning and Investment (MPI)
- Haiphong Foreign Affairs Bureau
- Vietnam Italy Steel JSC (VIS company, scrap iron recycling steelworks)
- Vietnam Japan Steel JSC (VJS, scrap iron recycling plant)
- Lien Minh (waste plastic recycling plant)

Summary of activities:

Ministry of Planning and Investment (MPI)

The main contents of discussions at MPI are as follows

- Outline of activities of this year's intercity cooperation project and request for cooperation
- The report on the results of the Green Growth Promotion Plan for Hai Phong City, which was held in cooperation with Kitakyushu City and Hai Phong City on December 10 in Hai Phong City, and a seminar on the establishment of an Eco Industrial Park Request for a lecture on the industrial park concept
- Request to attend an intercity cooperation seminar to be held in Japan in January 2020
- Consultation on Eco-Industrial Park Initiative

| | |
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| Discussion at MPI 1 | Discussion at MPI 2 |

Figure 3.1　Discussion at MPI

Haiphong Department of Foreign Affairs

The main contents of discussions at Hai Phong Foreign Affairs Bureau are as follows.

- Outline of activities of this year's intercity cooperation project and request for cooperation
- Report on the results of the Green Growth Promotion Plan for Hai Phong City, which was implemented in cooperation with Kitakyushu City and Hai Phong City on December 10 and a seminar on the establishment of an eco-industrial park
- Request to attend an intercity cooperation seminar to be held in Japan in January 2020

| | |
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|  |  |
| Hai Phong City Foreign Affairs Bureau 1 | Hai Phong City Foreign Affairs Bureau 2 |

Figure 3.2　Discussion in a room of Hai Phong Department of Foreign Affairs

Vietnam Italy Steel JSC (VIS)

The main contents of the survey at VIS are as follows.

- Surveys by equipment manufacturers regarding the introduction of “high-efficiency blowers + high-voltage inverters” and “high-efficiency pumps + high-voltage inverters” using the JCM equipment subsidy system explained during the visit in July 2019
- Technical introduction of "high efficiency blower + high voltage inverter" and "high efficiency pump + high voltage inverter"
- Collection of information and data on the size, installation status, operation status, design / specifications, etc. of candidate facilities
- Factory inspection

| | |
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|  |  |
| Discussion at VIS | Inspection of factory |

Figure 3.3　Visit Survey on VIS

Vietnam Japan Steel JSC (VJS)

The main contents of the survey at VJS are as follows.

- Explanation of intercity cooperation project based on sister city partnership between Kitakyushu and Hai Phong
- Explanation of JCM equipment subsidy project
- Technical introduction of "high efficiency blower + high voltage inverter" and "high efficiency pump + high voltage inverter"
- Factory inspection
- Request to collect technical information

| | |
|---|---|
|  |  |
| Discussion at VJS | Inspection of factory |

Figure 3.4　Visit Survey on VJS

Lien Minh (plastic recycling plant)

- The main contents of the survey at Lien Minh are as follows.
- Explanation of JCM equipment subsidy program
- Technical introduction of "high efficiency blower + high voltage inverter" and "high efficiency pump + high voltage inverter"
- Factory inspection

| | |
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|  |  |
| Inside the Lien Minh plant | Site visit |

Figure 3.5　Visit Survey on Lien Minh

### 3.1.2 Second field survey

Period: December 9 (Mon) to December 14 (Sat), 2019

Places visited:

- Workshop on strengthening Hai Phong Green Growth Promotion Plan and promoting Eco-Industrial Park

- Haiphong Foreign Affairs Bureau
- Nam Cau Kien (NCK) industrial park (environmental education center and wastewater treatment facility)
- VIS Company
- VJS
- Bridgestone Vietnam
- DEEP-C headquarters

Summary of activities:

<u>Workshop on strengthening Hai Phong Green Growth Promotion Plan and promoting Eco-Industrial Park</u>

The main contents of the workshop are as follows.

- With the support of Kitakyushu City, a report on the results of 15 pilot projects in the Green Growth Promotion Plan created by Hai Phong City after 5 years
- Report on the contents and progress of the Eco-Industrial Park Initiative by MPI
- Announcement of eco-industrial park aimed at NCK industrial park
- Announcement on JCM system
- Presentation by a company based in Kitakyushu on energy saving or environmental improvement technology
- The signing ceremony of the memorandum of understanding of the promotion of the Eco-Industrial Park by Kitakyushu City, the city's Eco Town Center, and the NCK Industrial Park

| | |
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|  |  |
| Presentation at the workshop (Compost business) | Signing ceremony |

Figure 3.6　Workshops and Ceremony of Signing MOU

Haiphong Department of Foreign Affairs

The main contents of the discussion at Hai Phong Department of Foreign Affairs Bureau are as follows.

- There was a change in the personnel change of the Deputy Director of the Foreign Affairs Bureau between the first field survey and the second field survey.
- We explained this intercity cooperation project and requested cooperation.
- Request for dispatch of people to intercity cooperation seminars to be held in January 2020
- Explain the activities of this trip

| | |
|---|---|
|  |  |
| Meeting 1 | Meeting 2 |

Figure 3.7　Discussion at Department of Foreign Affairs, Hai Phong

NCK Industrial Park (Environmental Education Center and Wastewater Treatment Facility)

The main contents of the visit to the environmental education center and wastewater treatment facilities at NCK Industrial Park are as follows.

- Advice and discussion on the operation of NCK Industrial Estate Environmental Education Center
- Advice on operation of NCK industrial park wastewater treatment facility
- Progress report on JCM business of two steel companies (VIS and VJS) in NCK Industrial Park
- Discuss deployment to other factories in NCK Industrial Park

| | |
|---|---|
|  |  |
| NCK Industrial Park Environmental Education Center Seminar room | NCK industrial park wastewater treatment facility inspection |

Figure 3.8 Visit Survey on NCK Industrial Park

VIS

The main contents of the VIS survey are as follows.

- Discussion on performance measurement of existing dust collection equipment
- Request for additional performance measurement of existing dust collection equipment

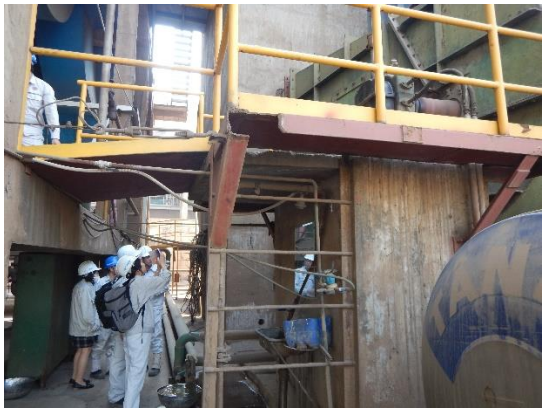
| | |
|---|---|
|  |  |
| Confirmation of performance measurement position and method 1 | Confirmation of performance measurement position and method 2 |

Figure 3.9 Visit Survey on VIS

VJS

The main contents of the VJS survey are as follows.

- Discussion on blower specifications, installation year and operating status
- Discussion on replacement of electric furnace (induction furnace) requested by

VJS

Bridgestone Vietnam

The main contents of the Bridgestone Vietnam survey are as follows.

- Discussion on applicability of JCM for biomass power generation business
- Discussion on rooftop solar power generation

DEEP-C headquarters

The main contents of the DEEP-C survey are as follows.

- Explanation of JCM subsidy program
- Explanation on the outline of DEEP-C's electricity business
- Introduction of technologies applicable as JCM

| | |
|---|---|
|  |  |
| Discussion at DEEP-C headquarters 1 | Discussion at DEEP-C headquarters 2 |

Figure 3.10 Visit Survey on DEEP-C

### 3.1.3 Third field survey

Period: February 17 (Mon) to February 22 (Sat), 2020

Visit:

- Haiphong Department of Foreign Affairs
- VIS (Hung Yen factory)
- VJS
- Nam Cau Kien (NCK) Industrial Park
- Sankyu Vietnam
- VJS
- DEEP-C
- Bridgestone Vietnam

Hai Phong Department of Foreign Affairs

The main contents of the discussion at the Hai Phong Department of Foreign Affairs are as follows.

- Explain the activities of this trip
- Discussion on the future of activities based on the Memorandum of Understanding for the Eco-Industrial Park with NCK Industrial Park
- Discussion on low-carbon projects at Cat Bi Airport

VIS (Hung Yen Factory)

The main contents of the survey on the Hung Yen Factory of VIS are as follows.

- Discussion on the proposal of "high efficiency blower + high voltage inverter"
- Discussion on additional data measurement
- Observation of the lower process (rolling process) of steelmaking at the Hung Yen factory

| | |
|---|---|
|  |  |
| Discussion of proposal | Tour of rolling process |

Figure 3.11　Visit Survey on VIS Hung Yen Factory

VJS

The main contents of the VJS visit survey are as follows.

- Specification confirmation for new electric furnace proposal and discussion on actual measurement data
- Discussion on improvement of electric power system of electric furnace (energy saving) as a new request from VJS side
- Reconnaissance of electric furnace power facilities

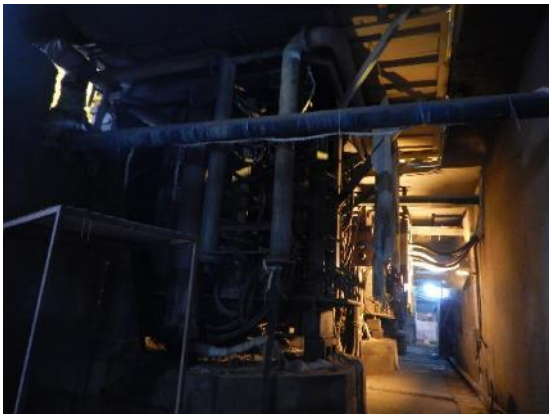
| | |
|---|---|
|  |  |
| Discussion in the control room | Tour of electric system for electric furnace |

Figure 3.12　Visit Survey on VJS Factory

Nam Cau Kien Industrial Park

The main contents of the discussion at the NCK Industrial Park are as follows.

- Launch ceremony for “Nam Cau Kien Club”
- Discussion on introduction of solar power generation facilities
- Discussion on new tenants
- Discussion on deployment to factories other than the two steel companies in the NCK industrial park

| | |
|---|---|
|  |  |
| Launch Ceremony NCK Club | Discussion |

Figure 3.13　Visit Survey on NCK Industrial Park

Cat Bi International Airport

The main contents of the survey at Cat Bi International Airport are as follows.

- Introduction of JCM subsidy system
- Introduction of possible JCM projects at the airport

・ Tour of airport facilities

| | |
|---|---|
|  |  |
| Discussion in the Conference Room | Chiller of Air Conditioning System for Airport Building |

Figure 3.14　Visit Survey on the Cat Bi International Airport

SANKYU VIETNAM

The main discussions in the survey at Sankyu Logistics Vietnam are as follows.

・ Discussion on the concept of an electric container ship being considered by the company
・ Introduction of JCM equipment subsidy system

| | |
|---|---|
|  |  |
| Discussion in the meeting room | Image of electrical container ship |

Figure 3.15　Visit Survey on Sankyu Vietnam

DEEP-C

The main contents of the DEEP-C survey are as follows

・ Detailed explanation of JCM equipment subsidy program

- Detailed explanation of DEEP-C's industrial park business
- Introduction of DEEP-C renewable energy business and discussion on JCM application
- Tour of the solar demonstration facilities and candidate sites in the DEEP-C industrial park

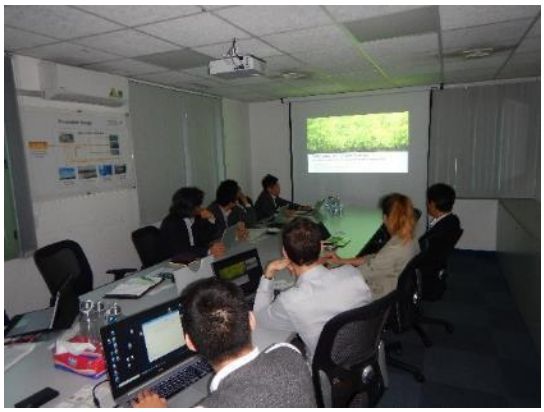
| | |
|---|---|
|  |  |
| Introduction of DEEP-C EIP Program | Demonstration facilities of Solar Power Systems |

Figure 3.16　Visit Survey on DEEP-C

Bridgestone Vietnam

The main contents of the Bridgestone Vietnam survey are as follows.

- Discussion on applicability of JCM for biomass power generation business
- Discussion on rooftop solar power generation

## 3.2 Activity 1: Survey on the introduction of high-efficiency blowers + high-voltage inverters and high-efficiency pumps + high-voltage inverters for two steel companies with electric furnaces, which consume the most energy

### 3.2.1 Vietnam Italy Steel

Vietnam Italy Steel JSC (VIS) is an iron and steel industry that uses scrap iron as a raw material, and is a Vietnamese company with a 70% stake in Kyoei Steel Co., Ltd., a Japanese company. Kyoei Steel has been focusing on overseas business in recent years, and has four operating companies in Vietnam, including VIS. VIS is headquartered in Hung Yen province, near Hanoi, and is a steel company with a capital of VND 738.3 billion and sales of VND 6,105.1 billion (2017). The business consists of melting scrap iron received in an electric furnace (arc furnace), and manufacturing and selling steel bars and wires for rebar. The VIS plant is divided into two plants, the Hai Phong plant and the Hung Yen plant, with the former responsible for the upper process (steel making) and the latter for the lower process (rolling). The VIS Hai Phong plant is located at the Nam Cau Kien industrial park in Hai Phong.

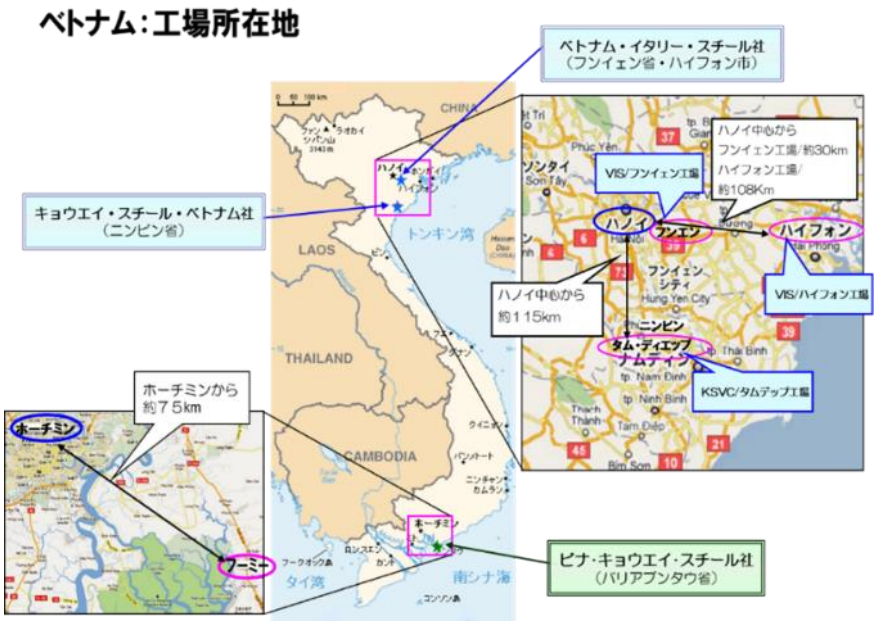



Figure 3.17 Location of VIS Hai Phong Plant and Hung Yen Plant

An overview of the VIS Hai Phong Plant and the Hung Yen Plant is as follows.

Table 3.1 Overview of VIS Hai Phong Plant and Hung Yen Plant

| Hai Phong Plant (Steel Making Plant) | |
|---|---|
| Factory site area | 164,582 m2 |
| Factory building area | 14,837 m2 |
| Production capacity | 400,000 t/year |
| Billet size | 120square・130square・150square・200square, length：6 m・12m |
| Electric furnace | 60 t（arc furnace） |
| Outside refining furnace | 60 t |
| Continuous casting equipment | 4strands |
| Hung Yen Factory (Rolling Mill) | |
| Factory area | 77,742 m2 |
| Factory building area | 13,398 m2 |
| Production capacity | 250,000 t/year |
| Product and size | Steel bars for reinforcing steel 10～40 mm, wire 6.0・8.0 mm |
| Heating furnace | 50 t |
| Continuous rolling equipment | 1line |

VIS became a subsidiary of Kyoei Steel Co., Ltd. in May 2018, and local plant managers are Japanese. Since steelmaking using an electric furnace uses a large amount of power, modernization of facilities was being considered to reduce power consumption in order to strengthen cost competitiveness. At the visit in July 2019, they explained the facilities of the “high-efficiency blower + high-voltage inverter” and “high-efficiency pump + high-voltage inverter” and the JCM system, and showed very high interest. Therefore, a system was established to proceed with this project using JCM equipment subsidies (Figure 3.18).

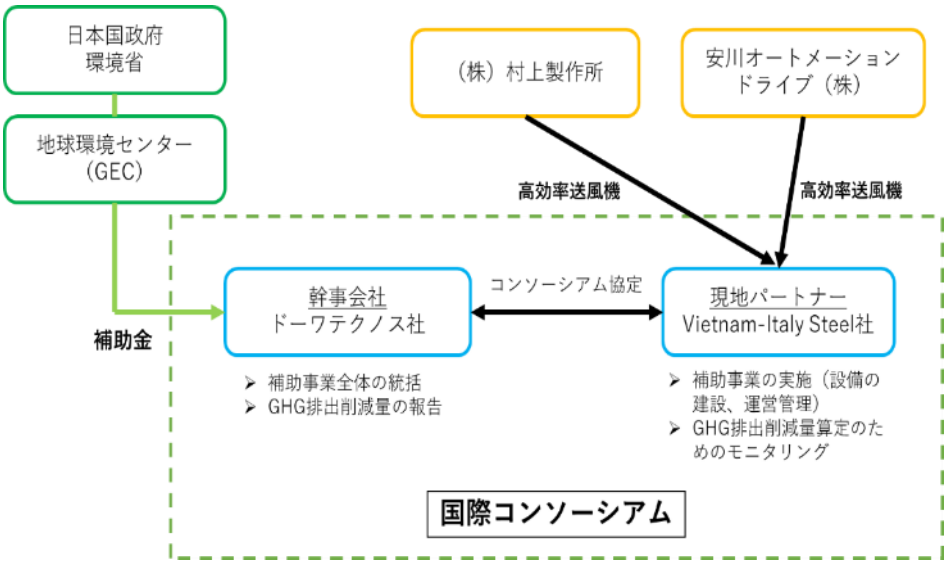



Figure 3.18: JCM project implementation system at VIS

In the first field survey this year, a field survey of VIS was conducted with the primary purpose of collecting basic information for making specific proposals.

| | |
|---|---|
|  |  |
| Dust collection equipment and chimney at VIS steel mill | Blower and motor |

Figure 3.19: VIS steel factory dust collection equipment

| | |
|---|---|
|  |  |
| Dust collection equipment control room | Dust collection equipment electrical room |

Figure 3.20 VIS Dust Collection Power Supply Room

In this survey, it was found that there were no specifications or design documents for the dust collection equipment at the VIS steel mill. In addition, Chinese companies that actually manufactured and delivered the products have already gone bankrupt, and it is not possible to obtain new materials. Therefore, in consultation with VIS, they were asked to measure the air volume and other parameters to measure the performance of the existing blower.

| | |
|---|---|
|  |  |
| Instruction of actual measurement point 1 | Instruction of actual measurement point 2 |

Figure 3.21 Explanation of blower air volume and pressure measurement points

Although the measurement was repeated several times due to the difference in the scale of the installed meter, the occurrence of turbulence, etc., the measured data is summarized below. The measurement points are shown in Figure 3.22.

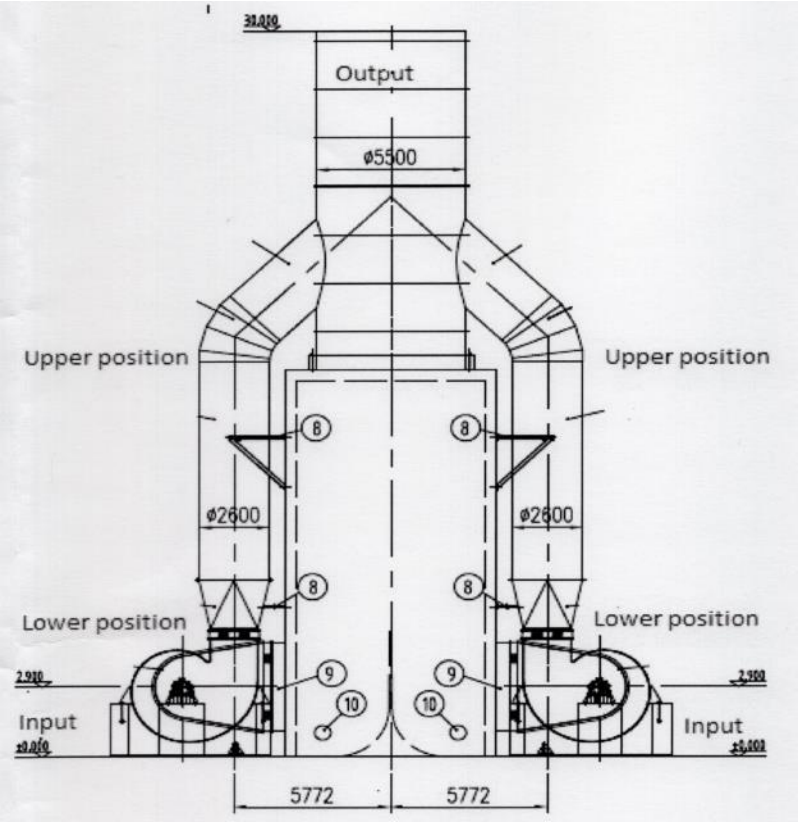



Figure 3.22 Measurement points of actual measurement in dust collector

Table 3.2 Measured data and main parameters of VIS dust collection equipment

| Fan | Fan Flow Rate (m3/h) | Damper Open Degree | Rated Speed (/min) | Shaft Power 85℃ (kW) | Static Pressure 20℃ (kPa) | | Dynamic Pressure 20℃ (kPa) | Total Pressure 20℃ (kPa) | Total Pressure 85℃ (kPa) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Input | Output Upper Position | | | |
| No.1 (Left) | 401,300 | 40% | 721 | 849 | -3.30 | 0.55 | 0.22 | 3.66 | 3.00 |
| | 369,150 | 40% | 642 | 631 | -2.50 | 0.33 | 0.19 | 2.74 | 2.24 |
| No.2 (Right) | 407,340 | 40% | 727 | 849 | -3.14 | 0.52 | 0.23 | 3.61 | 2.95 |
| | 380,640 | 40% | 648 | 631 | -2.51 | 0.34 | 0.20 | 2.65 | 2.17 |

Based on this data, the specifications of the new fan designed by Murakami Manufacturing Co., Ltd. are shown below. Figure 3.23 and Figure 3.24 show the performance curves of the existing and new blowers based on the above data.

Table 3.3 Specifications of existing and newly established

| | Existing | | Newly established | |
|---|---|---|---|---|
| Capacity (m3/h) | 590,000 | ⇒ | 540,000 | 8% down |
| Total Pressure (MPa) | 5.70 | ⇒ | 4.80 | 16% down |
| Air Temp (℃) | 85 | ⇒ | 85 | |
| Suction Gas Density (kg/m3) | 1.0 | ⇒ | 0.982 | 1.2*(273+20)/(273+85) |
| Shaft Power | - | ⇒ | 920 | |
| Motor (kW) | 1,400 | ⇒ | 1,000 | |
| Rated Speed (/min) | 920 | ⇒ | 985 | |

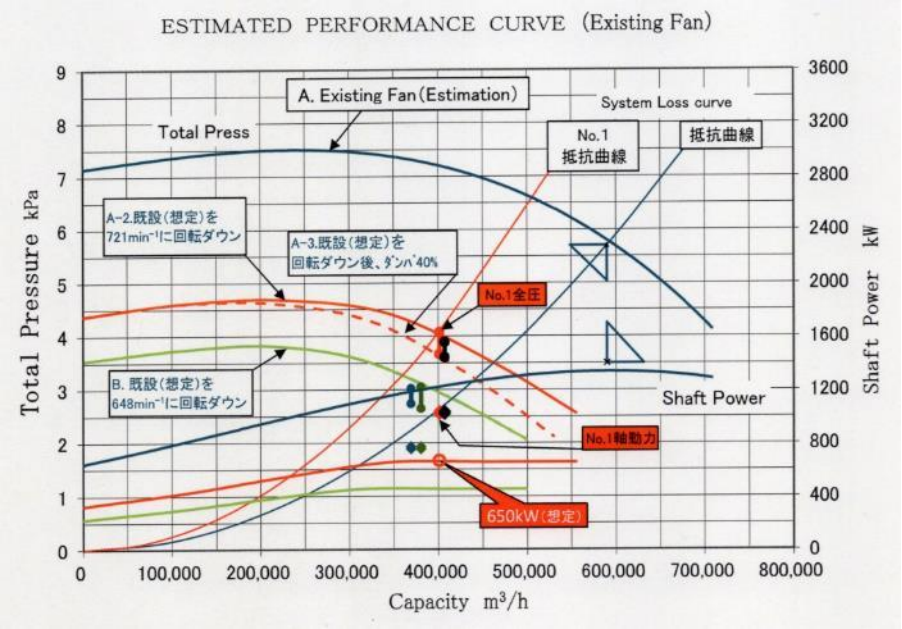



Figure 3.23 Performance curve of existing fan

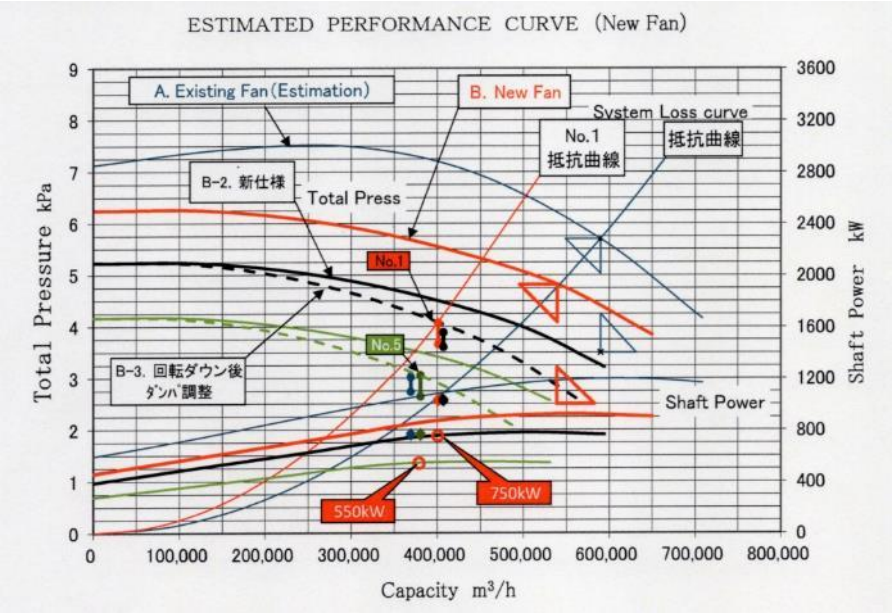



Figure 3.24 Performance curve of new fan

Here, the basic formula of the shaft power of the blower is as follows.

$$Pd = \frac{QH}{3600\eta_f\eta_m}$$

Pd： Shaft power（kW）

Q： Flow rate（m3/h）

H： Pressure（kPa）

ηf： Fan efficiency（－）（Flow rate dependent）

ηm： Motor efficiency（－）

The basic formula of the shaft power of the blower in the case of the inverter control is as follows. It should be noted that Q, ηf, and ηm are the same as the basic formula of the above-described blower shaft power.

$$Pi = \frac{(Q/Q_0)3}{3600\eta_f\eta_m\eta_i} \times Q_0H_0$$

Pi：Inverter output power（kW）

Q0：Fan rated flow（m3/h）

H0：Fan rated pressure（kPa）

ηi：Inverter efficiency（－）

The following table summarizes the specifications of the existing blower and the

specifications of the new blower.

Table 3.4 Specifications of Existing and New Blowers

| Item | Existing blower | New blower (draft) |
|---|---|---|
| Fan rated flow（m3/h） | 590,000 | 540,000 |
| Fan rated pressure（kPa） | 5.7 | 4.8 |
| Motor capacity（kW） | 1,400 | 1,000 |
| Rated motor speed（/m） | 985 | 920 |
| Motor rated current（A） | 158 | 121 |
| Motor efficiency（－） | 0.89 | 0.95 |
| Fluid temperature during data measurement（℃） | 20 | N/A |
| Fluid temperature during operation（℃） | 85 | 85 |
| Inverter efficiency（－） | N/A | 0.95 |
| Fan efficiency（－） | N/A | 0.72<br>（400,000 m3h、85℃） |

To calculate the amount of energy saving based on the above formula and the values shown in Table 3.X, the following is considered, taking into account the operating situation of the VIS company's Hai Phong plant, which operates 200 days and 24 hours a day.

Annual energy saving = (Pd-Pi) x number of working days x 1 hour of operation

Calculating the amount of energy saving based on the actually measured values this time gives the following.

Table 3.5 Annual energy saving effect by introducing
"high efficiency blower + high voltage inverter"

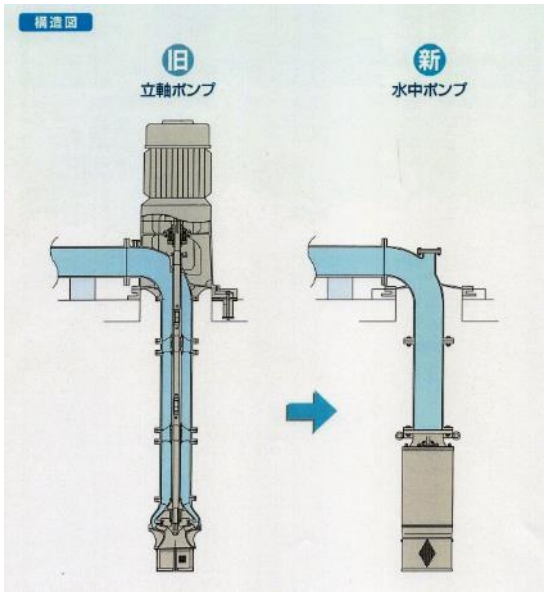
| | Existing measurement data | | | | | | Energy saving effect after project implementation | | |
|---|---|---|---|---|---|---|---|---|---|
| Fan | Flow rate (m3/h) | Pressure (kPa) | Speed (/min) | Motor current (A) | Shaft power (kW) | 85 ° C converted shaft power (kW) | Shaft power (kW) | Shaft power saving (kW) | Energy saving (kWh) |
| No.1 | 401,300 | 4.07 | 721 | 116 | 1028 | 841 | 455 | 386 | 1,852,800 |
| No.2 | 407,340 | 3.89 | 727 | 116 | 1028 | 841 | 476 | 365 | 1,752,000 |

If a high-efficiency blower + high-voltage inverter is installed in the existing dust collector with two fans, the energy saving effect will be 3,604,800 kWh per year. The CO2 emission intensity of grid power in Vietnam is 0.8154t-CO2 / MWh (2015 government published value), and the annual greenhouse gas emission reduction by this project is as follows.

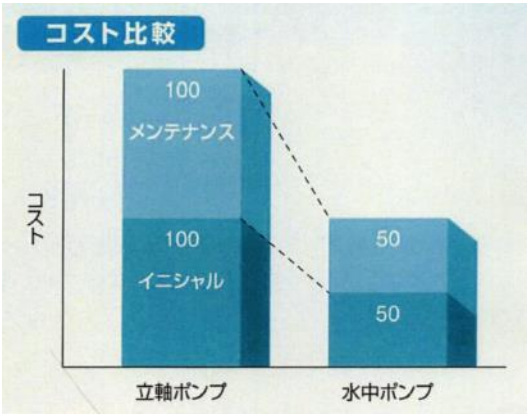
［3,604,800 (kWh)／1000 （kWh/MWh)］×0.8154 (t-CO2/MWh)
= 2,939 t-CO2

Therefore, the amount of greenhouse gas reduced by the operation of the installed equipment over the equipment service life (10 years) is 29,390 t-CO2. Regarding the proposal for this "high-efficiency blower + high-voltage inverter", VIS requested a revision of the specifications and estimates, and here we requested a request for additional data measurement. In the future, both sides will work together to apply for the JCM equipment subsidy program in Reiwa 2nd year.

VIS has pumped more than 20 pumps of cooling water to many locations on the premises, and is drafting a plan to replace existing vertical pumps with submersible pumps. It should be noted that the cost comparison in the figure is for the domestic case.




Vertical pump and submersible pump




Example: Cost reduction expectations

Figure 3.25 Replacement plan of vertical shaft pump with submersible pump

As a result of discussions with the VIS side, it was decided to give priority to the introduction of a "high-efficiency blower + high-voltage inverter" first, and to start discussions after the installation of the equipment had settled down.

### 3.2.2 Vietnam Japan Steel

The NCK Industrial Park also has another steel scrap mill with a production capacity higher than that of VIS, called Vietnam-Japan Steel JSC (VJS). Although the company name includes the word Japan, it has no relationship with Japanese companies and is a 100% Vietnamese company. The plant uses an induction furnace as an electric furnace, and the dust collection facilities are the same as those of VIS. A similar proposal was considered.

We actually visited VJS and carried out reconnaissance in the factory from steelmaking equipment to dust collection equipment.

| | |
|---|---|
|  |  |
| Molten iron from electric furnace | Put scrap iron into electric furnace |

Figure 3.26 VJS induction furnace and peripheral equipment

| | |
|---|---|
|  |  |
| VJS dust collection equipment | Dust collection power supply room |

Figure 3.27 VJS Dust Collection Equipment and Its Power Supply Room

In addition to the survey, a hearing survey was also conducted, and there were two systems of dust collection equipment, all made in China, but the installation time was relatively new in 2014 and 2017 respectively, and the equipment introduced in 2017 also had an inverter. I knew it was.

During discussions with VJS, of the five electric furnaces (consisting of two induction furnaces) of five systems from VJS, two systems are old and very inefficient, so priority is given to this improvement. There was a request to do so. The existing capacity of the induction furnace is very large (furnace capacity is 50 tons and 40 tons), and it has been an issue whether it is possible to provide an induction furnace of this scale, but the VJS will also consider improving the electric system. There was a request and received an explanation of the power system, and conducted a site survey of the actual power system.

As a result of the investigation, it was found that an extremely large current (4,000 A class) was used, and it was decided to consider a proposal for energy saving in equipment that handles that class of current.

| | |
|---|---|
|  |  |
| Description of induction furnace electric system | Investigation of induction furnace power supply equipment |

Figure 3.28 Discussion on induction furnace power system at VJS

## 3.3 Activity 2: Investigation of introduction of (1) high-efficiency blower + high-voltage inverter and (2) high-efficiency pump + high-voltage inverter to companies occupying Nam Cau Kien Industrial Park

### 3.3.1 Nam Cau Kien Industrial Estate Residents

In order to expand the "high efficiency blower + high voltage inverter" or "high efficiency pump + high voltage inverter" to other tenant companies proposed to two iron scrap steel companies in Nam Cau Kien Industrial Park (NCK Industrial Park), We visited two waste plastic recycling companies and slag recycling companies in the NCK industrial park and conducted a survey on the current situation.

The waste plastic recycling companies that conducted the site visit were Lien Minh Import & Export Services & Trading Company and Thuy Anh Trade & Investment & Import & Export Services Company. The inside of the factory is shown in the following photo. A variety of waste plastic was piled up in the factory in a cluttered manner, and it seemed that there was a processing facility between them. For the time being, although ventilation equipment was installed, the smell of burning plastic was found inside the factory, and it was felt that the ventilation equipment was not functioning. As a result of a survey of the equipment, it was found that all the equipment, including the manufacturing equipment, was made in China, and that the ventilation equipment had a small capacity relative to the factory scale, and was not able to actually suck in air due to insufficient maintenance.

The findings from the field survey or the problems were fed back to the two companies mentioned above, and it is necessary to collect and record the current operating data, etc., in order to proceed with the replacement of ventilation system equipment in the future.

| | |
|---|---|
|  |  |
| Waste plastic processing line 1 | Waste plastic processing line 2 |

Figure 3.29　Waste-Plastic Processing Line of Lien Minh Factory

| | |
|---|---|
|  |  |
| Inside the factory | Ventilation pump |

Figure 3.30　Warehouse Area and Ventilation Pump in Lien Minh Factory

At the request of the NCK Industrial Park, a slag recycling company Thanh Dai Phu My was visited to conduct a survey. The building was an open factory and had no ventilation system. Around the factory, the received slag was piled up like a mountain and sprinkled everywhere to prevent dust. Since the water being sprinkled is not collected and is flowing to the surrounding areas, problems such as water treatment in the factory are summarized and communicated to the factory.

| | |
|---|---|
|  |  |
| Process of removing impurities in slag | Inside the factory |

Figure 3.31 Visit Survey of Thanh Dai Phu My Factory

### 3.3.2 Survey outside Nam Cau Kien Industrial Park

As a survey of JCM projects other than Nam Cau Kien Industrial Park, a survey was conducted on DEEP-C Industrial Park and Bridgestone Vietnam.

DEEP-C industrial park

DEEP-C Industrial Park is the largest industrial park in Hai Phong and adjacent to Lach Huyen Port, the largest port in the north. It is operated by Denh Vu Industrial Zone, which is a shareholder of Belgian Rent-A-Port and Hai Phong City People's Committee, and has 14 Japanese companies.

The company has established an independent power company that supplies electricity to the DEEP-C industrial park, which has large-scale solar and wind power generation plans, In response to a request to use the subsidy system, an interview was held.


Figure 3.32 Location of DEEP-C Industrial Park

DEEP-C has been conducting solar panel demonstration tests and wind condition surveys for wind power generation for two years to implement the renewable energy business, and has sufficient data. In North Vietnam, which is generally said to have less sunshine hours, they have determined that they have business feasibility based on the data from the demonstration tests, and will implement solar power generation. Therefore, we exchanged opinions on the desire to utilize the JCM equipment subsidy system.

In the future, discussions will be held on the implementation of the plan and the selection and conditions of representative operators, and the plan will be advanced.

| | |
|---|---|
|   |  |
| Solar power generation demonstration test | Solar power generation demonstration facilities |

Figure 3.33　DEEP-C Solar Power Panel Demonstration Field

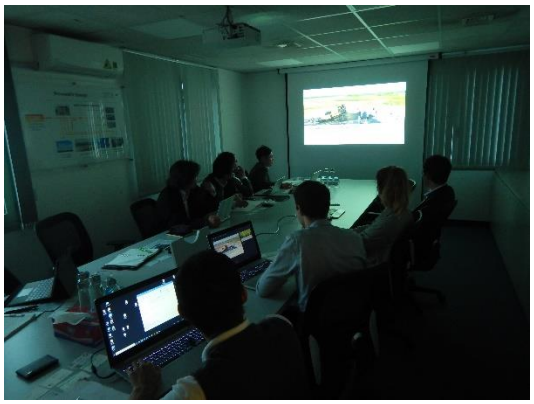
| | |
|---|---|
|  |  |
| proposed site for solar power generation facility installation | DEEP-C: explanation of the plan |

Figure 3.34　Visit Survey on DEEP-C Industrial Park

Bridgestone Vietnam

Bridgestone Vietnam is one of the largest factories in DEEP-C. As a measure to contribute to the Group's greenhouse gas emission reduction targets, the plant will replace the steam supply to the plant currently using fossil fuel boilers with a biomass boiler and a rooftop solar We are considering the introduction of power generation equipment. Opinions were exchanged on whether the JCM equipment subsidy system could be used in those projects.

In the biomass boiler introduction business, facilities and operators have already been decided, and it is now being checked whether or not an environmental assessment is required. If they could be matched, they wanted to use it.

Regarding the introduction of rooftop photovoltaic power generation, it is at the stage of evaluating the feasibility and the strength of the roof, etc., and it is said that we expect to see technical proposals from here, along with suggesting the use of JCM. I wanted them to do it. Therefore, preparations will be made for a proposal for a rooftop solar cell system.

## 3.4 Activity 3: Supporting the Nam Cau Kien Industrial Park, which aims to become a model of an eco-industrial park, in support of SDGs contribution activities

The Nam Cau Kien Industrial Park (NCK Industrial Park), which is actively engaged in a variety of activities with the aim of becoming a model business of the Eco Industrial Park, received a Kitakyushu city tour and a wastewater treatment facility at the NCK Industrial Park Inspection and advice for improvement, and discussion on the SDGs and the Eco-Industrial Park initiative at the Ministry of Planning and Investment of Vietnam (MPI), which was responsible for the Eco-Industrial Park Initiative and the Ministry of Planning and Investment (MPI).
The following describes each activity.

### 3.4.1 Kitakyushu-City Visit by the delegation of Nam Cau Kien Industrial Park

The Nam Cau Kien Industrial Park (NCK Industrial Park) has plans to move forward with the realization of an eco-industrial park, and President Diep of the NCK Industrial Park will promote the Eco-Industrial Park held last year in Hai Phong. The seminar is also introducing its efforts. President Diep of the NCK Industrial Park proposed to visit the Eco-Town, Kitakyushu City's Eco-Town, Environmental Museum and Recycling-related Facilities together with the tenant companies in the park, as a reference for future business promotion.October 2020 A training was held for the two days of the 24th and the 25th with the NCK industrial park inspection team. The two-day program is shown in the table below.

Table 3.6 NCK Industrial Park Delegation Kitakyushu Training Program

| | |
|---|---|
| 10/24(Thu)<br>First day of training | 01: 20-07: 30 Hanoi-Fukuoka (VN356)<br>10: 30-12: 00 Environmental Museum<br>(lunch)<br>14: 00-16: 30 Business meeting / Interview meeting / Water treatment hearing (Asia Low Carbon Center)<br>14: 00-15: 00 Interview between NCKIP and KITA<br>14: 00-15: 00 Interview with New Chemical Trading (Thuy Anh, Lien Minh, etc.)<br>15: 00-15: 30 Interview with VJS<br>15: 30-16: 30 Interview with Dowa Technos<br>18: 30-20: 30 Welcome Dinner (Nishi Nippon Industrial Club) [Kokura] |
| 10/25 (Fri)<br>Second day of training | 09: 00-10: 00 Eco Town Center<br>10: 15-10: 45 Home appliance recycling plant<br>11: 00-11: 30 OA equipment recycling factory<br>(lunch)<br>14: 00-15: 00 Plastic Recycling Center [Kokura] |

The following table shows the members of the NCK Industrial Park delegation. In addition to the five members from the NCK industrial park management company, a total of 17 people from steel scrap steel companies, waste plastic recycling companies, slag recycling companies, and related transportation companies participated.

Table 3.1 List of members of NCK Industrial Park Delegation

| | 名前 | 会社名 | 会社概要(入居者リスト-2019年7月) | 役職 |
|---|---|---|---|---|
| 1 | PHAM HONG DIEP<br>ファム ホン ディエップ | Shinec 社 (NamCauKien工業団地運営会社) | | 会長兼社長 |
| 2 | HOANG TUAN ANH<br>ホアン トゥアン アイン | | | 副社長 |
| 3 | PHAM THI PHAN LY<br>ファム ティ ファン リ | | | 環境部員 |
| 4 | VU THI LAN NHI<br>ヴ ティ ラン ニー | | | 環境部員 |
| 5 | VU DUY MANH<br>ヴ ヅウィ マイン | | | 営業部員 |
| 6 | DANG VIET BACH<br>ダン ベト バック | ベトナム-ジャパンスチール社 | ⑦Steel business and production<br>製鉄 | 会長 |
| 7 | DOAN NGOC HUNG<br>ゾアン ンゴック フン | Dai Thang 貿易&製品開発会社 | ③Recycle and Treatment industrial waste<br>産業廃棄物処理 | 社長 |
| 8 | DOAN NGOC TIEN<br>ゾアン ンゴック ティエン | | | 副社長 |
| 9 | PHAM MINH TIEM<br>ファム ミン ティエム | Thuy Anh 貿易投資&輸出入サービス会社 | ㉘Production of plastic beads<br>プラスチックリサイクル(ペレット製造) | 社長 |
| 10 | NGUYEN NHU DUNG<br>グェン ヌー ズン | Lam Son Thai Binh 社 | (番号なし)Logistics<br>ロジスティクス | 社長 |
| 11 | DO HUU HUYNH | Lien Minh 輸出入サービス&貿易会社 | ㉘Production of plastic beads<br>プラスチックリサイクル(ペレット製造) | 社長 |
| 12 | NGUYEN VAN NGHIA<br>ド フュ フイン | Thanh Dai Phu My 社 | ㉟ Factory manufacturing cement,magnetic powder,construction materials from steel slag recycling<br>セメント材料用リサイクルスラグ製造 | 会長 |
| 13 | NGUYEN HAI LAM<br>グェン ハイ ラム | GreenGrow Viet 社 | ㊴Workshop for rent<br>貸倉庫 | 社長 |
| 14 | NGUYEN HAI DAT<br>グェン ハイ ダット | ECC貿易&輸出入サービス&貿易会社 | (番号なし)Logistics<br>ロジスティクス | 社員 |
| 15 | MAI QUOC HUNG<br>マイ クォック フン | U&ME 投資会社 | ㉞Building workshop for rent<br>貸倉庫 | 社長 |
| 16 | MAI VAN SY<br>マイ ヴァン シ | Mien Duyen Hai コンサルティング技術計画投資会社 | ㊸Auxillary service area<br>補完的サービス業務 | 社長 |
| 17 | VU HOANG ANH<br>ヴ ホアン アイン | | | 通訳 |

The training of the NCK Industrial Park delegation began with the Kitakyushu City Environmental Museum, where they learned about Kitakyushu City, the environmental problems that had occurred in the past, and the background to solving them. The operation of the government-managed Yawata Steel Works led to the development of an industrial town.At that time, smoke rising from factories was accepted as a sign of development, but local mothers were concerned about the impact on children, Cooperated to measure environmental pollution, conducted discussions with governments and companies based on such data, and finally learned that the cooperation between local residents and industry-government-academia cooperation, and that the solution was headed for a solution I learned that it is important to work with local residents, universities, and the government, and to measure and collect data.

Afterwards, it was mentioned that Kitakyushu City had begun to transfer the know-how gained from overcoming environmental problems to cities with similar problems overseas, and in recent years has expanded its activities from the perspective of the SDGs.

| | |
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|  |  |
| Explanation of Kitakyushu City | Explanation of past environmental pollution issues |

Figure 3.35 Training in Kitakyusyu City Environmental Museum (1)

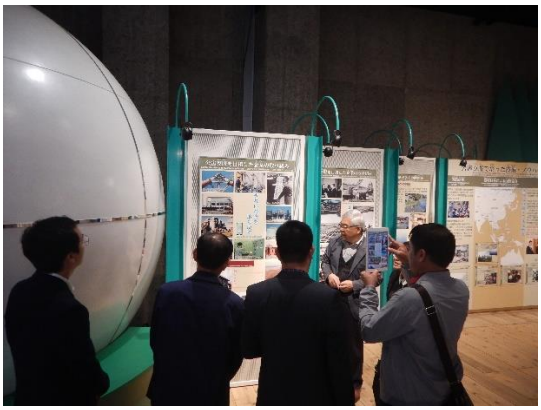
| | |
|---|---|
|  |  |
| Activities for Overcoming Environmental Problems | Important Elements for Solving Environmental Problems |

Figure 3.36 Training in Kitakyusyu City Environmental Museum (2)

| | |
|---|---|
|  |  |
| Worldwide development of know-how on solving environmental problems | Solving environmental problems and SDGs |

Figure 3.37 Training in Kitakyusyu City Environmental Museum (3)

After the training at the environmental museum, in the afternoon, we held an interview with a company in Kitakyushu, a briefing on the JCM equipment subsidy system, and a discussion. At the exchange meeting on JCM equipment subsidies, there was a discussion on how to use the JCM equipment subsidy system in the NCK industrial park and use it in activities aimed at an eco-industrial park.

| | |
|---|---|
|  |  |
| Meeting with companies | Briefing on JCM equipment subsidy system |

Figure 3.38 Introduction of Companies and Introduction of JCM subsidy system

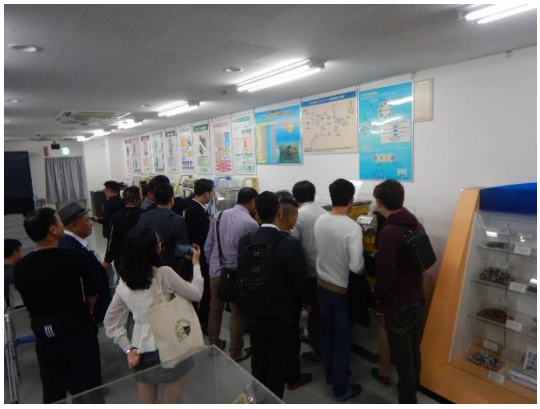
The second day of the training began with a visit to Kitakyushu Eco-Town Center, followed by a tour of recycling plants in Eco-Town. The NCK Industrial Estate Delegation is made up of companies in the fields of iron scrap recycling, waste plastic recycling, and industrial waste (slag) recycling. Questions were actively asked about the

system and the management system of the accepted ones.

Lecture at Eco Town Center


After visiting Eco Town Center

Figure 3.39 Lectures in Kitakyusyu Eco Town Center



Recycling plant tour 1

Recycling plant tour 2

Figure 3.40 Recycling Plant Tour in Kitakyusyu Eco Town

### 3.4.2 Activities at Nam Cau Kien Industrial Park

As an activity related to SDGs at Nam Cau Kien Industrial Park (NCK Industrial Park), lectures and opinions were exchanged by experts from Kitakyushu City in the fields of wastewater treatment and composting at the request of NCK Industrial Park.

Wastewater treatment in the industrial park is batch-treated at the wastewater treatment plant in the same estate and discharged to rivers, with the aim of increasing the efficiency of treatment. The compost business is one of 15 pilot projects in the green growth promotion plan of Hai Phong City supported by Kitakyushu City, and Mr. Diep, President of NCK Industrial Park, is also very interested in introducing the business content and technology. There was a request. The NCK Industrial Estate hopes to

implement the project as an environmentally friendly project involving the local people. This exchange of opinions is the first step, and efforts to realize this have been started. I have.

| | |
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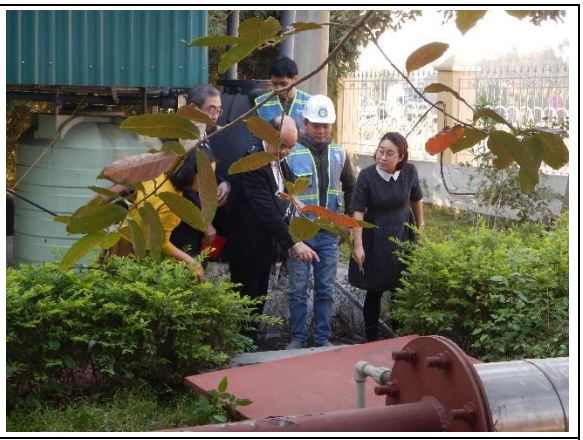
|  |  |
| Technology introduction and opinion exchange | wastewater treatment facility inspection |

Figure 3.41 Delegation from Kitakyusyu City visit to NCK Industrial Park

### 3.4.3 Activities for the Ministry of Planning and Investment in Vietnam

The Ministry of Planning and Investment (MPI) is not only responsible for industrial parks, but also responsible for the concept of an eco-industrial park. Invite a person in charge of the MPI Eco-Industrial Park concept to participate in a city-to-city seminar held in Japan in January 2020, and have them learn about the overall picture of the eco-park, eco-parks and SDGs during a training session in Kitakyushu. He also understood the importance of the SDGs concept in the preparation of guidelines for eco-industrial parks planned in the future.

| | |
|---|---|
|  |  |
| Explanation of ecoparks and SDGs | Explanation of a recycling-oriented society |

Figure 3.42 Training of Officials in charge of EIP from MPI, Vietnam

# Chapter 4 Workshop Participation

## Chapter 4 Contents

## 4.1 City-to-City Collaboration Workshop

### (1) Background

Some of the participants and invitees at the City-to-City Collaboration Workshop (Seminar on City-to-City Collaboration) sponsored by the MOE who are affiliated with Kitakyushu were invited to the city to accompany others during the training program conducted there.

### (2) Workshop schedule

In Kitakyushu: January 14 and 15, 2020

In Tokyo: January 16 and 17, 2020

### (3) Details

The meeting minutes recorded during participation in the Kitakyushu and Tokyo workshops are included below.

(Memo 1)

## JCM Seminar on City-to-City Collaboration - Kitakyushu Observation

Date: January 14 and 15, 2020
Location: Kitakyushu
Participants: Abe

Two days before and the day before the Seminar on City-to-City Collaboration for Zero-Carbon Society sponsored by the MOE and held at the Shinagawa Prince Hotel in Tokyo on January 16 and 17, 2020 some of the workshop invitees who are affiliated with Kitakyushu were invited to the city. Once there, they were provided with an explanation of Kitakyushu's history in dealing with environmental problems, the current state of Eco-Town, activities in Eco-Town, and given the opportunity to observe new test projects toward becoming a hydrogen (H) energy based society. NTT Data Institute of Management Consulting, who are involved in the 2019 City-to-City Collaboration project at each city also participated in the observation. Details of the observation are as follows.

Participants in the Kitakyushu observation are shown in Table 4-1 and the schedule is shown in Table 4-2. The five participants from Davao, Philippines were unable to make it to the observation due to planes being grounded from the January 12 volcanic eruption in the Philippines. Two participants in charge of eco-industrial park conception at the Vietnamese Ministry of Planning and Investment (MPI), which is the central ministry came to Kitakyushu, and five people came from Hai Phong, the sister city to Kitakyushu for a total of seven participants from Vietnam. This stems from Kitakyushu's support for eco-industrial park conception, with one industrial park that requested a model business being located in Hai Phong. Two participants came from the Iskandar Regional Development Agency (IRDA) in Malaysia, and two from the Alliance Stars Group in Yangon, Myanmar, with a total of 11 people joining in the observation.

As shown in Table 4-2, right after late night flights arrived from their respective countries at Fukuoka Airport on the morning of January 14, arriving participants traveled to Kitakyushu by chartered bus, left their luggage at the hotel, had lunch, and began the training program. After listening to an overview of Kitakyushu at Eco-Town Center, the participants observed operations at a home appliance recycling plant and office equipment (mainly copiers)

recycling plant in Eco-Town, returned to the hotel for a short time, then attended a welcome party.

On January 15, participants visited the Kitakyushu Environment Museum, learning about the history of environmental improvement efforts in Kitakyushu as well as current initiatives, then later touring a facility where testing of hydrogen energy usage is under way. After lunch, the participants took a tour of Kitakyushu, finally heading to Tokyo at night.
Details of activities are shown below.

Table 4-1 Kitakyushu Observation Participant List

Member list of JCM Workshop Partcipants

As of 7-JAN-2020

| | | Name | Organization | Position |
|---|---|---|---|---|
| 1 | Vietnam | Mr.Vu Quoc Huy | Ministry of Planning and Investment , Department of Economic Zone Management | Deputy Director General |
| 2 | Vietnam | Ms.Vuong Thi Minh Hieu | Ministry of Planning and Investment , Department of Economic Zone Management | Official |
| 3 | Vietnam | Ms.Nguyen Thi Bich Dung | People's Committee of Hai Phong City, Department of Foreign Affairs | Duputy Director |
| 4 | Vietnam | Mr. Pham Hong Ha | People's Committee of Hai Phong City, Department of Home Affairs | Vice Director |
| 5 | Vietnam | Mr. Nguyen Van Khoi | People's Committee of Vinh Bao District (Hai Phong City) | Vice Chairman |
| 6 | Vietnam | Mr. Hoang Trung Hieu | People's Committee of Do Son District (Hai Phong City) | Vice Chairman |
| 7 | Vietnam | Mr. Tran Minh Tan | People's Committee of Hai Phong City, Department of Public Security | Official |
| 8 | Malaysia | Ms. Norfiza binti Bashfari | People Management, Iskandar Regional Development Authority (IRDA) | Vice President |
| 9 | Malaysia | Ms. Wan Hezlin Enis binti Wan Ismail | People Management, Iskandar Regional Development Authority (IRDA) | Vice President |
| 10 | Myanmar | Mr. KIM Hyun Woo (Mike) | Alliance Stars Group | Manager |
| 11 | Myanmar | Ms.Daw San San Aye | Alliance Stars Group | Deputy Manager |
| 12 | Philippines | Mr. Sebastian Zimmerman Duterte | Davao City (City Councilor of Davao) | Vice Mayor |
| 13 | Philippines | Mr. J. Melchor JR. Bumpus Quitain | City Councilor of Davao | City councilor |
| 14 | Philippines | Ms. Diana Ann Welborn Quitain | City Councilor of Davao | Cheaf of Stuff |
| 15 | Philippines | Mr. Vince Jul O. Malicay | Office of Vice Mayor of Davao | Technical Adviser for Special Concerns or Executive Assistant of Vice Mayor Duterte |
| 16 | Philippines | Mr. Lawrence Alcazaren Zamora | Office of Vice Mayor of Davao | Security Officer, Presidential Security Group |
| 17 | Philippines | Mr. Kenny June B. Roma | Office of Vice Mayor of Davao | Security Officer, Presidential Security Group |
| 18 | Philippines | Mr. Ryan M. Monreal | Office of Vice Mayor of Davao | Security Officer, Presidential Security Group |

Table 4-2 Kitakyushu Observation Schedule

| | | |
|---|---|---|
| **Day1 14-January** | | |
| 07:30<br>08:10<br>08:10 | | Vietnam group arrival (VN356)<br>Myanmar group arrival (TG648)<br>Malaysia group arrival (SQ656) |
| 09:00 | 11:00 | Move to Hotel (Nishitetsu-inn Kokura) by chartered bus |
| 11:00 | | Check-in and Lunch<br>*Only keep baggage (not stay at room) |
| 13:00 | | Departure from Hotel to Kitakyushu Eco-Town |
| 13:30 | 16:15 | Kitakyushu Eco-Town (guidance, recycle factories of home appliance and OA equipment) |
| 16:15 | | Move to Hotel |
| 18:15 | | Departure from Hotel to Welcome party on foot |
| 18:30 | 20:30 | Welcome Party |
| **Day 2 15-Janurary** | | |
| 08:50 | | Meet up Hotel lobby after check-out<br>*Do not leave baggage with the hotel. |
| 09:00 | | Move to Kitakyushu Environmental Museum |
| 09:30 | 10:30 | Kitakyushu Environmental Museum |
| 10:30 | 12:00 | Kitakyushu Smart community (Hydrogen Town Demonstration test) |
| 12:00 | | Move to Kokura |
| 12:30 | 13:30 | Lunch |
| 13:30 | 14:40 | Kokura Castle etc |
| 14:40 | | Move to Kitakyushu AP |
| 16:20 | 17:50 | Kitakyushu AP – Tokyo Haneda AP (SFJ86) |
| 17:50 | | Move to Hotel (Shinagawa Price Hotel) by chartered bus |

January 14

(1) Eco-Town Center (13:30 - 14:00)

At Eco-Town Center in the Hibikinada area of Wakamatsu ward in Kitakyushu, participants listened to an explanation of Kitakyushu's history, a summary and features of the Hibikinada Marine Industrial Park, and the Kitakyushu Eco-Town Plan from the staff at the Center.

Ever since Yawata Steel Works was established in Kitakyushu in 1901, the city has developed into a manufacturing town. Various world-famous companies make their home

here, such as Nippon Steel, Yaskawa Electric, which manufactures industrial robots, and TOTO, which produces toilets and washbasin systems. For 20 years starting in the 1960s, the city experienced problems with pollution, spending nearly 800 billion yen, turning it into the advanced Eco-Town of today.

| | |
|---|---|
|  |  |
| Explaining at Eco-Town Center 1 | Explaining at Eco-Town Center 2 |

After learning about the background of Eco-Town in a classroom-style setting, the participants listened to an explanation on the steel, plastic, and fiber recycling programs in the town using Eco-Town Center facilities.

| | |
|---|---|
|  |  |
| Explaining recycling of old clothes and fibers | Explaining the Comprehensive Environment Industrial Complex |

| | |
|---|---|
|  |  |
| Explaining urban mining | Group representing Hai Phong |

(2) Nishinihon Kaden Recycle Corporation (14:15 - 15:00)

Nishinihon Kaden Recycle Corporation is a company that runs a home appliance recycling project in the Kitakyushu Eco-Town Comprehensive Environment Industrial Complex based on Home Appliance Recycling Law. They accept and recycle four types of home appliances including LCD/CRT TVs, washing machines/dryers, refrigerators, and air conditioners. With a processing capacity of 282 tons per day (1 million units per year at standard weight conversion), they are the largest-scale recycling plant in Western Japan.

First, company employees provided an explanation about the company, then the participants watched a video presentation explaining the recycling process for each appliance at the plant. The TV recycling process is shown in Figure 4-1, washing machine process in Figure 4-2, refrigerator process in Figure 4-3, and air conditioning process in Figure 4-4.

After watching the video, they took part in a tour of the plant that followed a tour course. The tour course allowed participants to see part of each recycling process as explained in Figures 4-1 to 4-4. Photos were prohibited during the tour.

| | |
|---|---|
|  |  |
| Explaining the recycling company | Explaining the recycling processes |

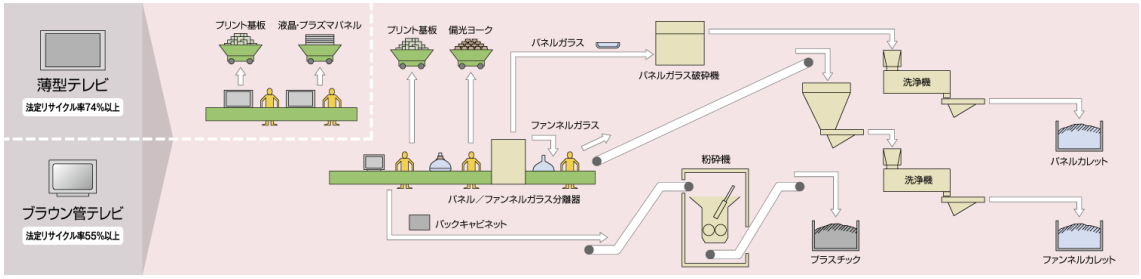



Figure 4-1 Recycling process for flat screen and CRT televisions

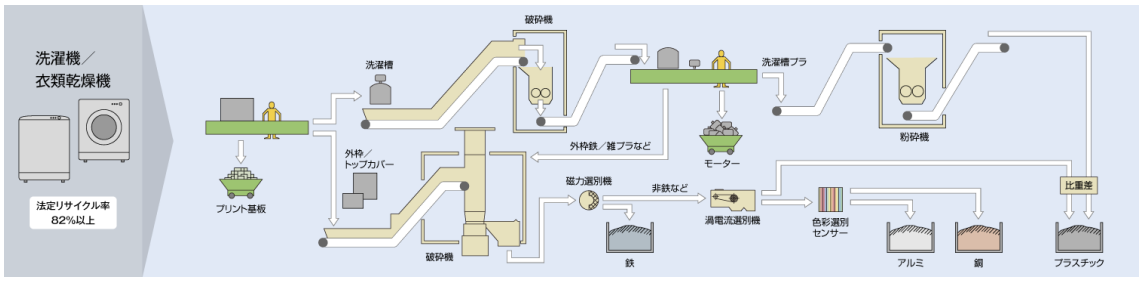



Figure 4-2 Recycling process for washing machines and clothing dryers

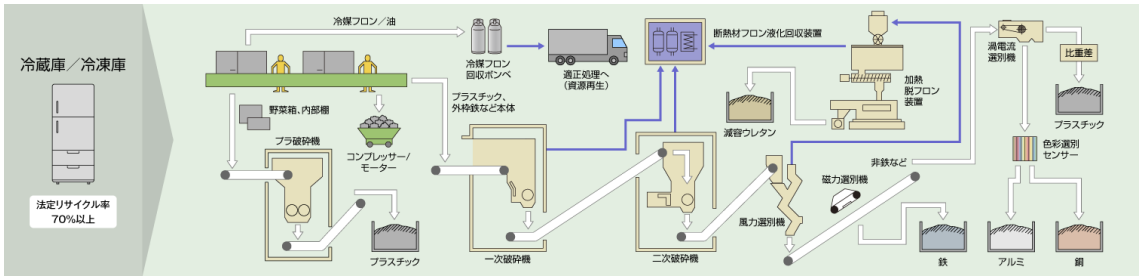



Figure 4-3 Recycling process for refrigerators

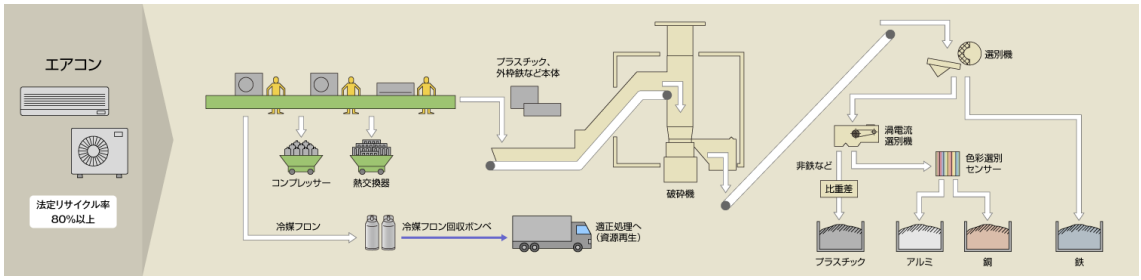



Figure 4-4 Recycling process for air conditioners

(3) Recycle Tech Corporation (15:15 - 16:00)

Recycle Tech Corporation is a business that mainly handles recycling of office equipment, and is funded by the Shinryo Corporation which mainly handles industrial waste processing and recycling, and the Ricoh Co., Ltd. Their office equipment recycling process is shown in

Figure 4-5.

After watching a video explaining the company and their recycling process, participants received an explanation on recycling showing actual dismantled office equipment samples, as well as a briefing on photovoltaic panel (PV panel) recycling efforts which was launched in recent years. Later they toured the recycling plant with participants asking questions about how the massive rows of copiers are managed. The staff explained that each copier was assigned a bar code upon arrival, helping to properly identify each copier and which step of the process it is currently in.

| | |
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|  |  |
| Company and recycling process explanation 1 | Company and recycling process explanation 2 |

| | |
|---|---|
|  |  |
| Office equipment recycling process explanation | PV panel recycling process explanation |

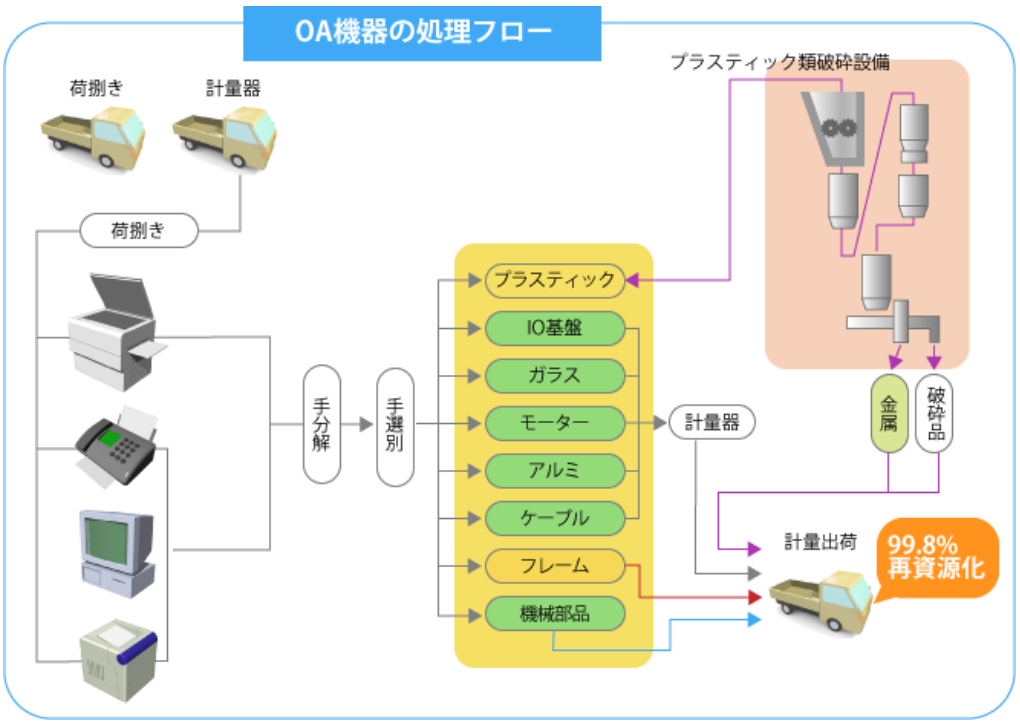


Figure 4-5 Office equipment recycling process

After a tour of the Recycle Tech Corporation office equipment recycling plant, the remaining time was used to show participants the wind power generation facilities at the industrial park. Participants stayed on the bus during the observation due to the rainy weather, however, Eco-Town Center employees talked about the wind power generation facilities on land and the offshore floating facilities, as well as future plans for offshore wind power initiatives.

Hibikinada Marine Industrial Park coastal wind power

| |
|---|
| generation facilities<br>(On clear days you can see the floating offshore wind turbines) |

**January 15**

(1) Kitakyushu Environment Museum (9:30 - 10:30)

The Environment Museum cooperates with various institutions and groups in an effort to achieve an environmentally-friendly and sustainable society, such as schools, corporations, citizens, citizens' groups, and the government. It serves as a base for collaborative efforts in Kitakyushu's goal of becoming the environment capital of the world, providing a comprehensive place where citizens can gather together and learn about the environment.

After listening to an explanation on Kitakyushu's geographical location and background at the Environment Museum, the participants heard about how the environment was sacrificed to develop into a manufacturing town, and the severe situation it faced in the 1960s. At that time, efforts to solve environmental pollution began mainly thanks to the mothers of elementary school children in the area. People from the sciences and government then joined in, taking over 20 years and massive sums of money to revitalize the environment resulting in the Eco-Town of today that the world can be proud of.

Later, participants listened to an explanation of the Environment Museum and how it serves as a base for SDGs such as learning and gathering together, and about efforts toward becoming a resource recycling society. Participants were highly interested in the transformation of Kitakyushu, engaging in an active discussion on how it changed, what the role of the government was at that time, and how funds were used to solve problems.

| | |
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|  |  |
| In front of the Environment Museum - Meeting the director | Geographical explanation of Kitakyushu |

| | |
|---|---|
|  |  |
| Environmental pollution in the 1960s | Efforts to solve environmental problems |

| | |
|---|---|
|  |  |
| Development of knowledge gained in solving environmental problems | SDG initiatives |

| | |
|---|---|
|  |  |
| Resource and waste recycling | End of the Environment Museum tour |

(2) Kitakyushu Smart Community (10:30 - 12:00)

In order for Kitakyushu to become a hydrogen energy based city, there are three efforts

under way. (1) Testing and promotional activities at Kitakyushu Hydrogen Town in the Higashida area, (2) Creation of a carbon dioxide-free hydrogen production and supply depot in the Hibikinada area, and (3) Popularization of fuel cell vehicles and hydrogen stations across the entire city.

In the Environment Museum conference room, participants listened to a summary of efforts to transform Kitakyushu into a hydrogen energy based city, then heard an explanation of fuel cell construction (Figure 4-6) which is a technology required to achieve this goal, fuel cell vehicles (Figure 4-7), and a hydrogen transportation test project (Figure 4-8). Later they visited the neighboring Higashida area to view fuel cell vehicles, hydrogen-powered house, hydrogen transportation facilities, and hydrogen leak detection equipment. Participants showed great interest in the fuel cell vehicle.

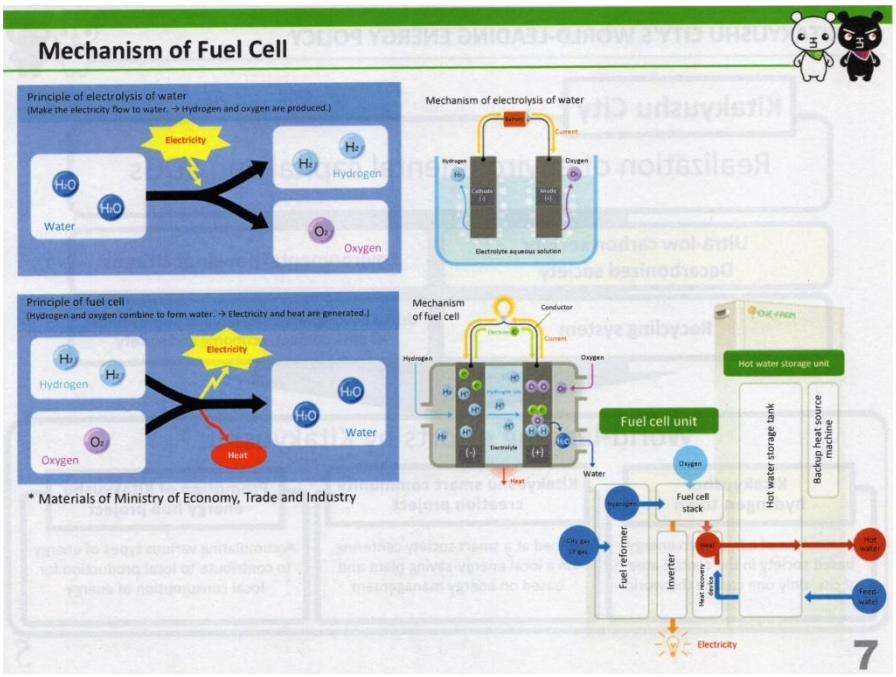
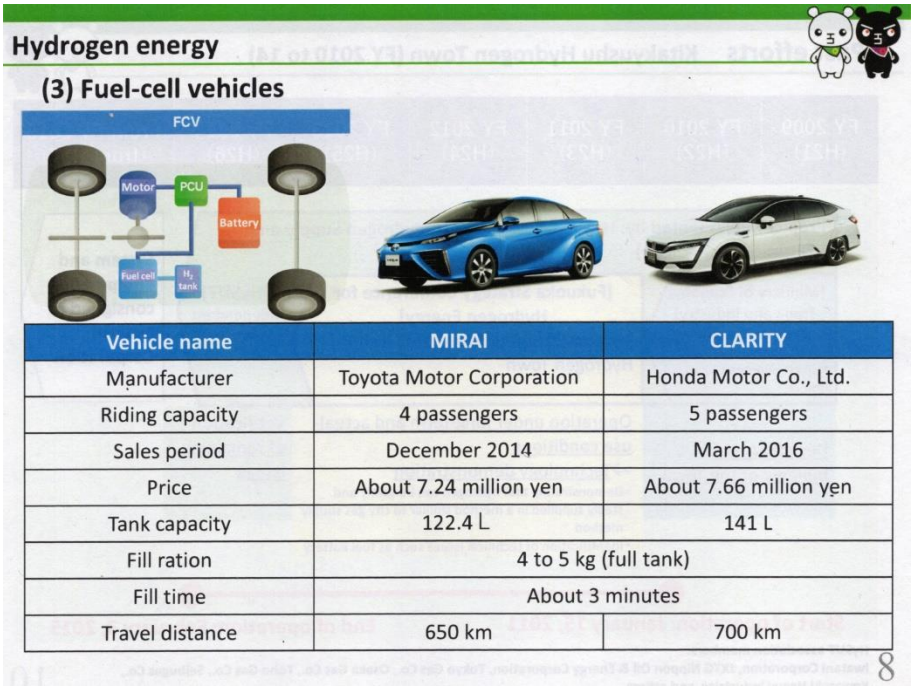



Figure 4-6 Fuel cell principles




| Vehicle name | MIRAI | CLARITY |
|---|---|---|
| Manufacturer | Toyota Motor Corporation | Honda Motor Co., Ltd. |
| Riding capacity | 4 passengers | 5 passengers |
| Sales period | December 2014 | March 2016 |
| Price | About 7.24 million yen | About 7.66 million yen |
| Tank capacity | 122.4 L | 141 L |
| Fill ration | 4 to 5 kg (full tank) | |
| Fill time | About 3 minutes | |
| Travel distance | 650 km | 700 km |

8

Figure 4-7 Fuel cell vehicle (Toyota MIRAI and Honda CLARITY)


Figure 4-8 Hydrogen transportation test project

| | |
|---|---|
|  |  |
| Lecture on efforts to achieve a hydrogen energy based city | Fuel cell vehicle (CLARITY) 1 |
|  |  |
| Fuel cell vehicle (CLARITY) 2 | Fuel cell house |
|  |  |
| Hydrogen usage test facilities explanation 1 | Hydrogen usage test facilities explanation 2 |

| | |
|---|---|
|  |  |
| Hydrogen transportation pipe | Hydrogen leak sensor (Left closed at all times) |

JCM Seminar on City-to-City Collaboration

January 16 and 17, 2020
Venue: Shinagawa Prince Hotel Main Tower,
International Convention Center Pamir
Participants: Kobayashi, Yamakawa

We participated in the Seminar on City-to-City Collaboration for Zero-Carbon Society, organized by the Ministry of the Environment (MOE), held on January 16 and 17, 2020, in Tokyo. On the morning of the 16th, a closed seminar was held, followed by a site visit in Tokyo in the afternoon. On the morning of 17th, a closed seminar was held, followed by a open seminar in the afternoon.

## ■ January 16 Morning Closed Seminar Program

| Time | Presentation |
|---|---|
| 09:00-09:30 | Opening remarks & Presentation titled: Domestic and international trends for creating a zero-carbon society<br>Mr. Kotaro Kawamata, Director, Environmental Strategy Division, Minister's Secretariat, MOEJ |
| | Recent development of City-to-City Collaboration Projects & Points for next fiscal year<br>Ms. Mahoyo Yamamoto, MOEJ |
| 09:30-10:15 | **I. Projects in Viet Nam**<br>1. Ho Chi Minh – Osaka<br>Mr. Masaru Ishikawa Manager, Environmental Science & Engineering Dept., Nippon Koei Co., Ltd.<br>2. Hai Phong – Kitakyushu<br>Mr. Yuichi Abe Associate Partner, Socio & Eco Strategic Consulting Unit, NTT Data Institute of Management Consulting, Inc.<br>3. Can Tho - Hiroshima Prefecture<br>Mr. Kazuki Matsubara Senior Managerial Staff, Foreign Business Division, Commerce, Industry and Labor Bureau, Hiroshima Prefectural Government<br>**II. Projects in the Philippines**<br>4. Davao – Kitakyushu<br>Ms. Emiko Murakami, Director of Business Promotion, Kitakyushu Asian Center for Low Carbon Society, City of Kitakyushu<br>5. Quezon – Osaka<br>Mr. Motofumi Suzuki Senior Advisor, Oriental Consultants, Co., Ltd.<br>**III. Projects in Malaysia**<br>6. Kuala Lumpur – Tokyo Metropolitan Government<br>Dr. Junichi Fujino Programme Director, City Taskforce, IGES<br>7. Iskandar – Kitakyushu<br>Mr. Motoshi Muraoka Partner, Socio & Eco Strategic Consulting Unit, NTT Data Institute of Management Consulting, Inc.<br>Q&A |
| 10:15-10:25 | Break |

| | |
|---|---|
| 10:25-11:05 | **IV. Projects in Myanmar**<br>8. Hlegu Township, Yangon Region – Kitakyushu<br>Mr. Motoshi Muraoka Partner, Socio & Eco Strategic Consulting Unit, NTT Data Institute of Management Consulting, Inc.<br>9. Yangon – Kawasaki<br>Mr. Takahiro Fukahori Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City<br>10. Sagaing Region - Fukushima<br>11. Ayeyarwady Region- Fukushima<br>Mr. Koji Kojima Research Director, Environmental and Energy Research Division, Mitsubishi Research Institute Inc.<br>Mr. Naoki Kato Manager, Environment Division, Environment Department, Fukushima City<br>**V. Projects in Thailand**<br>12. Laem Chabang Port, Bangkok Port – Yokohama<br>Mr. Kousuke Shibasaki Deputy General Manager, Engineering Department, Yokohama Port Corporation<br>13. Eastern Economic Corridor – Osaka<br>Mr. Masaru Ishikawa Manager, Environmental Science & Engineering Dept., Nippon Koei Co., Ltd.<br>Q&A |
| 11:05-11:15 | Break |
| 11:15-11:55 | **VI. Projects in Indonesia**<br>14. Semarang – Toyama<br>15. Bali – Toyama<br>Mr. Keiichi Kobayashi Section Chief, International Cooperation Section Environmental Policy Div., Toyama City<br>Ms. Aki Baba Associate Senior Staff, Environmental Science & Engineering Dept., Nippon Koei Co., Ltd.<br>16. Jakarta - Kawasaki<br>17. Rokan Hulu, Riau Province – Kawasaki<br>Mr. Takahiro Fukahori Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City<br>Q&A |
| 11:55-12:00 | Administrative announcement (IGES), End of session |

(Note) The order of presentations may be changed.

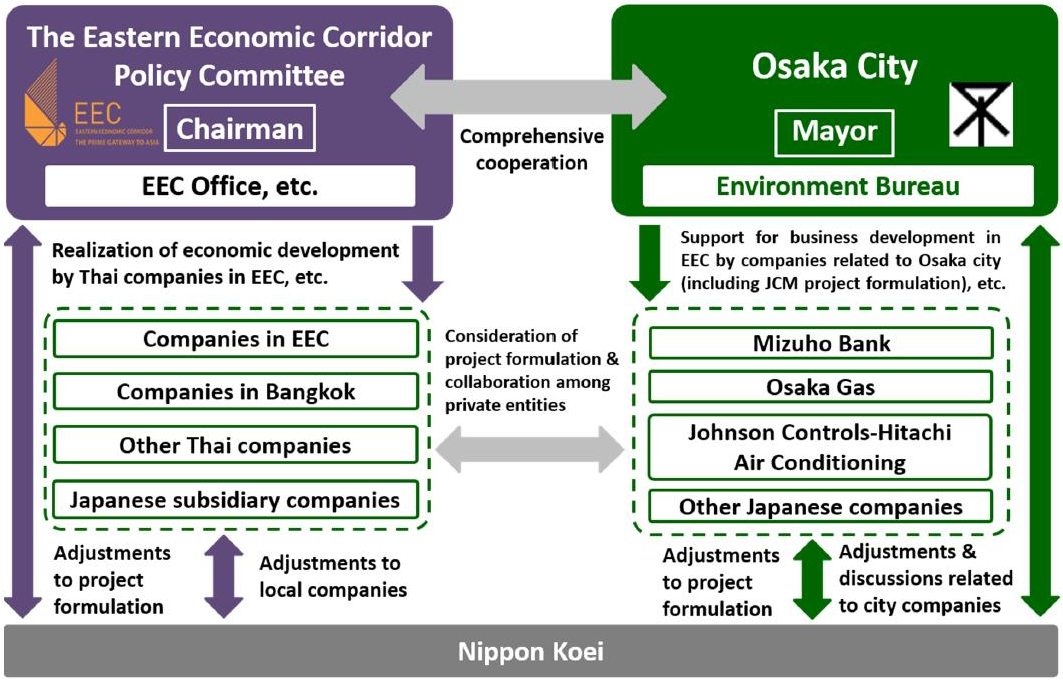
- 09:00 Opening remarks & Presentation titled: Domestic and international trends for creating a zero-carbon society - (15 min): Mr. Kotaro Kawamata, Director, Environmental Strategy Division, Minister's Secretariat, MOE
  - ✧ City-to-city collaboration is one important means of achieving the goals of the Paris Agreement, and we would like to continue actively engaging in it in the future.
  - ✧ Ten Asian countries, 32 cities and 14 local governments have participated so far in city-to-city collaboration. 120 persons from six Asian countries, 17 cities, and eight local governments participated in this city-to-city collaboration seminar. This year, self-funded participation was also higher than the average year.

- ✧ The latest trend in decarbonization in Japan is that the number of local governments declaring that they aim to decarbonize is on the rise. The main causes of this include the devastating impact of the natural disasters this year and the growing call for local governments to decarbonize by Minister of Environment Koizumi after he took office in September. As a result, currently, 33 local governments have declared that they will be zero carbon cities. For example, Nagano Prefecture, which was severely damaged by typhoons this year, made a decarbonization declaration this year.
- ✧ For future international development, we plan to consider the holding of a "Zero Carbon City International Forum" in cooperation with local governments that have declared that they will become zero carbon cities.
- ✧ It is difficult for Japan as a whole to immediately realize decarbonization; however, we will make use of frameworks such as city-to-city collaboration projects and JCM equipment subsidies to proactively work toward decarbonization.

- 09:15 Recent development of City-to-City Collaboration Projects & Points for next fiscal (15 minutes):
  Ms. Mahoyo Yamamoto, International Cooperation / Environmental Infrastructure Office, Global Environment Bureau, International Strategy Division, MOE
  - ✧ As for the granted requests for this year, 10 out of 21 primary applications were granted and 7 out of 9 secondary applications were granted. The contents of the proposals for the secondary applications are a refinement of the contents of the successful bids in primary applications, and we are very satisfied with the results.
  - ✧ The change for this year's applications is that the project period has been changed to a maximum of three years. The reason for the change is that it is difficult to formulate a JCM equipment subsidy project in a single fiscal year, and it is necessary to work on designing systems, etc., over the course of several years. With the project period having been set to three years, this year, the contents of activities of 11 projects will be premised on plan formulation. It should be noted that although the proposals are for a three-year implementation plan, contracts will remain single-year contracts.
  - ✧ Although the naming has changed from low carbon to decarbonization, we recognize that decarbonization is something that is difficult to realize immediately. We hope that next year's city-to-city collaboration projects will work with a view to achieving a zero-carbon society by 2050.

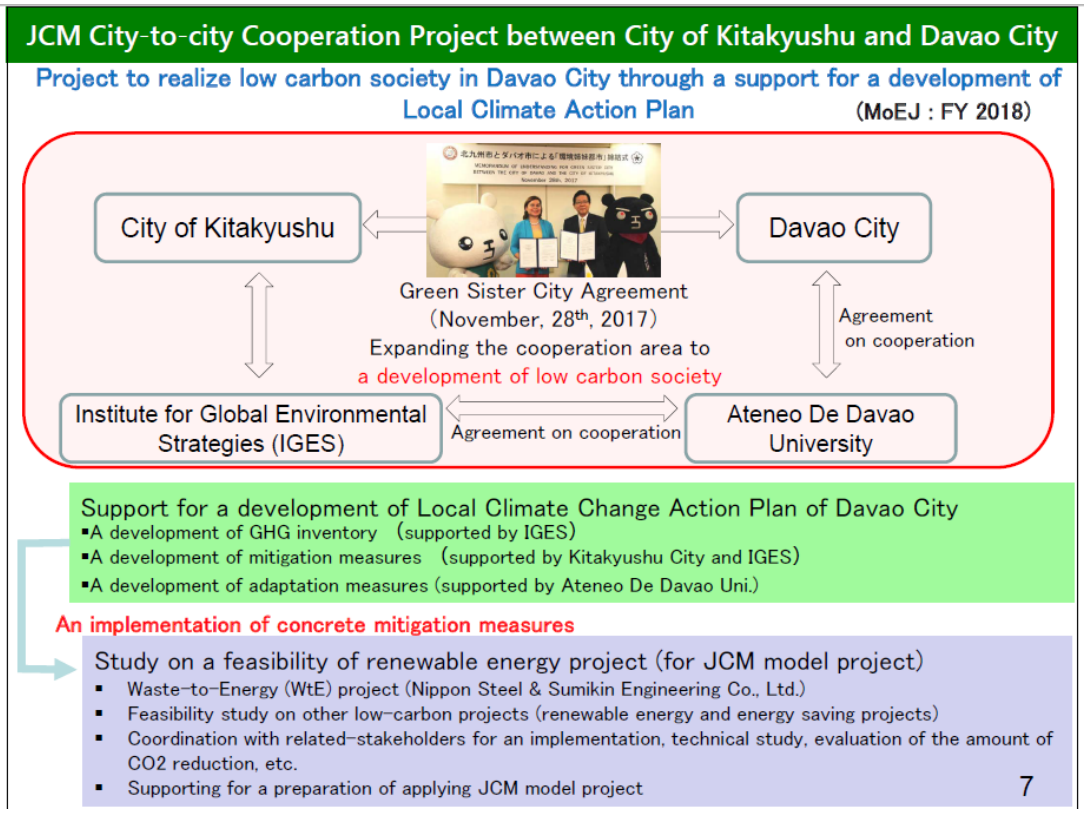
- ✧ The call for applications for next year's city-to-city collaborations is expected to start around late March.

- Introduction of projects in Vietnam
  - ➢ Ho Chi Minh - Osaka City Project (5 min): Mr. Masaru Ishikawa, Manager, Environmental Science & Engineering Dept., Nippon Koei Co., Ltd.
    - ✧ Osaka City is sharing its accumulated knowledge of climate change mitigation measures, adaptation measures, and administrative management with Ho Chi Minh City.
    - ✧ The project formulation activities include consideration of the introduction of energy-saving air-conditioners, gas boiler fuel conversion and photovoltaic power generation systems.
    - ✧ There are currently no particular issues, and both Ho Chi Minh City and Osaka City are very positive. As for activities for the next fiscal year and beyond, we would like to continue with the policy dialogue that has been implemented through city-to-city collaboration. Specifically, we will work on a policy dialogue on the proactive introduction of low-carbon technologies in Ho Chi Minh City. We will also continue to focus on project formulation. In addition, we also plan to work on project formation in public works. The industry is focusing its attention on the beverage industry and the energy-intensive cement industry.
    - ✧ The project structure is as shown below.



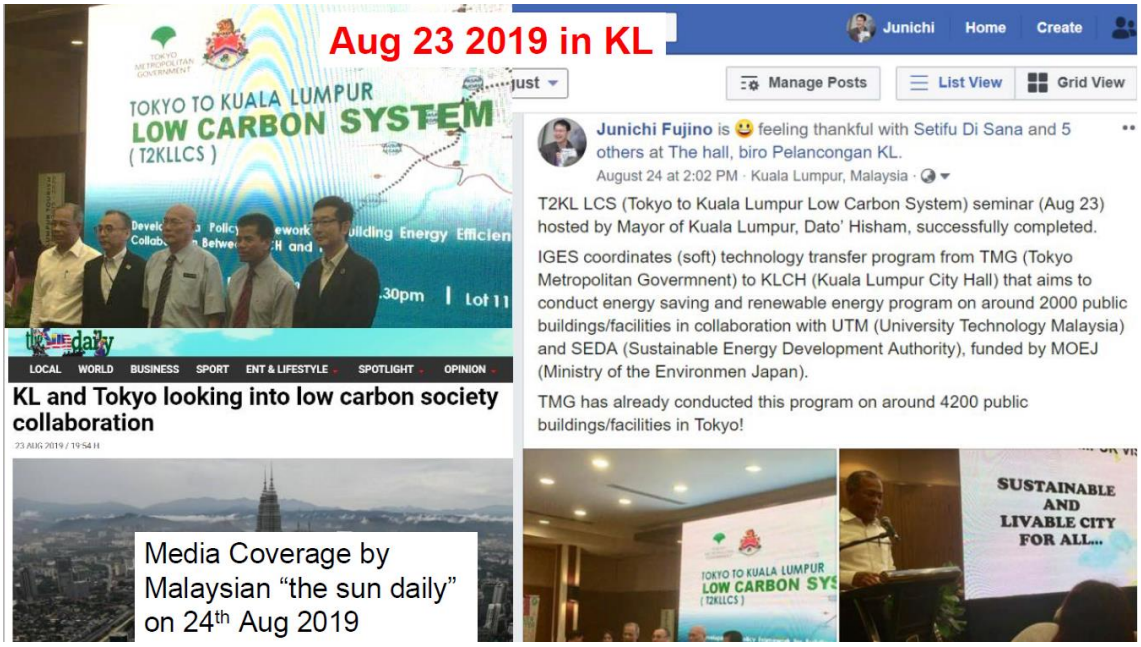

- Hai Phong - Kitakyushu City Project (5 min): Mr. Yuichi Abe, Associate Partner, Socio & Eco Strategic Consulting Unit, NTT Data Institute of Management Consulting, Inc.
  - In terms of activities, we are looking into the feasibility of introducing the following equipment for two steel companies with electric furnaces and the tenant companies of the Nam Cau Kien Industrial Park, which have the highest energy consumption.
    (a) High efficiency blowers + high voltage inverters
    (b) High efficiency pumps + high voltage inverters
- Can Tho - Hiroshima Prefecture Project (5 min): Mr. Kazuki Matsubara, Senior Managerial Staff, Foreign Business Division, Commerce, Industry and Labor Bureau, Hiroshima Prefectural Government
  - Rice cultivation is thriving in the city of Can Tho, and there is a demand for using the rice husks discharged from the rice mills. In this project, the rice husks discharged from the rice milling process are compressed into solid blocks, which will then be used as fuel to generate electricity through gasification, thereby providing 100% of the electricity used at the rice mill.
  - At present, rice mills are purchasing electricity from the Southern Power Corporation via the grid; however, replacing it with biomass power will contribute to reducing greenhouse gases.

- Introduction of projects in the Philippines
  - Davao - Kitakyushu City Project (5 min): Ms. Emiko Murakami, Director of Business Promotion, Kitakyushu Asian Center for Low Carbon Society, MOE, City of Kitakyushu
    - The collaboration between Davao City and Kitakyushu City began when Kitakyushu City was consulted regarding the problem of waste by Davao City, via the Consulate-General, and technical cooperation was implemented.
    - JICA projects and city-to-city collaboration projects are being used to support Davao City.
    - With the issue of waste, it is not a problem that can be solved just by installing equipment and facilities locally, and continuity will be lost unless capacity is developed in the field through support for collection and transportation and human resource development. To this end, we will continue to focus on capacity building through JICA projects, while formulating JCM projects through city-to-city collaboration projects.
    - The project structure is as shown below.

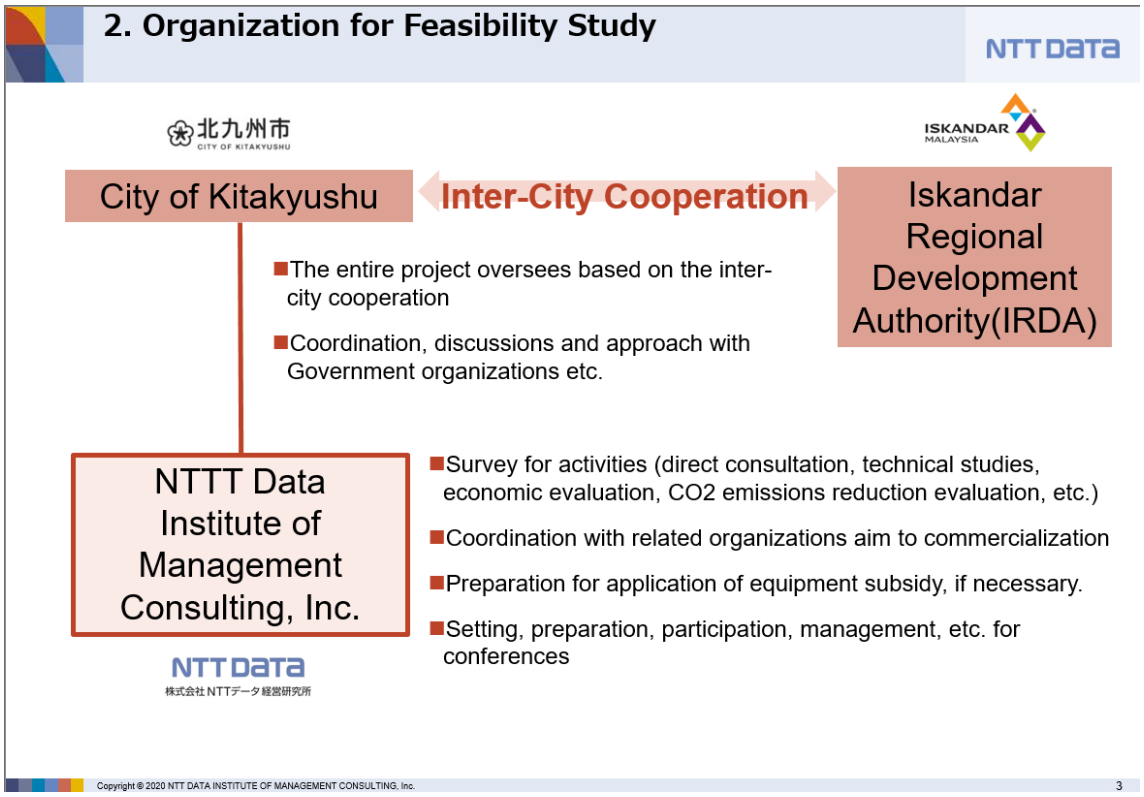


- Quezon - Osaka City Project (5 min): Mr. Motofumi Suzuki, Senior Advisor, Oriental Consultants, Co., Ltd.
  - There are three main activities in this project.
    (a) Introduction of energy-saving equipment in Quezon City after the renewal of air conditioning systems
    (b) Investigation of CFC recovery and destruction and consideration of countermeasures
    (c) Support of capacity building
  - We expect the following three outputs from this year's activities.
    (a) Investigation of applicability of a JCM equipment subsidy for air conditioning energy saving
    (b) Confirmation of the current status of fluorocarbon collection, recovery and destruction in the Philippines (Manila)
    (c) Gathering of fluorocarbon information

- Introduction of projects in Malaysia
  - Kuala Lumpur - Tokyo Metropolitan Government Project (5 min): Dr. Junichi Fujino, Program Director, City Taskforce, IGES
    - The Kuala Lumpur Government and the Tokyo Metropolitan Government are supporting the development of a policy framework for building energy efficiency through city-to-city collaboration projects.
    - The Tokyo to Kuala Lumpur Low Carbon System (T2KLLCS) seminar was held in Kuala Lumpur on August 23, 2019. Scenes from the event are shown below.




- Iskandar - Kitakyushu City Project (5 min): Mr. Motoshi Muraoka, Partner, Socio & Eco Strategic Consulting Unit, NTT Data Institute of Management Consulting, Inc.
  - The Iskandar Regional Development Authority and Kitakyushu City also engaged in city-to-city collaboration in 2015 and 2016.
  - In this city-to-city collaboration project, the following three main activities are being considered.
    (a) Review of action plans based on the already formulated blueprint for low-carbon societies
    (b) Follow-up surveys of the surveys that were conducted in 2015 and 2016
    (c) Investigations to identify waste heat recovery power generation projects that have potential
  - As a result of this year's efforts, we formulated an action plan for the building of industrial symbiosis in collaboration with the Iskandar Regional Development Authority, and identified several potential projects for JCM equipment subsidy applications.
  - The implementation system is as follows.




- Introduction of projects in Myanmar
  - Hlegu Township, Yangon Region - Kitakyushu City Project (5 min): Mr. Motoshi Muraoka, Partner, Socio & Eco Strategic Consulting Unit, NTT Data Institute of Management Consulting, Inc.
    - ✧ This project is a derivative project of the FY2018 Kitakyushu City - Mandalay City city-to-city collaboration study project.
    - ✧ Specifically, it will aim to realize a low-carbon project (realization of an eco green city) in a smart-city development project within the Hlegu township in the Yangon Region.
    - ✧ The introduction of cogeneration equipment, chillers, and photovoltaic power generation systems will be examined. The equipment to be considered for introduction at each facility is as follows.

## 1.Background
## About Eco Green City

- Approximately 1,453 acres of land will be developed in three phases over the 15 years from 2019 to 2034.
- As a more specific project, local power company Golden Green Energy will introduce a 30MW solar power facility.

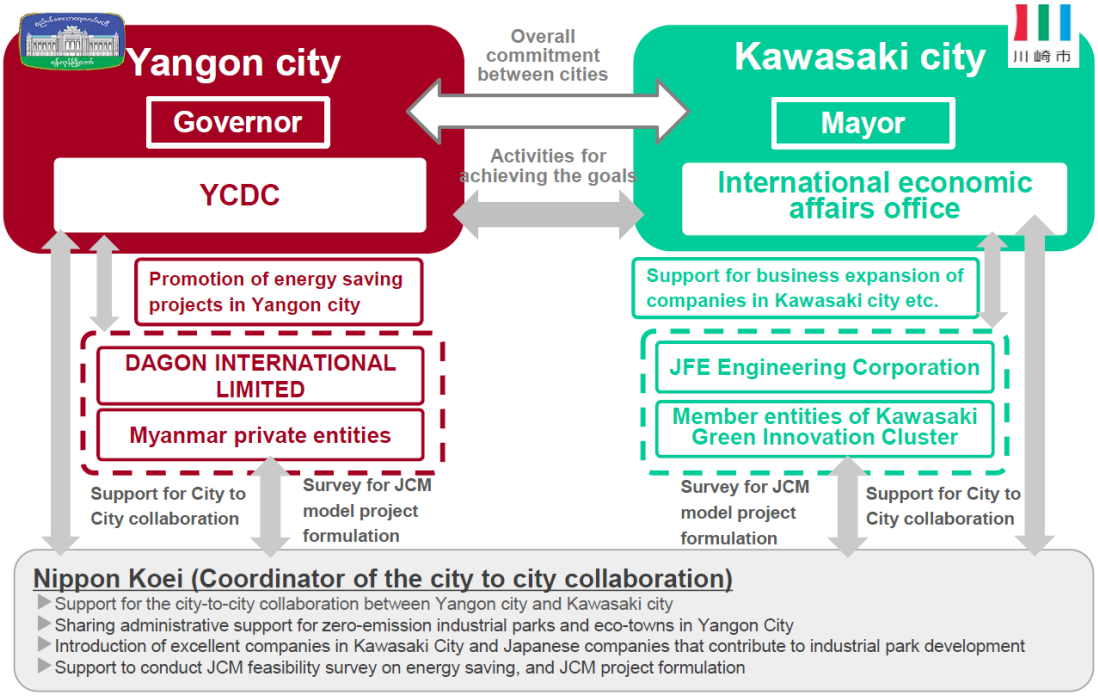

| Planned construction facilities | Assumed introduction technology |
|---|---|
| Water and sewage treatment plant | • High efficiency water treatment technology<br>• inverter |
| Commercial facility (outlet mall, Movie theater) | • Cogeneration equipment<br>• Chiller equipment<br>• Solar power, battery |
| Agripark (Experience farms, farms, etc.) | • Biomass power generation<br>• Solar power |
| Hospitals, hotels, museums, etc. | • Cogeneration equipment<br>• Solar power, battery |
| School | • Solar power, battery |
| Public housing (Low-income and public servant housing) | • Solar power, battery |





- Yangon - Kawasaki City Project (5 min): Mr. Takahiro Fukahori, Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City
  - An exchange of opinions between Yangon City and Kawasaki City will be conducted to address the environmental issues that Yangon City faces. We will also share the know-how of the SDGs of both cities in order to achieve the sustainable development of both cities. We will also conduct a feasibility study for a JCM equipment subsidy application.
  - The implementation system is as follows.

## 3：Each Actor's role in the project implementation




- Sagaing Region - Fukushima City Project (5 min): Mr. Koji Kojima, Research Director, Environmental and Energy Research Division, Mitsubishi Research Institute, Inc.
  - ✧ Through this project, we will consider a phased roll-out method for the rice-husk power generation system, the separation of municipal solid waste, and the appropriate treatment system in the region, aiming to support the establishment of a waste treatment system (master-plan formulation, proposal of related systems, awareness raising, etc.) and the construction of a low-carbon waste treatment system that takes advantage of local characteristics, in order to realize a low-carbon, sustainable regional city.
  - ✧ Several workshops and site visits are being conducted. Scenes from the workshops and site visits are shown below.

## Partnership for Low Carbon Initiative　Vertical Cooperation

With city development committee

With regional government officials

Meeting in MOEJ

Minister for Electricity, Energy and Industry (Ayeyarwady Region) and Vice Minister for Global Environmental Affairs (MOJ)

With site manager

With school principal

4

- Ayeyarwady Region - Fukushima City Project (5 min): Mr. Naoki Kato, Manager, Environment Division, Environment Department, Fukushima City
  - ✧ Through this project, discussions will be held regarding the promotion of environmental education at local elementary schools and the issue of waste treatment at final disposal sites. We are also focusing on collaborations with multiple cities.

## 3 Key achievements of city-to-city collaboration : Expansion to cities

Joint Workshop with Ayeyarwady Region & Sagaing Region (Feb. 2018, Yangon)

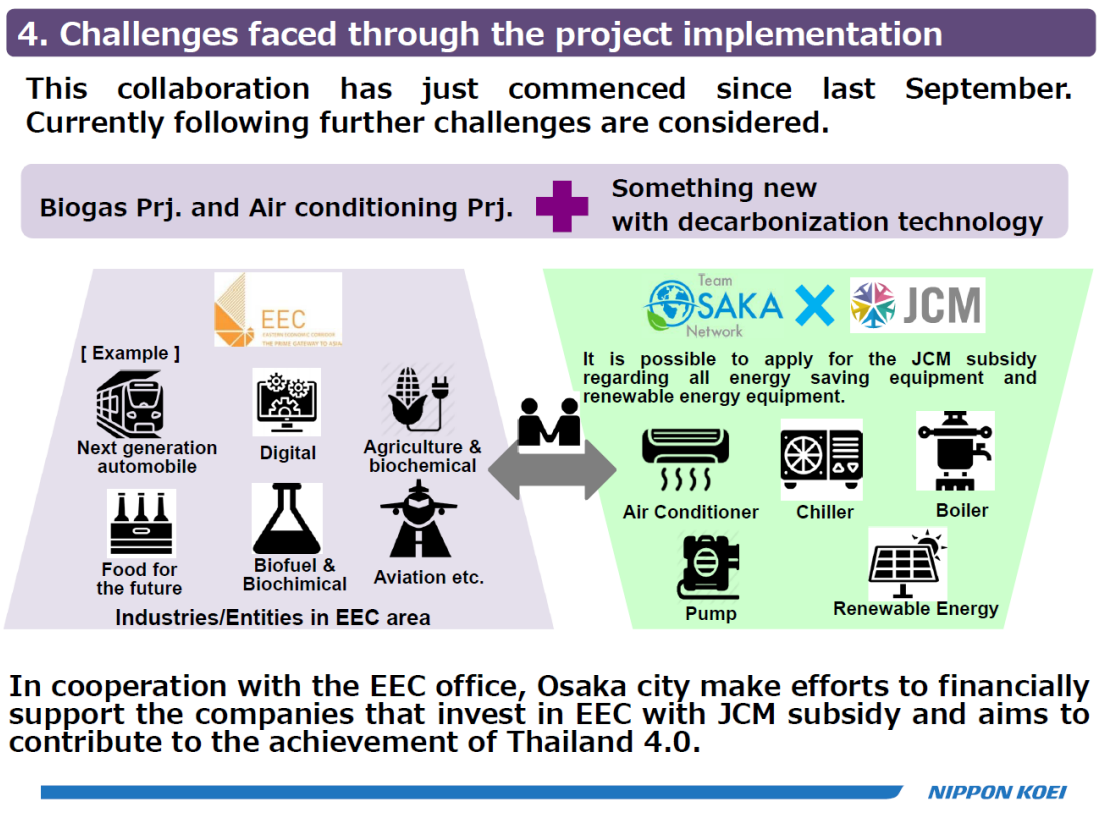
Courtesy visit to the Minister of Agriculture, Livestock and Irrigation(Feb. 2018)

Booth presentation of City-to-City Collaboration activities in Naypyidaw (Mar. 2018. Conference of Myanmar Rice Federation)

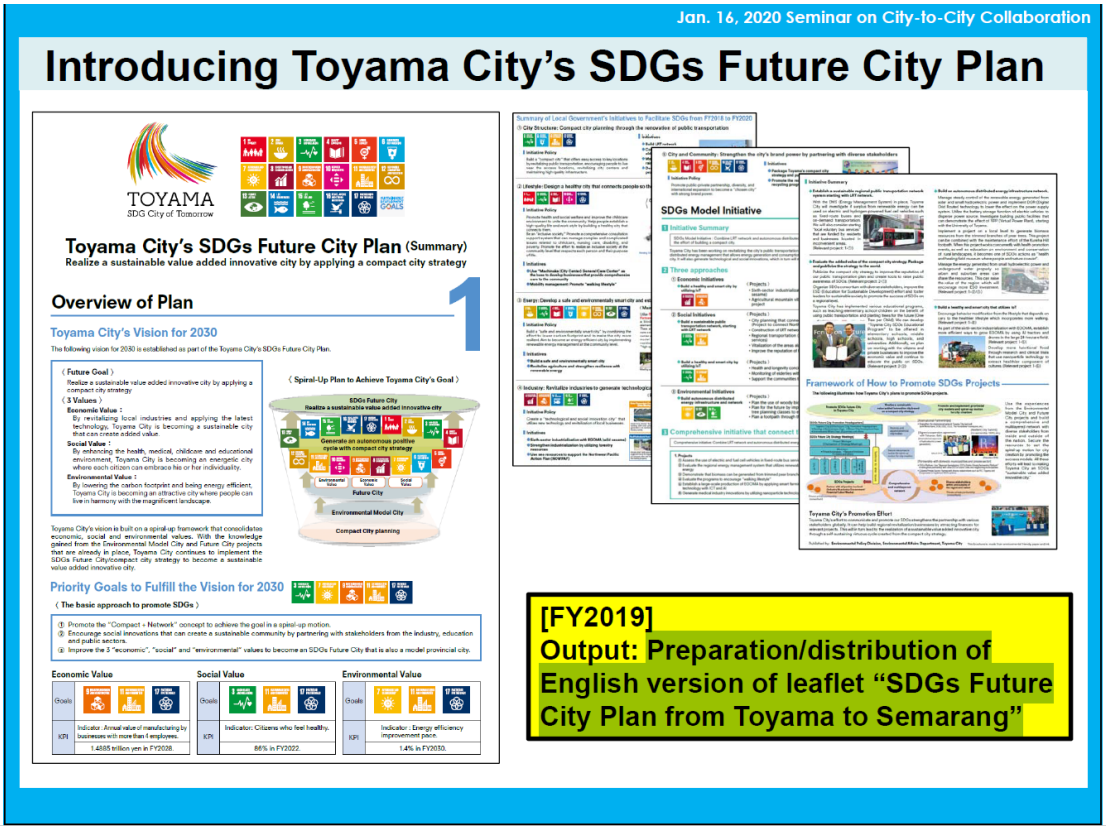
State Counsellor Dew Aung San Suu Kyi visited the booth, and we had a chance to explain the activity.

22

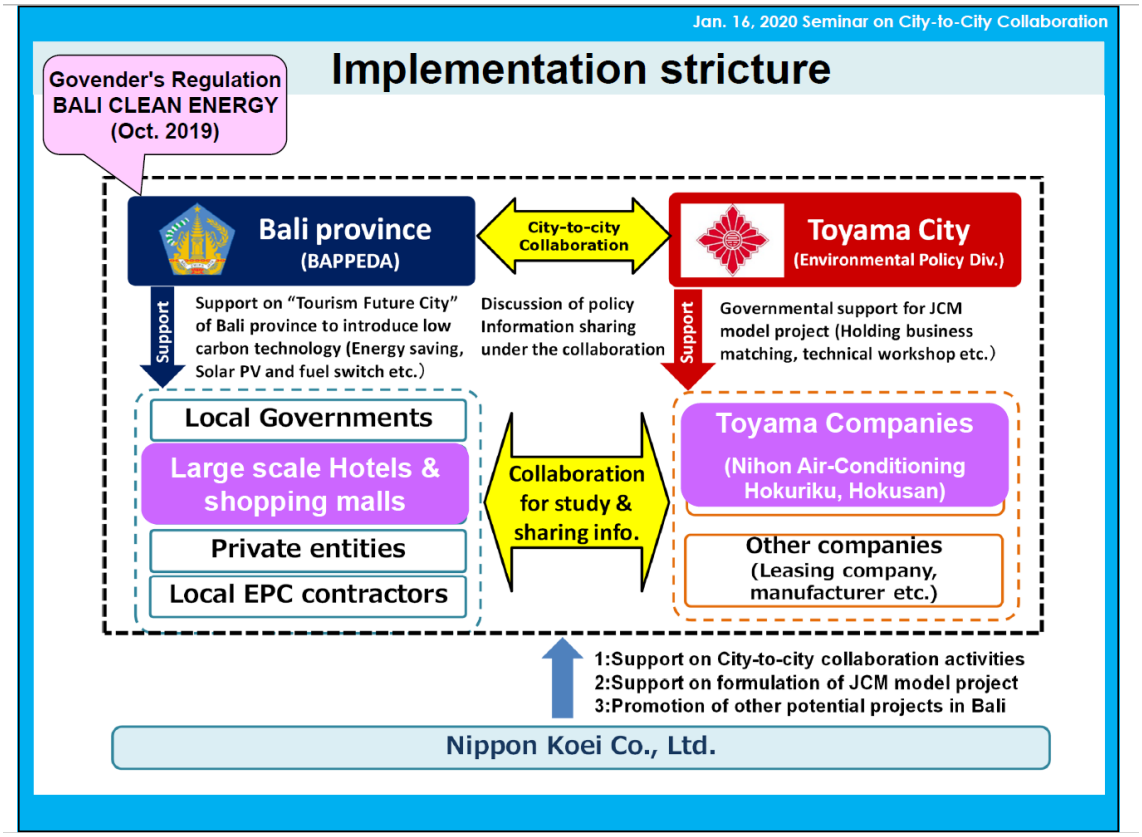
- Introduction of projects in Thailand
  - Laem Chabang Port, Bangkok Port - Yokohama City Project (5 min): Mr. Kousuke Shibasaki, Deputy General Manager, Engineering Department, Yokohama Port Corporation
    - Yokohama Port Corporation is an organization that carries out the construction and maintenance of Yokohama Port. In recent years, in consideration of environmental issues, they are making efforts to reduce the port's carbon dioxide (CO2) emissions.
    - With regard to environmental initiatives, Yokohama City has been engaged in city-to-city collaboration projects with Laem Chabang Port and Bangkok Port (including surrounding areas) since 2015. This year, we aim to reduce carbon emissions by supporting the efficient operation of railway terminals and coastal terminals at Laem Chabang Port and supporting the promotion of modal shifts in wide area logistics.
  - Thai Eastern Economic Corridor - Osaka City Project (5 min): Mr. Masaru Ishikawa, Manager, Environmental Science & Engineering Dept., Nippon Koei Co., Ltd.
    - In this project, a JCM project will be formulated within the jurisdiction of the Eastern Economic Corridor (EEC) of Thailand. Specifically, in addition to examining the introduction of biogas equipment and energy-saving equipment such as air conditioning, we will look into the introduction of renewable energy equipment.



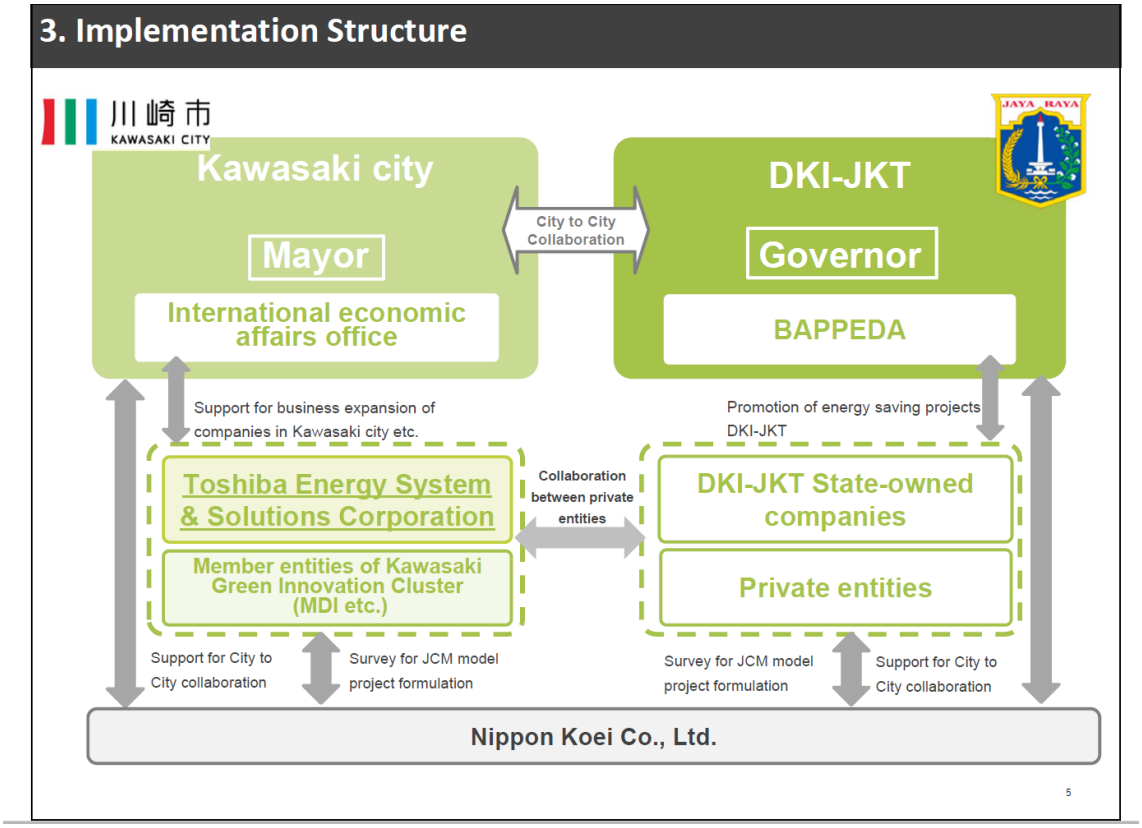

- Introduction of projects in Indonesia
  - Semarang - Toyama City Project (5 min): Mr. Keiichi Kobayashi, Section Chief, International Cooperation Section, Environmental Policy Div., MOE, Toyama City
    - In this project, specifically, the introduction of the following three types of equipment will be considered for promoting clean energy in Semarang City.
      (a) Renewable energy (photovoltaic and biomass power generation)
      (b) Energy-saving equipment (high-efficiency chillers and boilers, etc.)
      (c) Switching energy to natural gas (CNG)
    - We are also working on creating an English version of the SDGs city plan leaflet. An image of the leaflet is shown below.




- Bali - Toyama City Project (5 min): Ms. Aki Baba, Environmental Science & Engineering Dept., International Consulting, Nippon Koei Co., Ltd.
  - Toyama City, an environmental future city, will support Bali in creating a low-carbon and leading tourism city (tourism future city) based on its knowledge and track record on environmental policies and project formation.
  - Under the city-to-city collaboration between the two cities, Toyama-based companies with excellent low-carbon technologies (energy saving, renewable energy, fuel conversion, etc.) will specifically conduct the following activities to solve Bali's problems.
    (a) Introduction of energy-saving and renewable energy to large-scale tourist facilities such as hotels
    (b) Implementation of JCM project formation by introducing fuel conversion technology in the transportation sector
  - The implementation system is as follows.




- Jakarta - Kawasaki City Project (5 min): Mr. Takahiro Fukahori, Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City
  - The goal of Kawasaki City and Jakarta City is to achieve sustainable green innovation. In order to achieve this goal, the project will specifically implement the following activities.
    (a) JCM equipment project formation (introduction of energy-saving equipment & introduction of renewable energy equipment)
    (b) Exchange of views on SDGs and holding of workshops
  - The implementation system is as follows.




- Rokan Hulu, Riau Province - Kawasaki City Project (5 min): Mr. Takahiro Fukahori, Manager, International Economic Affairs Office, Economic and Labor Affairs Bureau, Kawasaki City
  - The target of Rokan Hulu, Riau Province and Kawasaki City is the realization of a circular economy in the Riau Region - the world's largest palm oil producer.
  - We will consider introducing technology to supply electricity and steam, which are essential for palm oil production, by utilizing the palm empty fruit bunches (EFB) owned by the city-based enterprise group.

- Q&A
  - What are the merits of engaging in city-to-city collaboration in collaboration with multiple local governments?
    - When collaborating with multiple cities, it is possible to make use of the experiences with cities previously collaborated with.
    - If implemented in multiple cities, the possibility of horizontal development of the project can be explored.
- 11:55 Administrative announcement (IGES), End of session

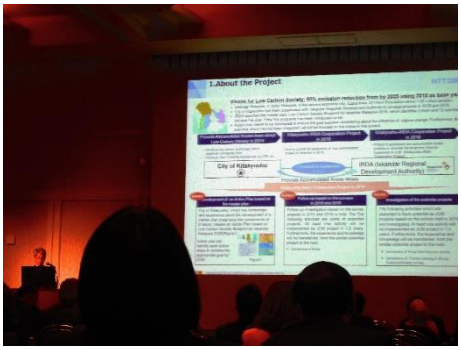
■ January 16 Afternoon site visit Tokyo, Japan

| | | |
|---|---|---|
| Objectives | To promote understanding, including low-carbon technology and operation, through site visits. | |
| Sites to be visited | Group 1 | Group 2 |
| | Shinagawa Incineration Plant (13:30-16:00) | Tokyo Gas - Gas Science Museum What is gas (13:30-16:45) |

■ Photos

Kitakyushu City's presentation at closed seminar

Hai Phong City project presentation at closed seminar




Iskandar project presentation at closed seminar


Yangon project presentation at closed seminar

## ■ January 17 Morning Closed Seminar Program

Closed Seminar: Exchange of views on decarbonized and sustainable city development

| 時間 | セッション |
|---|---|
| 09:00-09:10 | 趣旨説明＆ファシリテーション<br>IGES 北九州アーバンセンター　プログラムディレクター　林　志浩 |
| 09:10-10:00 | グループ A：計画策定と省エネ等の案件形成を進めている都市<br><br>パネリスト：<br>ホーチミン市<br>ホーチミン市　ホスピタリティ管理課　課長　ヴォ・ティ・タン・キウ<br>ケソン市<br>ケソン市　環境保全・廃棄物管理部　環境管理専門員 III　ディビッド・ジョン・サウラ・ベルガラ<br>クアラルンプール市<br>クアラルンプール市　機械電気部　街灯維持課　電気技師　ムハド・シャズニ<br>スマラン市<br>スマラン市　開発計画局　インフラ環境調査課　課長　ムハンマド・ルスフィ・エコ・ヌグロホ<br>ジャカルタ<br>ジャカルタ首都特別州　運輸省　運輸局　職員　ユニア・トリヨコ |
| 10:00-10:10 | 休憩 |
| 10:10-10:50 | グループ B：工業団地やスマートシティ等、面的に低炭素都市形成を進めている都市<br><br>パネリスト：<br>ハイフォン市<br>ハイフォン市人民委員会　外務局　副局長　グエン・ティ・ビッチ・ズン<br>ベトナム計画投資省<br>ベトナム計画投資省　経済圏管理部　副部長　ヴ・クオック・フイ<br>ヤンゴン管区・レグ群区<br>アライアンススターズグループ　事業開発マネージャー　ヒュンウー・キム<br>ヤンゴン市<br>ヤンゴン市開発委員会　環境管理局　都市環境保全・清掃部委員（8）　トゥー・ヤー・アウング |
| 10:50-11:00 | 休憩 |
| 11:00-11:40 | グループ C：廃棄物管理の改善やバイオマス発電等を通じて低炭素都市形成を進めている都市<br><br>パネリスト：<br>カントー市<br>カントー市　天然資源環境局　環境保護局　次長　ルー・トゥン・タイ<br>ザガイン管区<br>ザガイン管区開発委員会　担当部長　ティット・トゥー・ミン<br>エーヤワディ管区<br>エーヤワディ管区政府事務総長　タン・スウェ・ウィン |
| 11:40-11:55 | 振り返り、閉会挨拶<br>環境省　山本真帆代 |
| 11:55-12:00 | 事務連絡（IGES）、終了 |

※同日午後の公開セミナーに登壇いただく都市は含めていません。

- Three framing questions for discussion

1. The benefits of participating in the city-to-city collaboration project

2. Keys for promoting low-carbon, decarbonized and sustainable city development
3. The kind of role local governments should play in realizing a sustainable city and the necessary support

[Group A: Ho Chi Minh, Quezon, Kuala Lumpur, Semarang, Jakarta]

- Regarding Question 1 (The benefits of participating in the city-to-city collaboration project)
  - (Ho Chi Minh) The government will formulate a plan for a low-carbon society and realize low-cost development including PPP. Energy costs for companies will be reduced. It will be the most important capacity building.
  - (Quezon) Collaboration with Osaka City is important in realizing our vision. We concluded an MOU in 2018, and the advantage is that we were able to obtain information on low-carbon technologies. We are grateful that we are able to learn about the activities of other cities through the exchange of information at conferences.
  - (Kuala Lumpur) Our project is being implemented in collaboration with Tokyo. By having Tokyo share its successful and unsuccessful cases, we are able to consider initiatives to achieve the goal of reducing CO2 emissions by 2030. Comprehensive initiatives have been implemented through city-to-city collaboration.
  - (Semarang) We have been engaging in city-to-city collaboration since 2017. The direct benefits are the transfer of knowledge and technology. Toyama City is a compact city and we learn a lot from its commitment to sustainable development.
  - (Jakarta) The advantage is that we can check the progress of other cities and countries towards becoming low carbon.
  - (IGES) We would like to hear KL's case studies and specific examples of comprehensive initiatives.
  - (Kuala Lumpur) Usually, low carbon initiatives often focus on specific expertise. On the other hand, collaboration with Tokyo has led to the development of staff capabilities as well as technical topics.

- Regarding Question 2 (Keys for promoting low-carbon, decarbonized and sustainable city development)
  - (Ho Chi Minh) Ho Chi Minh is engaging in several initiatives. It is important to raise the awareness of local governments and private companies.
  - (Quezon) It is important for all stakeholders to understand the importance of decarbonization and to implement multi-stakeholder initiatives.

- (Kuala Lumpur) Leadership and commitment are important. Next is the transfer of knowledge and technology.
- (Semarang) Commitment is extremely important. Furthermore, it is important to realize action in pilot projects and present the actual results and benefits to local government heads.
- (Jakarta) Providing stakeholders with incentives is key. In addition to technical and financial incentives, it is important to make it easier to obtain permits from the government.
- (IGES) Regarding multi-stakeholder involvement, what measures are there to encourage involvement?
- (Quezon) We are building relationships by visiting to all stakeholders directly. With regard to the relationship with C40 (Cities Climate Leadership Group), we are currently having them formulate an action plan (benefits and stakeholder involvement in mitigation, adaptation and environmental policies).

・ Regarding question 3 (The kind of role local governments should play in realizing a sustainable city and the necessary support)
- (Ho Chi Minh) We want to create a stable environment that will enable companies to grow. We will introduce energy saving and renewable energy based on city-to-city collaboration. Financial support for feasibility studies is important. For JCM, it is important to be able to introduce new technologies with equipment subsidy.
- (Quezon) The government stands at the forefront of mitigating and adapting to climate change. We are formulating an environmental law and creating a framework that can be extended to other local governments. We have created a new department for human resource development, but support, such as the sharing of know-how, is important.
- (Kuala Lumpur) The role that cities should play is to set an example. If city hall becomes low-carbon first, citizens can use it as a model to imitate at home. We want Japan to share its experiences. In addition, funding is needed.
- (Semarang) Policy support from the Government is needed. In Indonesia, local government efforts require the support of the central government. G2G discussions are also taking place with Japan. Action is taken at the administrative level. Furthermore, JCM equipment subsidies can also be implemented between private companies, but a wider player approach is required.
- (IGES) How does Team Osaka's proposal differ from proposals from individual enterprises?

- (Ho Chi Minh) The proposals are backed up by experience.

[Group B: Hai Phong, Ministry of Planning and Investment of Vietnam, Hlegu (Yangon Region), Yangon]

- Regarding Question 1 (The benefits of participating in the city-to-city collaboration program)
  - (Hai Phong) We are progress from feasibility study to pilot project in collaboration with Kitakyushu City.
  - (Ministry of Planning and Investment of Vietnam) City-to-city collaboration is helping us to realize Vietnam's national strategy of green growth. It is also contributing to the achievement of SDGs and the development of the environment and society. Due to the similarity of the characteristics of the cities that are collaborating, as we hear of success cases, there is increasing interest in industrial parks and state governments.
  - (Hlegu, Yangon Region) Myanmar has great interest in projects that contribute to city development. City-to-city collaboration programs can contribute to the achievement of low-carbon goals and provide an appropriate direction for development. Public and private involvement is required. Project finance is also important.
  - (Yangon) We have concluded an MOU with Kawasaki City. It has led to collaboration with energy-saving technology and more. Another advantage is we have been able to exchange information.

- Regarding Question 2 (Keys for promoting low-carbon, decarbonized and sustainable city development)
  - (Hai Phong) Most important of all is to include decarbonization in the master plan for city development. And to also inform the citizens through it. Cooperation with the Government is also important. Confirmation of laws and provision of incentives. Ultimately, the whole of society needs to get involved. It is important to expand to involvement of local governments and citizens and international support. While it was necessary to set development goals in order to make the industrial park eco-friendly, with the support from Kitakyushu City, the management of the industrial park went smoothly.
  - (Ministry of Planning and Investment of Vietnam) There are three important points. (a) Strategy and planning at the national level are important. Strategies are also being adopted at the local government level. Policy concerning SDGs is under

review. A policy for eco-industrial parks was also formulated in 2019. On the other hand, it cannot be said that the legal framework has been sufficiently developed. Regulations on waste power generation are insufficient. (b) A consistent action plan is important. We want to work with the cooperation of an experienced country. (c) Support from overseas. It is important to obtain technical and financial support from the World Bank, IMF, UNIDO and JICA.

- (Hlegu, Yangon Region) (a) Improvement of the environmental awareness of citizens. Granting educational programs from the time of elementary school. (b) Realizing city-to-city collaboration. (c) Building various finance models.

・ Regarding question 3 (The kind of role local governments should play in realizing a sustainable city and the necessary support)

- (Hai Phong) The key point is that local governments make their own city development plans. In addition, it is important that plans are reviewed. There are proposals from international organizations, and we hope that there are initiatives that will lead to their realization.
- (Ministry of Planning and Investment of Vietnam) Cities implement solutions for low-carbon societies. Strengthening international cooperation and sharing experiences is very important. Furthermore, dialogue with partner countries is important.
- (Hlegu, Yangon Region) Building a finance model is important. Most projects are carried out by the private sector, but many of them face financial challenges. Myanmar has also received support from the likes of the ODA and the World Bank, and financial support is of the utmost importance.
- (Yangon) The sharing of knowledge is important for its role in realizing a low-carbon society. We would like to create a database on air pollution and waste separation.

[Group C: Can Tho]

・ Regarding Question 1 (The benefits of participating in the city-to-city collaboration program)

- (Can Tho) We implemented several initiatives related to GHG reduction, with the cooperation of Japan. We obtained a lot of knowledge through the city-to-city collaboration project. Through the sharing of skills and experiences, participation in training programs, inspections, and tours, we gained the know-how to realize the project.

- (Sagaing Region) The advantage of participating in a city-to-city collaboration project is that it can raise awareness of low-carbon societies, and that the framework can be deployed horizontally in other areas.
- (Ayeyarwady Region) The advantage of participating in a city-to-city collaboration project is that we can obtain many opportunities from the program. We can learn about sustainable development with low carbon technologies, infrastructure and mitigation measures.

・ Regarding Question 2 (Keys for promoting low-carbon, decarbonized and sustainable city development)
- (Can Tho) Multi-stakeholder participation is a major premise. Municipal government leadership, consensus with the local community, and the coordination of local and central governments are important. In addition, it is necessary to secure a budget for technology introduction. As for international cooperation, we want you to share your success stories.
- (Sagaing Region) Systematic planning and the establishment of a circular economy are important. Cooperation between government and citizens is important.
- (Ayeyarwady Region) For decarbonization and sustainable city development, dialogue and projects with companies for low-carbon initiatives are required.

・ Regarding question 3 (The kind of role local governments should play in realizing a sustainable city and the necessary support)
- (Can Tho) It is important to realize the plans of the municipal government. It is important for the city to coordinate for the participation of multi-stakeholders. Financial support is necessary.
- (Sagaing Region) It is important to formulate a waste-management policy.
- (Ayeyarwady Region) It is important that cities strengthen their partnerships. Frameworks such as PPP is also important.

・ Comments from Ms. Yamamoto of the MOE
- Thank you all for your cooperation, including your stories about zero carbon cities.
- I realize that there is no single solution, and you are each working on a variety of initiatives. I understand that everyone is advancing their initiative with an awareness of being a leader.
- There were many mentions of finance. I myself felt that there was a financing problem when I participated in COP25, so I want to work to resolve it.

- I understand that there is a need for mutual understanding of city-to-city collaboration. In addition to this event, we are holding medium-sized seminars and workshops. Last year there was a move to newly adopt Hiroshima Prefecture through a workshop. Next month, a seminar will also be held in Yokkaichi City, Mie Prefecture. New cities will be prioritized; however, I would like you to raise your hands.

■ January 17 Afternoon Open Seminar Program

| 時間 | セッション |
|---|---|
| 14:00-14:10 | 開会挨拶<br>環境省 地球環境局長 近藤智洋 |
| 14:10-14:30 | 環境インフラ輸出戦略の最新動向<br>環境省 地球環境局 国際連携課 国際協力・環境インフラ戦略室 室長 杉本留三 |
| 14:30-14:50 | 都市インフラ輸出戦略の最新動向<br>国土交通省 都市局 国際室 室長 伊藤昌弘 |
| 14:50-15:10 | タイランド 4.0 の実現に向けた取組<br>タイ東部経済回廊事務局 投資戦略推進部 部長 ムック・シーブンルアン |
| 15:10-15:30 | 休憩 |
| 15:30-17:00 | 都市間連携のマッチングと案件形成に関するパネルディスカッション<br>パネリスト:<br>・環境省 地球環境局 国際連携課 国際協力・環境インフラ戦略室 室長 杉本留三<br>・国土交通省 都市局 国際室 室長 伊藤昌弘<br>・タイ東部経済回廊事務局 投資戦略推進部 部長 ムック・シーブンルアン<br>・大阪市 環境局 環境施策部 都市間協力担当課長 三原眞<br>・イスカンダル開発庁 市民管理部 副部長 ノーフィザ・バシュファリ<br>・北九州市 環境局 環境国際経済部 事業化支援担当課長 村上恵美子<br>ファシリテーター:<br>・IGES 所長 森秀行<br><br>インタラクティブツールを活用した質疑応答<br><br>閉会挨拶 |

- 14:00 Opening remarks from organizer, Mr. Tomohiro Kondo, Director General, Global Environment Bureau, MOE
  - The Paris Agreement has started. Municipal and local governments are key players, as efforts lead by non-governmental organizations, including local governments, are encouraged. City-to-city collaboration is very important. This year, 17 projects were adopted.
  - With regard to the latest trends in decarbonization in Japan, typhoons and floods damaged the country in 2019. Nagano Prefecture was one of the worst affected areas, but Nagano Prefecture has formulated its plans having been affected by climate change. With regard to CO2 emission reduction, 33 local governments have stated that they are aiming to have net zero emissions.
  - As for future international development, a forum is scheduled to be held, for sharing and communicating zero carbon city declarations, gathering together the heads of cities advocating reduction of CO2 emissions in Japan and overseas. The targets will be higher than ever before, so a more proactive commitment will be required. We have established various menus, such as creating scenarios using AI and financial support utilizing JCM, so please make use of them.

- 14:10 Domestic and overseas moves to build a zero-carbon society
  - Latest trends in environmental infrastructure export strategies
    Mr. Ryuzo Sugimoto Director, International Cooperation / Environmental Infrastructure Office, Global Environment Bureau, International Strategy Division, MOE
    - Japan's initiatives are being disseminated at COP25.
    - 32 local governments in 10 countries are involved in city-to-city collaboration projects.
    - At COP25, the minister actively discussed the matter of Article 6 of the Paris Agreement. Although no agreement was reached, a course was set for an agreement at COP26.
    - Introduction of JCM success stories.
      - Transformer introduction project in Vietnam and Laos: Initially it was introduced only in Vietnam, but has been extended to Laos with the cooperation of manufacturers.
      - The project to introduce LED street lights in Siem Reap, Thailand, and Phnom Penh, Cambodia, and the project to introduce high-efficiency water pumps in Danang, Vietnam, got started because there were subsidies available,

but they are cases where the benefits were understood, and their introduction advanced on a business basis.

- With the renewable energy project in the Philippines, the region was able to benefit from energy costs no longer flowing out of the region.

- Latest trends in city infrastructure export strategies

  Mr. Masahiro Ito, Director, International Affairs Office, City Bureau, MLIT

  - With regard to the Japanese and overseas markets, the Japanese market is shrinking due to population decline. On the other hand, markets outside Japan (Asia region) are expected to expand.
  - Japan's advantage is smart cities (Initiatives across multiple fields, such as environment, energy, transportation, medical and health). Transit-oriented development (TOD), such as "Kashiwanoha" along the Tsukuba Express line, is important. It also contributes to achieving SDGs.
  - The "Japan-ASEAN Smart City Network High-Level Meeting" was held to expand the opportunity for case introductions to ASEAN. A public-private conference has been established.
  - JASCA was established, and a system for building smart cities in the ASEAN region was created. Of the 21 JOIN-funded projects, nine were related to city development. We are examining ways to support energy, water supply, data analysis, and other items that are associated with urban development in the future. We are also working to be able to assist smaller-scale development projects.
  - Outside Japan, we have begun to pay attention to collaboration between local governments.

- Actions for realizing Thailand 4.0

  Ms. Muk Sibunruang, Executive Director, Investment Strategy and Promotion Division, EEC Office of Thailand

- The EEC includes the Chachoengsao, Chon Buri and Rayong provinces.
- The expressway from Bangkok to Rayong will be extended. Laem Chabang Port and Map Ta Phut Port will be updated. In addition to these infrastructure improvements, we will finance investments in specific industries. We will start with an investment of THB 1.7 trillion in areas such as tourism, medical service provision and demand-driven education.

- 15:30 Panel discussion on matching for city-to-city collaboration & project formulation

[How to build relationships of trust between cities]

- (Osaka) City-to-city collaboration projects also involve human relationships, and stakeholder collaboration and communication are important. The decision-makers of the other party are often quite senior, and movements may need to span long periods. It is important to build trust by taking into account the circumstances regarding that point.
- (Kitakyushu) In addition to going to the field surveys, we also used JICA's invitation project to have them visit Kitakyushu City and they gained experience and we deepened mutual understanding. It is important to note that the month in which the fiscal year starts and ends varies from country to country.

[Collaboration with private companies]

- (Osaka) The cooperation of private companies is essential. Local governments provide policy support, and this includes examples of businesses that are reducing CO2 emissions. We do various searches for companies that have solutions and carry out matching. It is important to make a master plan from the upstream and take a bottom-down approach.
- (Kitakyushu) Kitakyushu City matches small and medium-sized enterprises in the city with companies that have seeds. IRDA (Iskandar Regional Development Agency) in Malaysia and Hai Phong City in Vietnam have been working from upstream. The LED introduction project in Davao, Philippines, has also progressed from the top down.

[Expectations for city-to-city collaboration projects]

- (Thai EEC) More than 50% of the EEC has been developed by Japanese investment. We learn a lot about foreign direct investment, especially with regard to transport infrastructure. If we can make a successful case of the EEC, we would like to expand further.
- (Malaysia IRDA) We are very pleased to be working with Japan. IRDA is promoting initiatives such as the Eco-Life Challenge, in collaboration with Toyama, for micro-hydroelectric power generation, and Kyoto and Tokyo. While there are differences in language, we do not feel that it is an obstacle. We collaborate with Japan with mutual respect. In addition to providing us a package of support, from feasibility studies to actual project implementation, they also carrying out capacity building. The fact that there are models that have been proven in Japan has led to the motivation that IRDA can do the same.

[How private companies can participate]

- (Osaka) Team Osaka has exceeded 100 members. We currently, exchange information through issuing newsletters and holding meetings and international conferences.
- (Kitakyushu) Basically, we are advancing projects together with local companies in the city. Businesses that wish to collaborate with us in the future should set up a branch office in Kitakyushu City. The city also has its own subsidy system for small and medium-sized enterprises. Activities in collaboration with the city have also served as PR for companies to secure human resources.

[Areas we want local governments to work on]

- (MOE) We feel that the trends have changed from seven years ago when JCM first started. We feel that the Paris Agreement in 2015 and the formulation of the SDGs marked a major turning point, but we also feel that the roles and effects of local governments and cities have clearly expanded. SDGs have been localized and, the goal of sustainability has been set in all cities. We would like them to start with communication between people, then move on to the transfer of systems and plans and the realization of projects. We feel that the significance of city-to-city collaboration lies in planning and creating ongoing, sustainable projects.

[Comment from MLIT]

- There are two points. The first is that, with regard to decarbonization, many contributions can be made if it can be tied to city development. Since licensing in the partner country is a particular bottleneck in the project, we hope that Japan local governments can cooperate to solve the problem. The second is that, there is an expectation that cooperation from the upstream process of city development and the creation of a master plan is possible. We believe that know-how regarding the creation of smart cities based on Japan's high dependency on public transportation can contribute internationally.

[What do you think about the package projects? Expectations for Japanese companies]

- (Malaysia IRDA) It is important to look at all areas in a similar way. We believe that having a master plan for the IRDA as a whole will accelerate achievement of goals towards zero carbon.
- (Thai EEC) The biggest goal is to attract companies. If we can also able to decarbonize it would be extremely good. There are also plans for smart cities in the EEC. We also

hope for education that will deepen the understanding of Industry 4.0. Furthermore, since agriculture is thriving in Rayong Province, there could be potential in the agricultural field and in biomass utilization.

[Comment from the MOE]

- (MOE) Given the longevity of urban infrastructure, the infrastructure we will invest in from now will be in use in 2050. We think that it is important to incorporate those value that can be demonstrated even in such a case. We should question whether technology is moving towards decarbonization or becoming a debt for the future, and help steer it in the direction of decarbonization and provide support for investment. We also feel the importance of networking. When matching needs with seeds, we think that it is better to connect many-to-many rather than one-to-one.

[Characteristics of Japanese companies overseas entities would like to collaborate with]

- (Thai EEC) Is it a business operator with the technology targeted by the Thai side? People are also important.
- (Malaysia IRDA) Whether or not it is fit for business purposes is important.

[Difference in sense of speed between local governments]

- (Osaka) It appears that Japan is said to be slower moving, but I believe it is important to maintain close communication and achieve tangible results.
- (Kitakyushu) In our case, we are pushing the other side to keep up. I hope we can collaborate well.

[The key to project success]

- (Malaysia IRDA) All members involved in the project are enthusiastic.

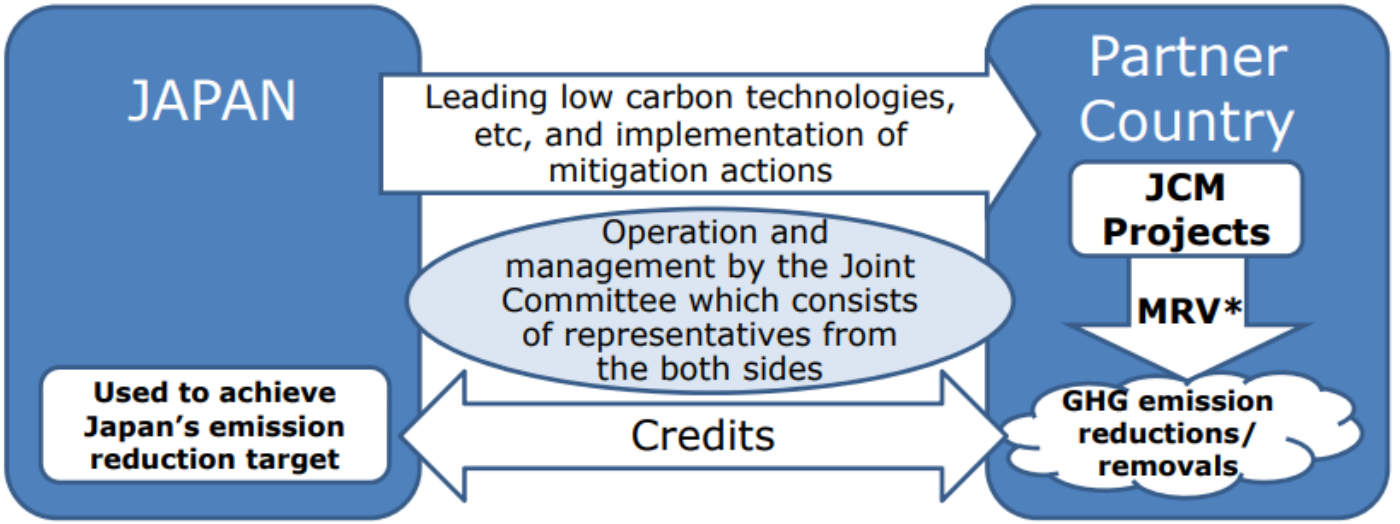
# Introduction of JCM Subsidy System for the Facilities to Reduce CO2 Emissions

October 2019

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

# 1.What is JCM?

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




*measurement, reporting and verification

# 2．JCM partner countries

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

Mongolia
Jan. 8, 2013
（Ulaanbaatar）

Bangladesh
Mar. 19, 2013
(Dhaka)

Ethiopia
May 27, 2013
(Addis Ababa)

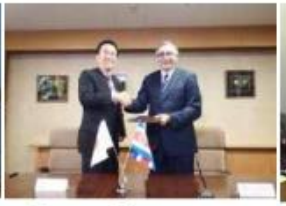
Kenya
Jun. 12,2013
(Nairobi)

Maldives
Jun. 29, 2013
(Okinawa)

Viet Nam
Jul. 2, 2013
(Hanoi)

Lao PDR
Aug. 7, 2013
(Vientiane)

Indonesia
Aug. 26, 2013
(Jakarta)



Costa Rica
Dec. 9, 2013
(Tokyo)

Palau
Jan. 13, 2014
(Ngerulmud)

Cambodia
Apr. 11, 2014
(Phnom Penh)

Mexico
Jul. 25, 2014
(Mexico City)

Saudi Arabia
May 13, 2015

Chile
May 26, 2015

Myanmar
Sep. 16, 2015

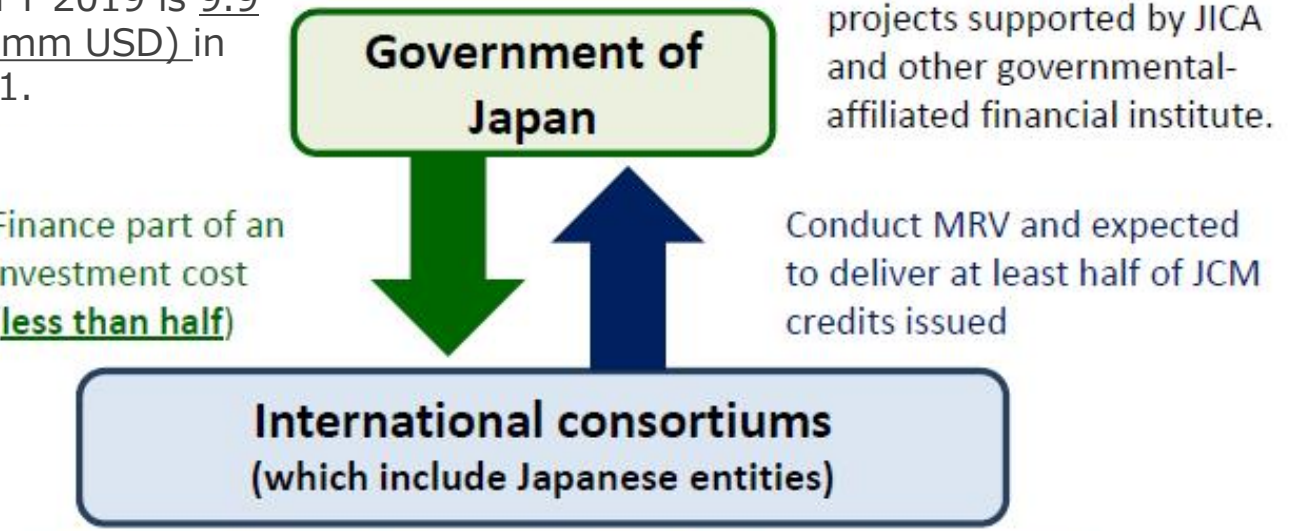
Thailand
Nov. 19, 2015


the Philippines
Jan. 12, 2017

# 3. JCM Subsidy Program

The budget for projects starting from FY 2019 is 9.9 billion JPY (90 mm USD) in total by FY2021.

(1 USD = 100 JPY)

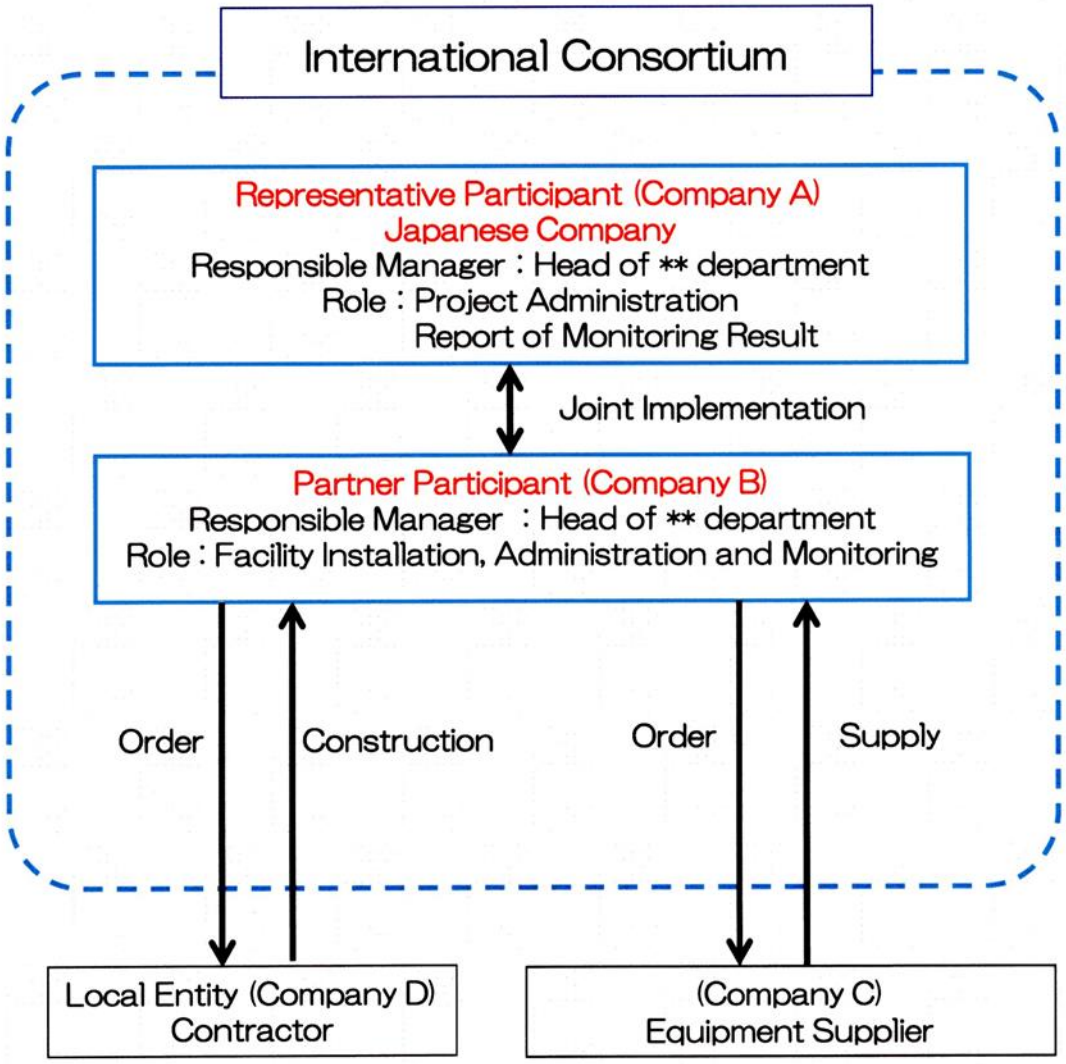



- Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO2 from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- Eligible Projects : starting installation after the adoption of the financing and finishing installation within three years.

# 7．To Apply to JCM subsidy

- The proposed project must contribute to the emissions reductions of CO2 originated from energy.
- The project participants must establish “the International Consortium”.
  - The International Consortium should consist of one Japanese entity and one local entity at least.
  - The representative of the International Consortium only can deal with the application and proposal of JCM subsidy.
  - Only a Japanese entity, legally registered in Japan, can become the representative of the International Consortium.
  - The International Consortium must operate the facilities, and monitor and record all of the parameters required to calculate the amount of CO2 emission reductions for the JCM project during the legal durable years.

# 8．Example Diagram of the International Consortium for JCM project



# 9. Documents required for the Application of the JCM Subsidy

1. Company Information
   - Description of your business
   - Scale of capital and shareholder composition
   - Scale of business
   - Balance sheet and earnings statement in the last three years
   - Brochure or booklet of your company
2. Project Information
   - Description of the factory as a project site including capacity, number of workers, amount of products, etc.
   - Information of the project
   - Description of the project including what you do
   - Capacity of the project
   - How to earn money
   - Scale of Investment and its breakdown
   - All of the data required to calculate the cash flow and IRR of the project, including price of electricity, capacity to sell the electricity, how many days to operate the project in a year, cost of operating and maintenance, etc.
   - The buyer of the electricity
   - How to finance the project
   - Information of all of the approval and license required for the project, and the status of the acquisition
   - Structure of the project for construction and operation
   - Description of the technologies introduced for the project
   - Schedule of the EPC (Engineering, Procurement, and Construction) for the project.
3. Information of a License, a Permit, etc. required fro the project
   - Documents of All of the licenses and permits required for the project
   - Example: EIA, PPA, FIT system,

Note: All of the information shown above should be backed up with official documents.
If not, the information must be confirmed with any evidences.

# 10. To win the JCM subsidy（1）

- Two important Factors in the examination of JCM proposals:
  - The possibility to implement the proposed project actually
  - The amount of CO2 emission reductions (originated from energy)
- To show the possibility of the proposed JCM project
  - Details of the plan, design and estimation of the project
  - Finance for the project
    - Balance sheet and earnings statement of the local company
    - How to finance for the project
    - JCM subsidy will be provided after the completion of construction and the check of test operation by the MOEJ
  - Continuity of the project as business
    - Business model of the project
    - Support system in the partner country, like FIT
    - Soundness of the local entity as a project owner

# 1 1． To win the JCM subsidy

- Why is the amount of CO2 emission reductions important?
  - The upper limits of JCM subsidy have been fixed in advance.
    - For first project using a certain low-carbon technology: 50%
    - For second to forth project using a similar technology: 40%
    - For fifth or after project using a similar technology: 30%
  - There is a numerical value as a guide used in the examination of JCM project proposals.
    - Value of cost-effectiveness of the subsidy: JPY 4,000/t-CO2.(In case of PV projects, JPY3,000/t-CO2 applied)
    - The cost-effectiveness of the subsidy means a unit of subsidy required to reduce 1 ton of CO2 emission by the project.
    - It is calculated from the total amount of the subsidy divided by the total amount of CO2 emission reduction by the project for the legal durable years.

# 1 2． Example of JCM subsidy

- The proposed JCM project is the second one to use a similar technology in the country.
- In this case, the upper limit of the JCM subsidy is 40% of the cost of the equipment and its installation. If the cost is JPY 500 million, the upper limit of the JCM subsidy is calculated at JPY 200 million.
- The project can reduce CO2 emissions by 3,000 t-CO2e per year.
- If the legal durable years of the equipment is 10 years, the total CO2 emission reduction for the legal durable years will be calculated at 30,000 t-CO2e. According to the guide value of cost-effectiveness, JPY 4,000/t-CO2, the appropriate value of the subsidy for the project would be calculated as follows:

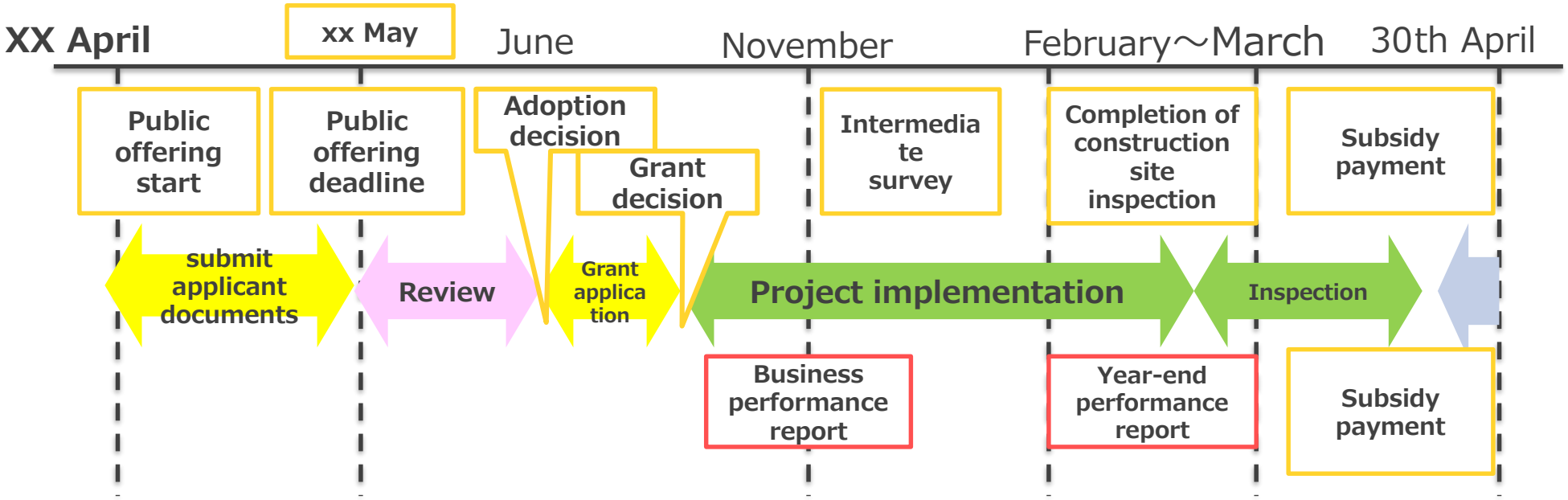
  JPY 4,000/t-CO2 * 30,000 t-CO2 = JPY 120 million

- Usually the actual JCM subsidy for the project will be JPY 120 million.

- The more the project can reduce CO2 emission, the higher the amount of subsidy you may get is.

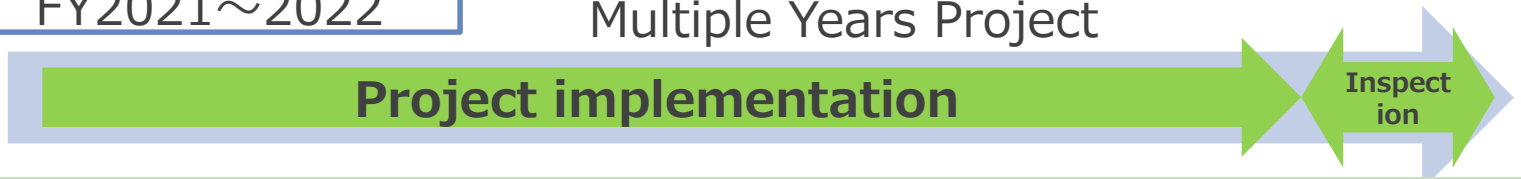
# 13. Schedule from Application to Project Implementation

(Example) FY2020




FY2021～2022

Multiple Years Project




- **Grant application is needed from the adoption unofficial within 3 months.**
- **pay estimate to the end of each FY year, the settlement payment in the final year**

# 1 4. Summary

- The proposed JCM project must reduce CO2 emission originated from energy.
- JCM can support the part of the cost of equipment to reduce CO2 emission and its installation.
  - The upper limits are 50%, 40% and 30% according to the technologies used in the project.
  - In usutal cases, “JPY 4,000/t-CO2*total amount of CO2 emission reductions” is applied to the projects
- The project participants have to establish the International Consortium for JCM.
  - One Vietnamese entity and one Japanese entity are required at least
- The examination of JCM proposals is highly competitive.
  - Important factors are the possibility of the proposed JCM project and the amount of CO2 emissions reduction.
  - The finance of the project is also very important because JCM subsidy will be provided after the completion of the construction.
  - The more CO2 emission reduction the project achieves, the more easily the project win the JCM subsidy.

NTT DATA

Global IT Innovator

# Real Examples of JCM Model Projects in Viet Nam

NTT DATA Institute of Management Consulting
Socio & Eco Strategic Consulting Unit
Yuichi ABE

October 24 & 25, 2019

# Introduction of Biomass Boiler to Chemical Factory

Outline of GHG Mitigation Activity

- Daiichi Jitsugyo Co., Ltd. and THUAN HAI CORPORATION jointly introduce biomass (Rice husk) -fueled steam boilers to supply steam to a chemical factory located in Phu My 3 Specialized Industrial Park in Ba Ria Vung Tau Province.
- The project contributes to the achievement of the country's Vision by 2030 and Green Growth Strategy through achieving decarbonization by introducing biomass-fueled steam boilers instead of fossil fuel-fired boilers.

Expected GHG Emission Reductions

16,882 tCO2/year

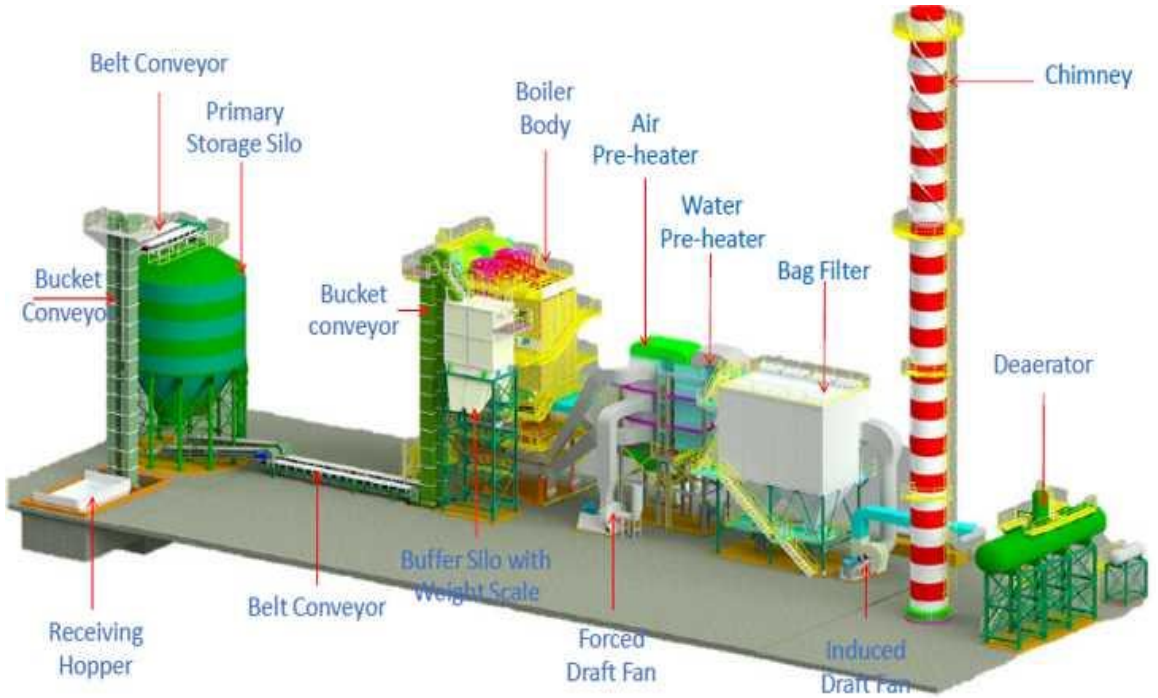
= Reference CO2 emission − Project CO2 emission

Reference CO2 emission

= Fuel consumption by reference boiler [ton/year]

× Emission Factor [tCO2/ton]

Project CO2 emission = 0 [tCO2/year]



# Energy Saving by Introduction of High Efficiency Water Pumps in Hue City

Outline of GHG Mitigation Activity

- High efficiency water pumps with inverter control are installed in a new water treatment plant and two existing water treatment plants owned by THUA THIEN HUE WATER SUPPLY JOINT STOCK COMPANY (HueWACO).
- To perform with high efficiency, the pumps are customized to specific conditions and requirements of the recipient plants.
- Moreover, highly efficient operation is possible by adjusting the rotational speed of the motor according to the change in flow rate using an inverter

Expected GHG Emission Reductions

4,060 tCO2/year

= [(Reference power consumptions) − (Project power consumptions)] × Emission factor (EF)

Tu Ha WTP Water distribution pump (Existing pump)

# Waste to Energy Project in Hanoi City

Outline of GHG Mitigation Activity

- The objective of this project is to build and operate Waste to Energy plant for municipal solid waste from Hanoi City in the Xuan Son Waste treatment area in the northwestern part of Hanoi, Vietnam. Hitachi Zosen and T&T Group established SPC, which is responsible for the implementation of this project.
- Under the contract with the Hanoi People's Committee, 1,000 tons per day of municipal solid waste generated from Hanoi city is incinerated at this plant. The waste heat will be used for power generation. Generated power will be used for internal consumption and the rest of power will be supplied to the state-owned power company EVN.
- As a result, it reduces fossil fuel consumption and CH4 emissions from landfill disposal.

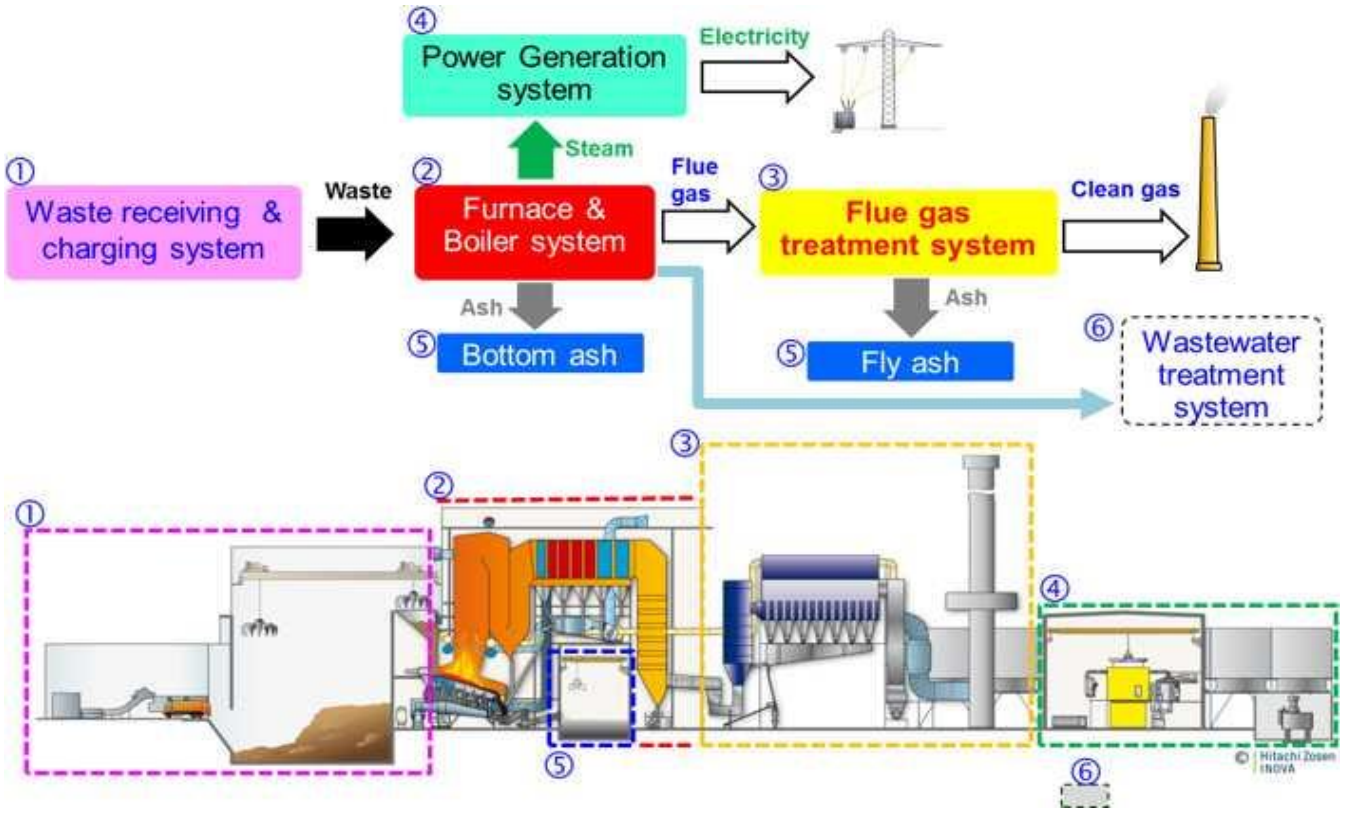
Expected GHG Emission Reductions

119,870 tCO2/year

= ( Reference GHG emissions for 15 years

− Project GHG emissions for 15 years ) / 15 years

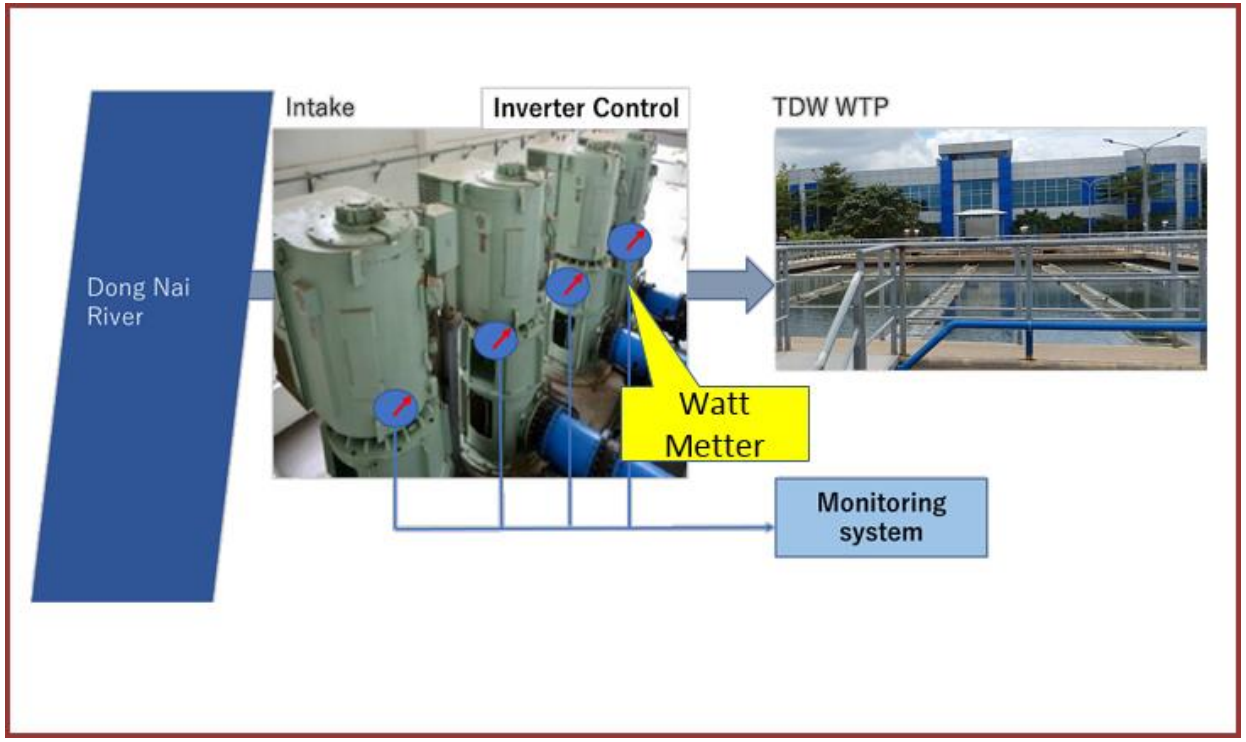
= ( 3,393,355 tCO2 − 1,595,288 tCO2 ) / 15 years



# Energy Saving by Introduction of Inverters for Raw Water Intake Pumps

Outline of GHG Mitigation Activity

- This project introduces invertors to control the motor of pumps at the intake pumping station in Ho Chi Minh City and reduces energy consumption as well as GHG emission.
- Currently the pump operation is ineffective because the amount of water is adjusted by the valve operation on the discharge side.
- On the other hand, inverter will enable to control flowrate by adjusting the rotational speed of motor to cope with fluctuation of water volume and to keep valves at the discharge side always fully open.
- By introduction of invertors, it is unnecessary to control the amount of water by valve operation. As a result, the pump can be operated efficiently and the power consumption is reduced.




Expected GHG Emission Reductions

1,043tCO2/year

[(Reference Power Consumptions) – (Project Power Consumptions)] x Emission Factor (EF)

=[(Power Consumptions with valve control) – (Power Consumptions with invertor control) ]x EF

# Modal Shift from Truck to Cargo Ship with Freshness Preservation Reefer Container

Outline of GHG Mitigation Activity

- A freshness preservation reefer container “Hyokan Soko” forms static electric field with high voltage and low current in the chilled container, and enables long storage of foodstuff.
- Introduction of freshness preservation reefer containers enables to transport foodstuff by sea route that needs long storage, and leads to realize CO2 emission reduction by modal shift from trucks to cargo ships.

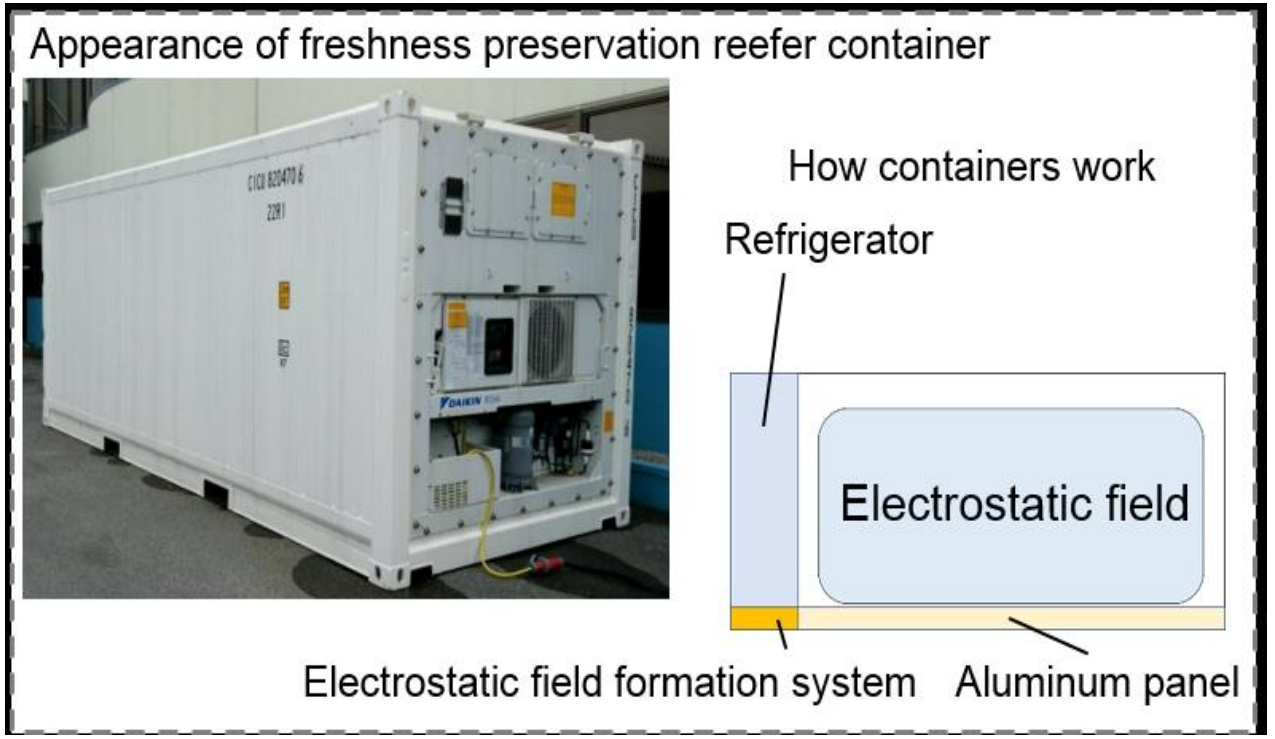
GHG Emission Reductions

10,061tCO2/year

Reference Emission – Project Emission

Reference Emission = Emission from land transport fuel consumption

Project Emission = Emission from sea transport fuel consumption + Emission from land transport fuel consumption (between the distribution base and the port) + Emission from container electricity consumption + Emission from cargo loading/unloading at the port



# Introduction of High Efficiency Centrifugal Chiller to Rubber Products Factory

Outline of GHG Mitigation Activity

- This project aims for saving energy by introduction of high efficiency centrifugal chiller to rubber products factory which is producing oil seals for engines and motors.
- Electricity consumptions as well as CO2 emissions will be reduced by installation and operation of high efficiency centrifugal chiller.

GHG Emission Reductions

289 tCO2/year

= (Reference CO2 emissions) [tCO2/year]

– (Project CO2 Emission) [tCO2/year]

= ((Reference Power consumption) [MWh/year]

– Project Power consumption [MWh/year]))

×Emission Factor [tCO2/MWh]

Reference Power consumption

= (COP(project)／COP(reference) )

×Electricity Consumption(project) [MWh/year]

# Introduction of Amorphous High Efficiency Transformers in Southern and Central Power Grids II

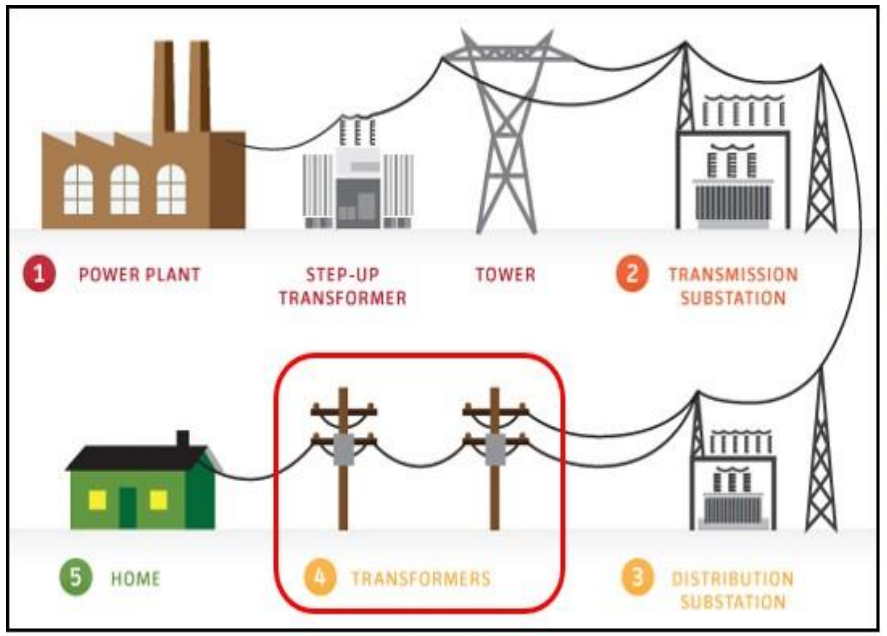
Outline of GHG Mitigation Activity

- The purpose of this project is to reduce CO2 emission through the promotion of amorphous high efficiency transformers in southern and central power grid of Vietnam.
- 2,145 transformers in total (530 for KHANH HOA PC, and 1,615 for DON NAI PC) are introduced to realize a reduction of distribution losses which contribute to CO2 emission reduction.
- Hitachi Metals in Japan supplies Amorphous alloy to be used as core of the transformers, then THIBIDI fabricates the transformers.

Expected GHG Emission Reductions

1,469 tCO2/year

= (No load losses of the reference transformer – No load losses of the project transformer) x (1 – Blackout rate during the project period) x CO2 emission factor of the grid




"④TRANSFORMERS" in the above are the subjects of the project.

Amorphous high Efficiency transformer

# Introduction of Energy Saving Equipment to Brewery

Outline of GHG Mitigation Activity

- Sapporo Group's Vietnam branch (Sapporo Vietnam Limited.) introduces highly-efficient and energy-saving equipment together with the expansion of production facilities in Long An brewery. This project reduces electricity and LPG consumption by introducing air compressor, cold water chiller and once-through boiler (LPG). This project reduces the percentage of unloads as well as the frequency of starts / stops and improves the performance of each individual unit. A cascade cooling system is built by the cold water chiller.

Expected GHG Emission Reductions

111 tCO2/year

Air compressor: 18.3 [tCO2/year]

= (RE electricity consumption − PJ electricity consumption) × EFel

= (Electricity required ÷ SP of current equipment × (SPRE − SPPJ)) × EFel

Cold water chiller: 13.6 [tCO2/year]

= (RE electricity consumption − PJ electricity consumption) × EFel

= (Refrigeration capacity required × (1 ÷ COPRE − 1 ÷ COPPJ)) × EFel

Once-through boiler: 79.3 [tCO2/year]

= (RE LPG consumption − PJ LPG consumption) × EFlpg

= (RE LPG consumption

− RE LPG consumption × $\eta$ RE ÷ $\eta$ PJ × ORPJ

+ RE LPG consumption × (1 − ORPJ)) × EFlpg

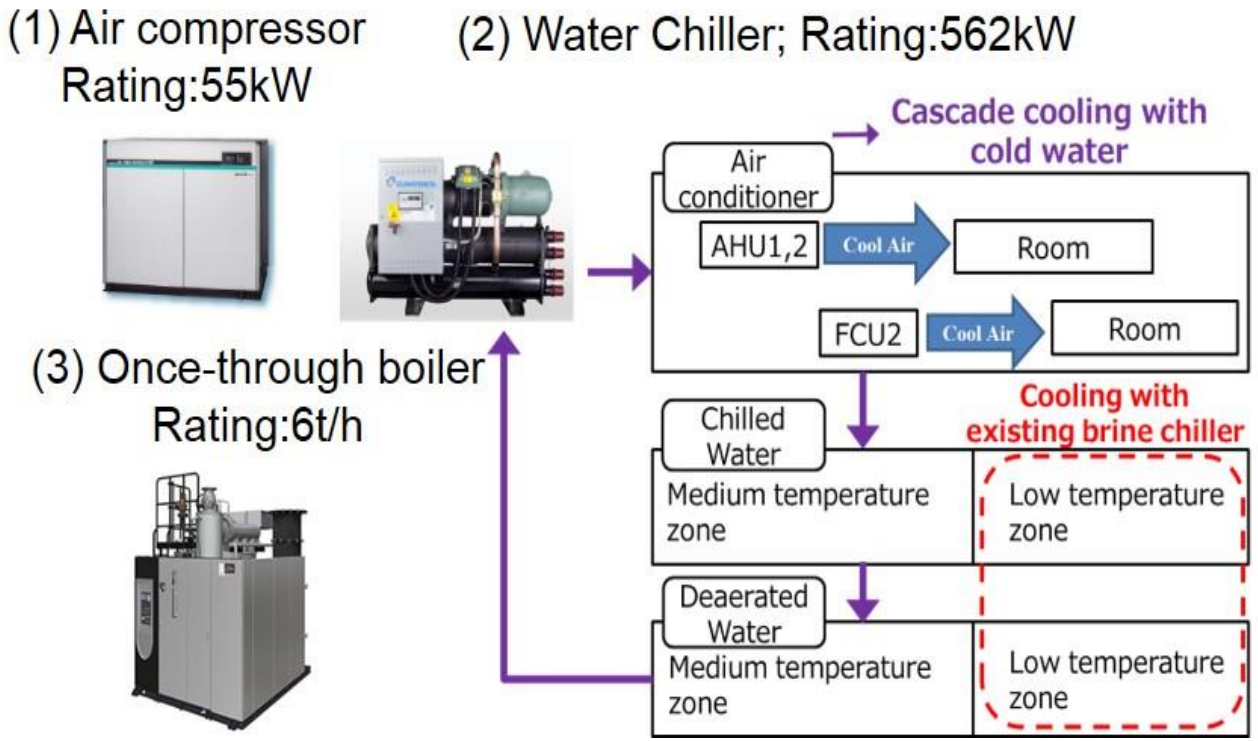
RE: Reference, PJ: Project,

EFel: Grid emission factor, EFlpg: LPG emission factor,

SP: Specific power of air compressor,

COP: Coefficient of performance of chiller,

$\eta$ : Boiler efficiency, OR: Operation rate



# Introduction of Energy Saving Equipment to Automotive Wire Production Factory

Outline of GHG Mitigation Activity

- This project reduces electric power consumption by introducing high-efficient wire stranding machines.
- The new machines contribute to the reduction of GHG emission by energy-saving measures, such as reinforced frames, friction reduction mechanism and installation of smaller, lightweight parts and high-efficient motor.

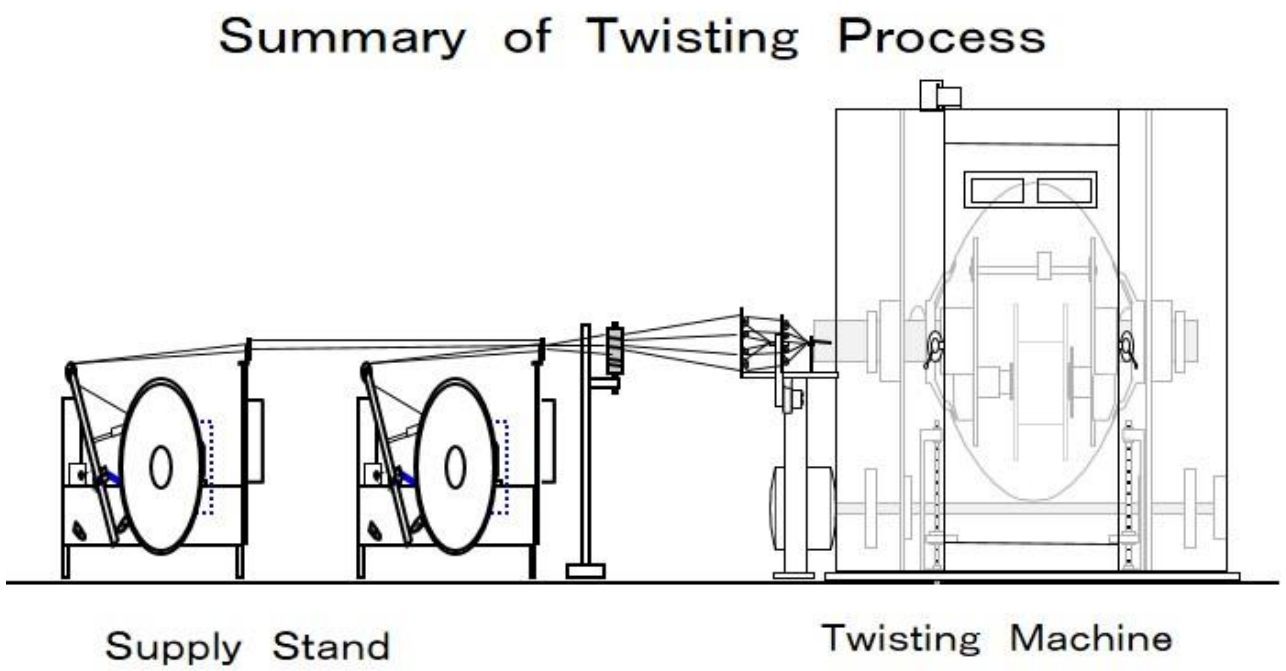
Expected GHG Emission Reductions

591 tCO2/year

= (Reference CO2 emissions) −
(Project CO2 emissions)

Reference CO2 emissions: 1,751.0 [tCO2/year]

Project CO2 emissions: 1,159.6 [tCO2/year]



# Installation of Energy Saving Equipment in Lens Factory

Outline of GHG Mitigation Activity

- produces chlorine and caustic soda, and the production of these chemicals consumes a lot of energy. This project intends to upgrade the element package of ion exchange membrane (IEM) salt electrolyzers to a latest package and reduce energy consumption from the production process.

Expected GHG Emission Reductions

1,220 $tCO_2$/year

= (Reference emission reductions (RE))

− (Project emission reductions (PE))

1) Turbo Freezer: 104 [$tCO_2$/year]

Calculating a competing product as a reference

RE: 1,220.9 [$tCO_2$/year]

PE: 1,116.9 [$tCO_2$/year]

2) Heat Pump: 1,116 [$tCO_2$/year]

Calculating the existing facilities as a reference

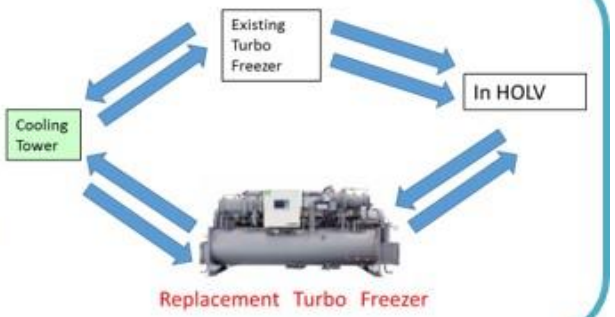
RE: 1,469.3 [$tCO_2$/year]

PE: 352.7 [$tCO_2$/year]

**Centrifugal Chiller**

***MHI ETI-50***

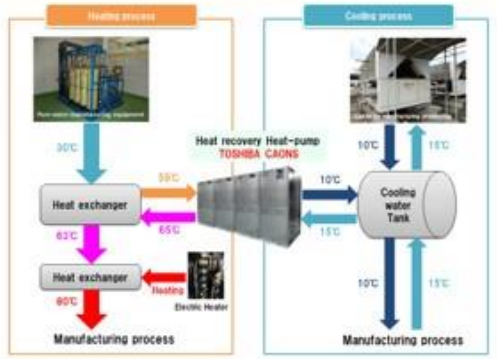
- Refrigerant: R-134a
- Cooling capacity: 460 USRt
- To replace one of two existing air conditioning turbo freezers, one will be utilized for backup
- COP will increase from 5.43 to 6.22




**Heat Recovery Heat-pump**

***TOSHIBA CAONS (HWC-WH6702V)***

- Hot water supply (Temperature range: 50-85 degrees Celsius)
- Heat capacity; 60kW, Cool capacity; 42.3kW
- Saving energy by the hot and cold water supply simultaneously, then total COP has been achieved 5.7



# Introduction of Solar PV System at Shopping Mall in Ho Chi Minh

Outline of GHG Mitigation Activity

- This project strengthens measures to save energy of the shopping mall in Ho Chi Minh City by introduction of photovoltaic power generation system on the roofs of car parking area and bicycle parking space for 100% self-consumption and enables reduction of power consumption purchased from EPS and CO2 emissions.
- This shopping mall also introduces high efficiency equipment to strengthen measures to save energy as the “Low-carbon shopping mall”. This project conforms to the environmental policy of the Vietnamese government and is expected to spread out as a model case.

Expected GHG Emission Reductions

- 125 tCO2/year
- The amount of CO2 Emission Reduction by Solar PV System = (1)Reference emission – (2)Project Emission (1)Reference emission: (annual electrical power output (kWh) (Self-consumption)) x (grid electricity CO2 emission factor in Vietnam) = 125 tCO2/year (2)Project Emission: 0(Zero)

# Installation of High Efficiency Kiln in Sanitary Ware Manufacturing Factory

Outline of GHG Mitigation Activity

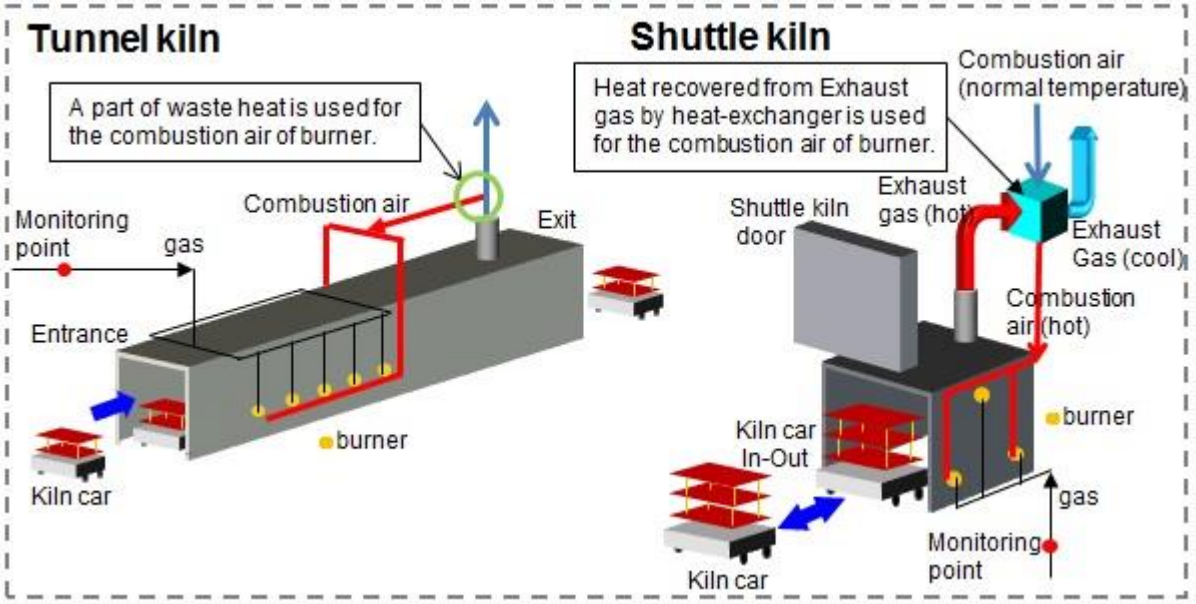
- Two High Efficiency kilns (tunnel, shuttle) are installed in a new sanitary ware manufacturing factory in Thang Long Industrial Park II in the suburbs of Hanoi city. The tunnel kiln has a heat recovery system in products cooling stage and the shuttle kiln is equipped with a heat-exchanger for the heat recovery from exhaust gas, reducing usage amount of fuel gas. Maximum energy-saving amount through this function is up to 30%.

Expected GHG Emission Reductions

311 tCO2/year

Tunnel kiln: 302 [tCO2/year]

Shuttle kiln: 9.8 [tCO2/year]



# Energy Saving in Factories with Air-Conditioning Control System

Outline of GHG Mitigation Activity

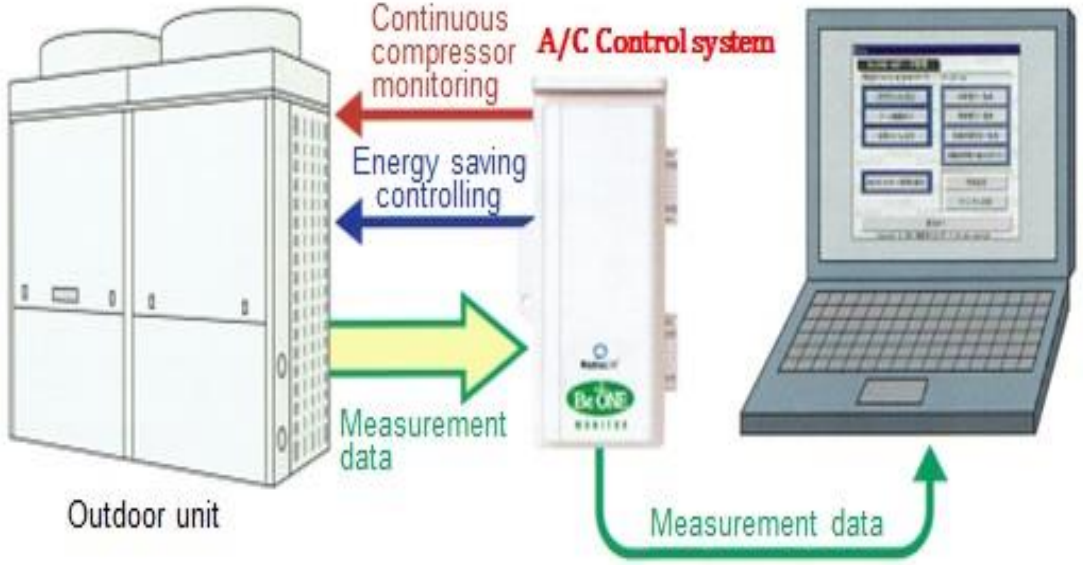
- This project introduces “Air conditioning control system” to air conditioners in six component factories in Vietnam. The system constantly monitors operation status of the compressor equipped in the air conditioner outdoor unit by measuring an electric current at the optimum programmed timing. Controlling the compressor once or twice in thirty minutes and the system reduces energy consumption and CO2 emissions. This system can be introduced to existing facilities and realizes energy-saving by preventing excessive cooling without impairing comfortableness.

Expected GHG Emission Reductions

3,297 tCO2/year

= Reference emissions − Project emissions

= 23,907.3 [tCO2/year] − 20,609.8 [tCO2/year]



# Energy Saving in Acid Lead Battery Factory with Container Formation Facility

Outline of GHG Mitigation Activity

- Currently, CSB Battery (Vietnam) manufactures small valve-regulated lead-acid (VRLA) batteries* (so-called sealed battery) with the tank formation method (See the chart below). This project introduces container formation method to some production lines, and about 60% of CO2 from fossil fuel combustion is reduced by integrating formation and charging processes, which consume much of energy in the 11-step battery production, and eliminating a drying process and LPG usage. Furthermore, this new formation method reduces water consumption by removing washing step.
- (*Compared to flooded lead-acid battery, it doesn't need to refill water and is utilized in various ways, such as in uninterruptible power supply (UPS).)

Expected GHG Emission Reductions

3,825 tCO2/year

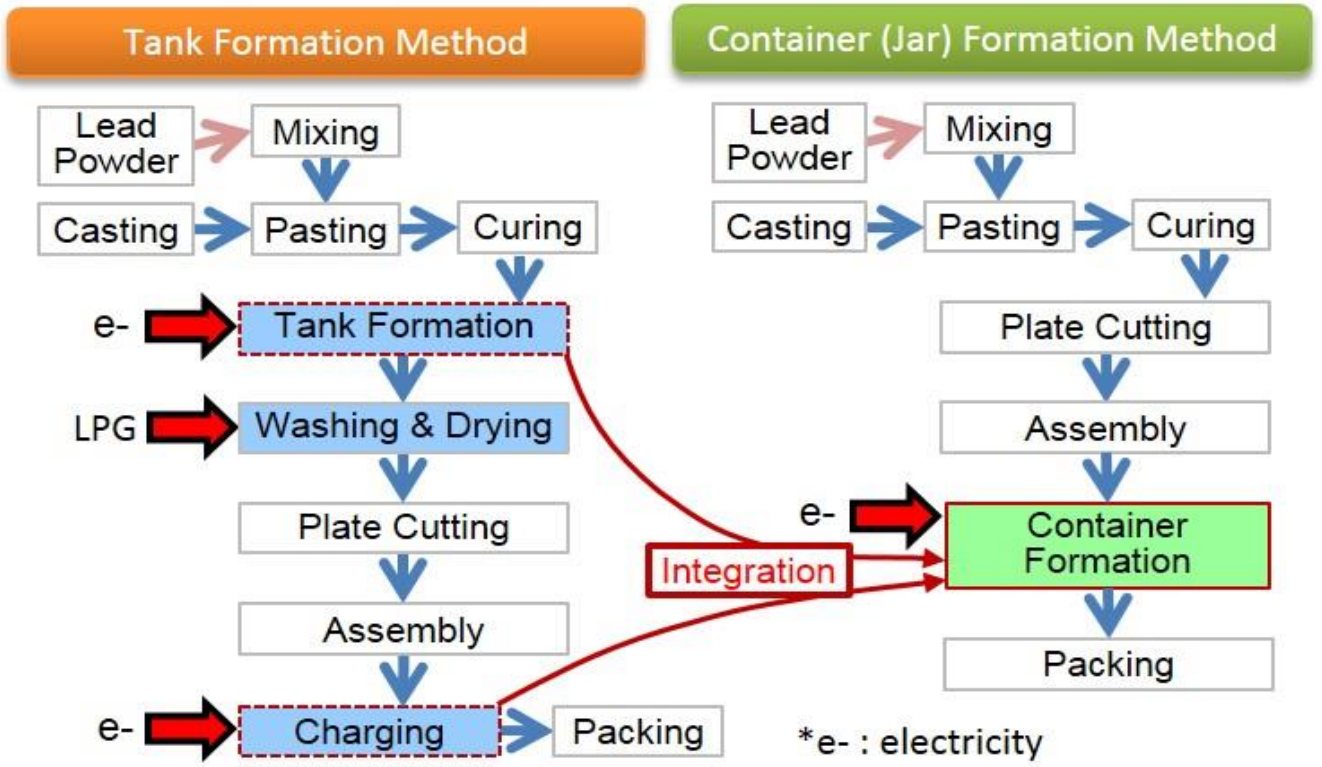
= Reference emission reductions (RE)

− Project emission reductions (PE)

= 7,293.1 [tCO2/year] − 3,467.4 [tCO2/year]

RE: CO2 emissions from battery production with tank formation method

PE: CO2 emissions from battery production with container formation method



# Introduction of Energy-Efficient Air Conditioners in a Lens Factory

Outline of GHG Mitigation Activity

- This project aims to reduce energy consumption of the existing factory which manufactures lens for single-lens reflex camera in the east of Hanoi city, by replacing current air conditioners to more energy-efficient ones. Training for the labours in the factory is planned so as to achieve proper operation and monitoring of the emission.
- Such introduction of the technology could also result in improvement of working environment for the labours, and in turn improvement of quality of the products as well as reduction of maintenance costs.

Expected GHG Emission Reductions

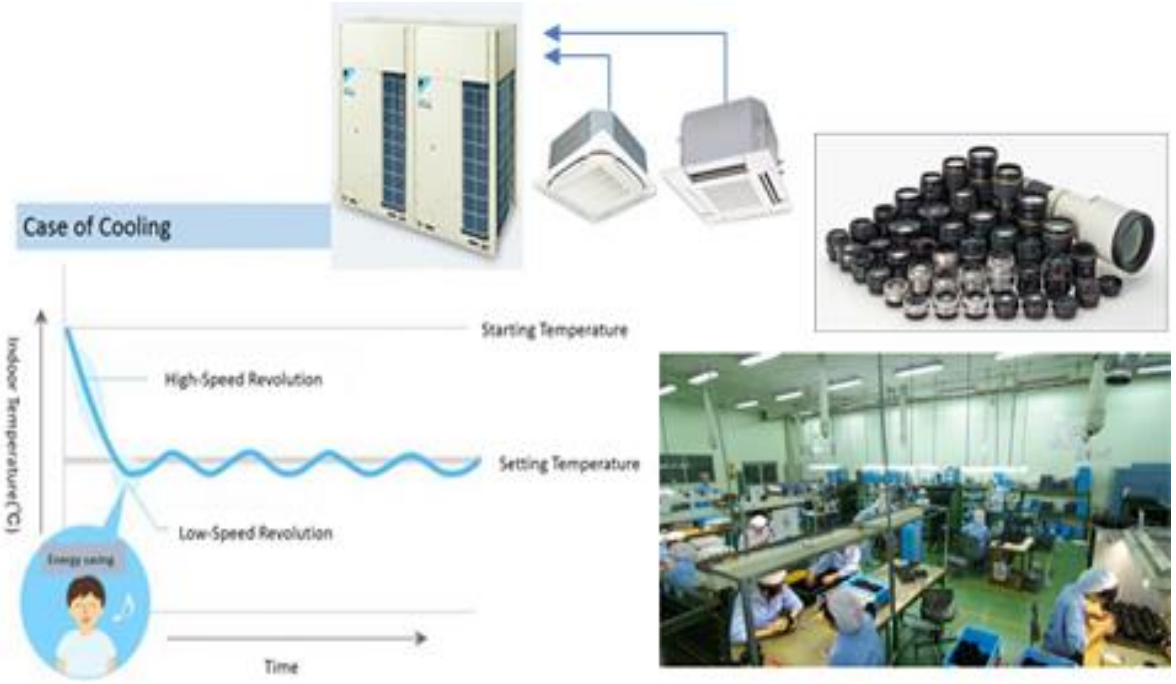
147 tCO2/year

= (Reference CO2 emissions) [tCO2/year]

− (Project CO2 emissions) [tCO2/year]

Reference CO2 emissions: 1,304.6 [tCO2/year]

Project CO2 emissions: 1,156.8 [tCO2/year]



# Introduction of High Efficiency Air-conditioning in Hotel

Outline of GHG Mitigation Activity

- While non-inverter air conditioner with poor energy efficiency is popular in hotels in Vietnam, this project is intended to achieve the energy saving as a whole with the introduction of high efficiency air-conditioning system, which is introduced to the new Novotel Suites in Hanoi (total floor area of about 29,000㎡, 17 floors above ground, two floors underground, 200 rooms), and achieves GHG emission reductions from reducing power consumption with introduction of high efficiency air-conditioning.
- (Equipment performance : COP 4.53, 73.0kW x 1set, COP4.09, 90kW x 12set, COP4.05, 95.0kW x 2set, COP3.29, 109kW x 1set, COP3.27. 125kW x 1set)

Expected GHG Emission Reductions

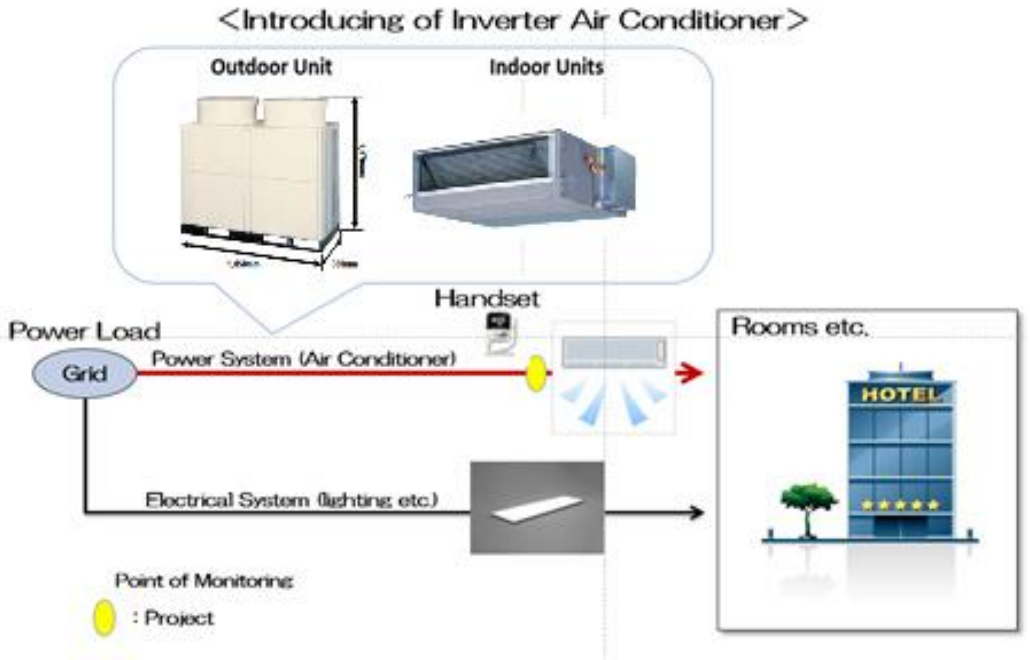
935 tCO2/year

= (Reference CO2 emissions) [tCO2/year]

　　– (Project CO2 emissions) [tCO2/year]

Reference CO2 emissions: 3,052.5 [tCO2/year]

Project CO2 emissions: 2,117.5 [tCO2/year]



# Eco-Driving by Utilizing Digital Tachograph System

Outline of GHG Mitigation Activity

- In this project, 130 trucks in use by NIPPON EXPRESS (VIETNAM) are fitted with an eco-drive improving system using digital tachographs, so that the quantity of fuel consumption, running distance and relevant data on driving behavior of drivers are continuously analyzed with cloud network in Binh Duong and Hanoi city, Vietnam.
- The drivers are given advice in order to improve their driving behavior based on the analyzed data, and feedback linked to the training outcome is provided for further improving the driving behavior.
- This project contributes to realizing improvement of transportation quality as well as fuel efficiency, which is directly linked with reduction in CO2 emissions.

Expected GHG Emission Reductions

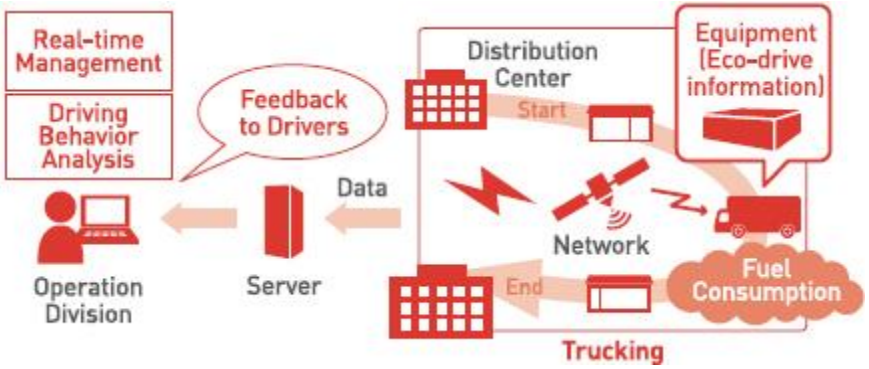
324 tCO2/year

= (Reference CO2 emissions) [tCO2/year]

− (Project CO2 emissions) [tCO2/year]

Reference CO2 emissions: 4,662 [tCO2/year]

Project CO2 emissions: 4,338 [tCO2/year]



環境省　国際協力・環境インフラ戦略室　御中

NTT DATA
Trusted Global Innovator

# 令和元年度低炭素社会実現のための都市間連携事業委託業務
# ベトナム・ハイフォン市低炭素化促進事業（エコインダストリアルパーク構想モデル事業の確立支援事業）／北九州市ーハイフォン市連携事業

2019年12月25日

NTTデータ経営研究所
社会・環境戦略コンサルティングユニット

1. 今年度事業の概要
2. これまでの活動
3. 3つの活動の現状
4. 今後の活動

# 1.　今年度事業の概要

# 1. 北九州市ーハイフォン市　都市間連携事業調査事業概要

**ハイフォン市における工業団地の環境改善によるEco-Industrial Parkの実現目指す**

- パリ協定の目標達成に向けて、都市部における気候変動対策の着実な実施は非常に重要である一方で、ベトナムの工業団地における産業活動についても深刻な環境汚染を引き起こし、人々の健康への脅威となっている。
- ベトナム政府の計画投資省（MPI）は、工業団地をエコインダストリアルパークのモデル候補地として注目し、工業団地地域における環境改善に向けて活動している。
- ハイフォン市では、2014年に北九州市の支援のもと、グリーン成長を促進することを目的に「ハイフォン市グリーン成長推進計画」を策定した。同計画の廃棄物、エネルギー、交通、カットバ島、上下水道・雨水排水、環境保全、グリーン生産の7分野を対象にした個別のプロジェクトの実施が進んでいる。
- 今後、継続したグリーン成長推進計画のパイロットプログラムの継続支援およびエコインダストリアルパーク実現に向けた支援が求められる。

2009年
北九州市・ハイフォン市
友好・協力協定締結

→ 2014年
**北九州市・ハイフォン市　姉妹都市協定締結**
北九州市の支援の下、ハイフォン市グリーン成長推進計画　策定

→ 2015年～
北九州市・ハイフォン市
都市間連携、設備補助事業等　多数

**北九州市** ― 姉妹都市関係 ― **ハイフォン市**

蓄積したノウハウの提供

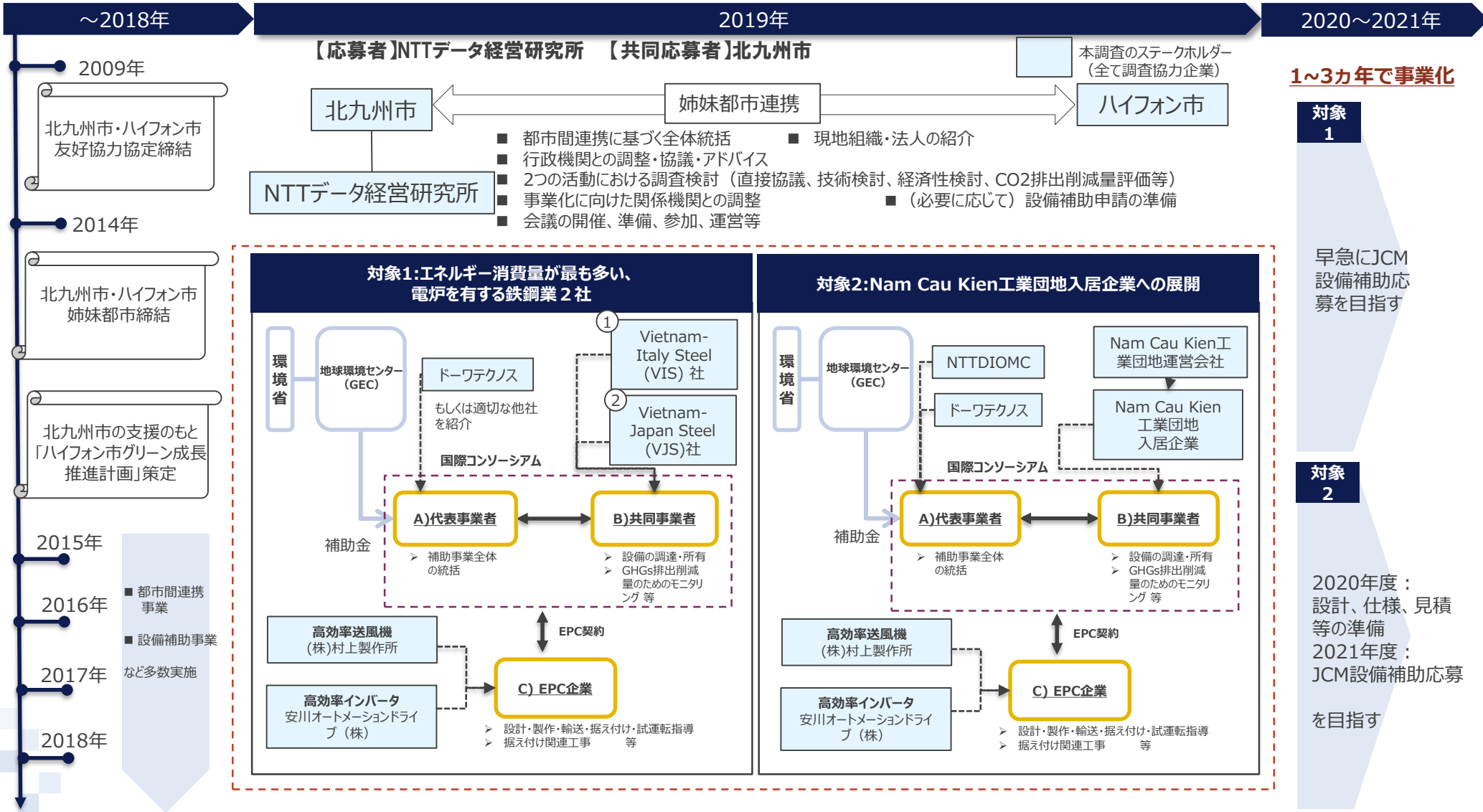
**令和元年度　低炭素社会実現のための都市間連携事業委託業務**

## ハイフォン市Nam Cau Kien工業団地におけるEco-Industrial Parkの実現

| | | |
|---|---|---|
| 対象事業者 | 対象1:エネルギー消費量が最も多い、電炉を有する鉄鋼業２社 | 対象2:Nam Cau Kien工業団地入居企業への展開 |
| 対象設備 | • 高効率送風機＋高圧インバータ<br>• 高効率ポンプ＋高圧インバータ | |
| 実現可能性・優位性など | • Eco-Industrial Parkの実現に向け、ベトナム計画投資省、ハイフォン市、北九州市のMOU締結済<br>• 工場の規模を問わず、どの工場においても送風機はほぼ利用しているため、工業団地の全入居企業に対して実施できれば削減量の拡大が見込める<br>• 設備導入候補企業２社（VIS、VJS）との協議を進めている | |

Nam Cau Kien工業団地

# 2. 北九州市ーハイフォン市間の支援・協力・案件調査等と支援先の全体像



# 2.　これまでの活動

# 3. これまでの活動

| 活動 | 日程 | 概要 | 訪問先 |
|---|---|---|---|
| Nam Cau Kien（NCK）工業団地代表団訪日研修 | 2019年10月23日（水）～10月25日（金） | Nam Cau Kien工業団地運営企業と入居企業10社からなる訪問団によるエコパークの来日研修 | 北九州市環境ミュージアム、アジア低炭素化センター、エコタウンほか |
| 第一回現地調査 | 2019年11月10日（日）～11月15日（金） | MPIに対し今年度活動の説明とEIP構想に関する意見交換。ハイフォン市外務局に対する今年度活動の説明。NCK工業団地入居企業のJCM調査。 | ・計画投資省<br>・ハイフォン市外務局<br>・NCK工業団地運営企業<br>・NCK工業団地入居企業4社 |
| 第二回現地調査 | 2019年12月9日（月）～12月14日（土） | ハイフォン市でのワークショップ参加。NCK工業団地運営企業とのエコ・インダストリアル・パーク構想意見交換。NCK協業団地入居企業JCM調査。DEEP-C工業団地のJCM調査。 | ・ハイフォン市外務局<br>・NCK国業団地運営企業<br>・NCK工業団地入居企業3社<br>・ブリジストン・ベトナム<br>・DEEP-C |

# 4. NCK工業団地訪日研修

**目的：** NCK工業団地運営会社は、同団地のエコ・インダストリアル・パーク（EIP）モデル事業を目指し、現在、環境教育センターの建設中。同運営会社と入居企業10社は、北九州市のエコタウンや各種リサイクル工場を見学し、環境教育センターの運営及びエコタウンとしての企業の活動について学ぶことを目的として来日。

**日程：** 2019年10月24日（木）及び25日（金）

**研修スケジュール：**

| 日程 | 活動内容 |
|---|---|
| 10月24日（木） | 01:20-07:30 ハノイ-福岡（VN356）<br>10:30-12:00 環境ミュージアム<br>（昼食）<br>14:00-16:30 商談会・面談会/水処理ヒアリング（アジア低炭素化センター）<br>14:00-15:00 NCKIPとKITAの面談<br>14:00-15:00 新ケミカル商事㈱殿との面談（Thuy Anh,Lien Minh他）<br>15:00-15:30 VJSとの面談<br>15:30-16:30 ㈱ドーワテクノス殿面談<br>15：00-16：30 JCM設備補助制度及びベトナムでのJCM事例解説 【小倉泊】 |
| 10月25日（金） | 09:00-10:00 エコタウンセンター<br>10:15-10:45 家電リサイクル工場<br>11:00-11:30 OA機器リサイクル工場<br>（昼食）<br>14:00-15:00 プラスチック資源化センター（日明） 【小倉泊】 |

# 4. NCK工業団地訪日研修

- JCM設備補助制度及びベトナムでのJCM事例解説では、以下の3つのテーマで説明を実施
  - JCM設備補助制度の概要
  - ベトナムにおけるJCM設備補助の実例（登録事例の解説）
  - JCM設備補助とエコ・インダストリアル・パーク（EIP）構想の関係
- 実例とその後のEIP構想の関係については、非常に高い興味を持ち、議論が白熱した。


# 5. 第一回現地調査

目的： 現地において関連団体とキックオフミーティングの実施、NCK工業団地内のスクラップ鉄製鉄所におけるJCMのための設備調査、及びその他JCMポテンシャル調査

日程：2019年11月10日（日）～11月15日（金）

スケジュール：

| 日程 | 訪問先 | 活動 |
|---|---|---|
| 11月10日（日） | | ハノイ入り 【ハノイ泊】 |
| 11月11日（月） | 計画投資省 | 今年度調査の説明及び同省とEIP構想の進捗に関する意見交換<br>午後： ハノイ → ハイフォンへ移動 |
| 11月12日（火） | ハイフォン市外務局<br>Vietnam-Italy Steel社 | 今年度調査の説明及び今回の調査の説明<br>JCM事業案件形成のための調査 |
| 11月13日（水） | Vietnam-Italy Steel社<br>Thanh Dai Phu My 社 | JCM事業案件形成のための調査<br>JCMポテンシャル調査 |
| 11月14日（木） | Vietnam-Japan Steel社<br>Lien Minh Import-Export Sevices & Trading社 | JCM事業案件形成のための調査<br>JCMポテンシャル調査<br><br>夕刻： ハイフォン → ハノイへ移動 |
| 11月15日（金） | | ハノイ発 |

# 5. 第一回現地調査

**MPI訪問（11月10日）**

- 今年度調査（NCK工業団地、EIP構想、JCM）の説明
- 12月のハイフォン市でのワークショップ参加の依頼
- EIP構想に関する意見交換
  - NCK工業団地以外の支援の必要性（例：バリア=ブンタオ州の新規工業団地）
  - ガイドライン作成計画
- 2020年1月都市間連携事業セミナー参加の依頼

**ハイフォン市外務局訪問（11月11日）**

- 今年度調査の説明
- 今回の活動の説明
- 2020年1月都市間連携セミナー参加の依頼

# 5.　第一回現地調査

**Vietnam-Italy Steel(VIS)社訪問**

- ◆ 電炉としてアーク炉を採用した鉄スクラップ製鉄所
- ◆ 「高効率送風機＋高圧インバーター」及び「高効率ポンプ＋高圧インバーター」導入JCM事業の調査
- ◆ 安川オートメーションドライブ社　→　高圧インバーター
- ◆ 村上製作所　→　高効率送風機
- ◆ ドーワテクノス　→　高効率ポンプ、取りまとめ

**活動**

- ◆ 上記3社の企業紹介及び導入候補の技術の説明
- ◆ 既存の集塵機及びその関連設備の現地調査
- ◆ 各種文献及びデータの収集

**結果**

- ◆ 「高効率送風機＋高圧インバーター」は実施可能
- ◆ 既設の集塵機関連のデータ不足
- ◆ 既設の性能評価のためのデータ取得依頼

# 5. 第一回現地調査

## Vietnam-Japan Steel(VJS)社訪問

- 電炉として誘導炉を採用した鉄スクラップ製鉄所
- 「高効率送風機＋高圧インバーター」及び「高効率ポンプ＋高圧インバーター」導入JCM事業の調査
- 安川オートメーションドライブ社　→　高圧インバーター
- 村上製作所　→　高効率送風機
- ドーワテクノス　→　高効率ポンプ、取りまとめ

## 活動

- 上記3社の企業紹介及び導入候補の技術の説明
- JCM設備補助制度の説明及び意見交換
- 既存の集塵機及びその関連設備の現地調査
- 結果
- 2基の集塵機は中国製高圧インバーター導入済み
- 2基の集塵機のうち、古い1基に対して「高効率送風機+高圧インバーター」の提案準備、そのためのデータ提供

# 5.　第一回現地調査

**Thanh Dai Phu My 社訪問**

- ◆ 鉄鋼スラグのリサイクル企業
- ◆ JCM制度を用いて、日本製環境設備導入希望
- ◆ 粉塵防止で常に散水　→　排水が回収されていない
- ◆ 工場内に集塵機が設置されていない

→　環境データの取得（水の使用量等）を依頼

Lien Minh Import-Export Sevices & Trading**社訪問**

- ◆ 廃プラスチックのリサイクル企業
- ◆ JCM制度を用いて、日本製環境設備導入希望
- ◆ 工場内の臭気が抜けていない

　→　換気空調系が機能していない

- ◆「高効率送風機＋高圧インバーター」の提案候補
- ◆ 既存の換気空調系設備のデータ取得を依頼

# 6. 第二回現地調査

**目的： ハイフォン市グリーン成長推進計画及びEIP推進のワークショップへの参加、NCK工業団地環境教育センター見学、JCM案件形成のための設備調査、及びその他JCMポテンシャル調査**

**日程：2019年12月9日（月）～12月14日（土）**

**スケジュール：**

| 日程 | 訪問先 | 活動 |
|---|---|---|
| 12月9日（月） | | ハノイ入り、ハノイ → ハイフォンへ移動 |
| 12月10日（火） | ヒューギ・ホテル<br><br>ハイフォン市外務局 | ハイフォン市グリーン成長推進計画の強化とエコインダストリアルパーク推進のためのワークショップ<br>新副局長に対する都市間連携事業の説明及び今回の訪問調査の説明 |
| 12月11日（水） | NCK工業団地環境教育センター<br>NCK工業団地廃水処理センター | 環境教育センターの施設及び設立趣旨の説明及びEIP構想とJCM事業案件形成への意見交換<br>NCK工業団地のEIP構想及びSDGs活動を支援するための課題解決 |
| 12月12日（木） | Vietnam-Italy Steel社<br>Thuy Anh Import Export Service and Treading Investment社<br>Vietnam-Japan Steel社 | JCM事業案件形成のための調査<br>JCMポテンシャル調査<br><br>JCM事業案件形成のための調査 |
| 12月13日（金） | ブリジストン・ベトナム<br>DEEP-C社 | JCMポテンシャル調査<br>JCMポテンシャル調査<br>夕刻： ハイフォン → ハノイへ移動 |
| 12月14日（土） | | ハノイ発 |

# 6.　第二回現地調査

**<u>ハイフォン市グリーン成長推進計画の強化とエコインダストリアルパーク推進のためのワークショップ</u>**

- ハイフォン市外務局　→　北九州市の支援を受け、グリーン成長推進計画（GGPP）を策定してから5年を経てのレビューと今後の活動
- コンポスト事業　→　GGPPで実施されている15の事業の中で最も成功している事例。ビジネス化目前。
- 計画投資省　→　EIP構想の現状と今後。ガイドラインの策定と公表
- NCK工業団地　→　エコ・インダストリアル・パーク構想のモデル事業を目指し、様々な活動を実施。それらを紹介。
- 北九州市　→　エコタウン及びエコタウンセンターの紹介
- J-fils　→　JICA実証事業（有機廃水処理）の紹介
- ドーワテクノス　→　「高効率送風機＋高圧インバーター」導入による省エネルギープロジェクトの紹介

# 6.　第二回現地調査

## Nam Cau Kien工業団地環境教育センター訪問

- ◆ NCK工業団地運営会社スタッフと入居企業に対する環境教育のための施設
- ◆ 北九州市のエコタウンセンターを参考に、文化の違いなどを考慮し、環境教育の拠点を目指す
- ◆ ハイフォン市と提携(MOU)し、同市が環境教育プログラムを提供
- ◆ NCK工業団地として、JCMモデルケースを作りたい

　→　最初は製鉄所。次に、廃プラ・リサイクル工場。

## NCK工業団地廃水処理施設訪問

- ◆ NCK工業団地は拡張工事を実施しており、現在の処理能力では不足する。また、現在、廃水処理がうまく機能していない。

→ BOD濃度が低すぎる　→　活性汚泥法が適用できない

→ 活性汚泥と汚濁物質の量的バランスの管理が重要

# 6.　第二回現地調査

**VIS社訪問**

◆ 既設集塵機の性能データ確認

→　日本より送付した圧力計のレンジが合わず、計測できず。

→　VIS社がデジタル圧力計を購入し、計測を約束。年内の測定目標。

**Thuy Anh Import Export Service and Treading Investment社訪問**

◆ 廃プラ・リサイクル工場の新設を計画。JCMを活用し、日本製設備を導入希望

→　日本のベンダーによる廃プラ・リサイクルパッケージの提案を検討

**VJS社訪問**

◆ 集塵機リプレイスについて議論

→　集塵機関連の図面・データ受領

JCM活用して、誘導炉のリプレイスができないか要望あり

→　対応を検討

# 6. 第二回現地調査

## ブリジストン・ベトナム訪問

- ◆ 1年半ほど前、バイオマス発電事業計画を検討しており、JCM活用について議論したものの、当時は見送ることとなった
- ◆ 計画変更等を重ね、事業実施に進むということで、JCM活用について議論することとなった
  - → すでに、設備メーカー等の入札段階にあり、JCM活用に伴う計画の遅れ等が見込まれるため、活用は難しい。
- ◆ 新規の屋根置き型太陽光発電事業を計画中、こちらでJCM活用を考えたい。設備提案を希望する。
  - → 次回の訪問時に提案する。

## DEEP-C訪問

- ◆ NCK工業団地と同様、エコ・インダストリアル・パーク構想モデル事業を目指している。
- ◆ 太陽光発電と風力発電を組み合わせた再生可能エネルギー事業を計画中であり、それに対してJCM活用を考えたい
  - → 費用対効果の検討用資料を提供

# 3.　3つの活動の現状

# 7.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

**Vietnam-Italy Steel社（アーク炉）**

- ①「高効率送風機＋高圧インバータ」導入は費用対効果が高く、VIS社も希望
- ②「高効率ポンプ＋高圧インバータ」導入は費用対効果がそれほど見込めないため見送り
- ①のJCM化のため、既設の集塵システムの情報収集を行ったところ、設計図書等が存在しないことが判明
- 現在の性能評価のため、必要パラメータの実測を実施　→　設計提案及びリファレンスケースの設定

**Vietnam-Japan Steel社（誘導炉）**

- 工場施設そのものが新しく、対象となりうるのは2基ある集塵システムのうちの1基のみ。
- 第二回現地調査にて、集塵システム関連の資料を入手。設計提案へ。
- 中国製誘導炉の故障が多いため、日本製へリプレイスを検討したいという依頼あり　→　設備提案のための検討を実施

# 8. 活動2: Nam Cau Kien工業団地入居企業への①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

**Thanh Dai Phu My社（鉄鋼スラグリサイクル企業）**

- 集塵設備なし
- 粉塵防止のため常に散水 → 排水の回収も行われていない
  → 環境データ（水の使用量等）の記録を依頼

**Lien Minh Import-Export Services & Trading社（廃プラリサイクル企業）**

- 工場内に強い臭気 → 換気空調系が機能していない
- ①「高効率送風機＋高圧インバータ」導入候補
- 既存の換気空調系設備の運転データの記録を依頼

**Thy Anh Import-Export Service and Trading Investment社（廃プラリサイクル企業）**

- 廃プラリサイクル工場の増設にJCMを活用して日本製設備の導入を希望
- 日本の廃プラリサイクル工場とNCK工業団地の廃プラリサイクル工場の違い
- 日本型のリサイクル工場のパッケージ化提案と省エネ効果の算定

# 9. 活動3:エコインダストリアルパークのモデルとなることを目指すNam Cau Kien工業団地に対するSDGsへの貢献活動の支援の実施

**Nam Cau Kien工業団地の課題**

- 排水処理施設の容量不足
- 入居企業の環境データあるいは運転データの取得状況
- リサイクル工場の簡易的な設備と近代化
- 工場内廃棄物の処理
- 大気汚染や工場内環境の改善

**課題解決へ向けて**

- 排水処理施設への助言(KITAの専門家による)
- 環境教育センター活動への助言(北九州市アジア低炭素化センターの支援)
- エコインダストリアルパーク構想に対する理解及びSDGsに対する理解の促進
- JCM設備補助制度を活用するための理解の推進

# 4. 今後の活動

# 10.　今後の活動

## 第三回現地調査(2020年2月上旬予定)

- VIS社：　製鉄所集塵機のリプレイスに対する設計提案及びJCM設備補助制度活用の説明
- VJS社：　製鉄所集塵機に対する設備提案及び誘導炉リプレイスに関する設備提案
- NCK工業団地入居企業：　環境データ取得状況の確認
- ブリジストン・ベトナム：　屋根置き型太陽光発電システムの提案
- DEEP-C: 「太陽光発電＋風力発電」による再生可能エネルギー事業のJCM設備補助適用に関する協議
- ハイフォン市カットビ空港：　省エネルギー事業を中心としたJCM設備補助活用の提案
- NCk工業団地：エコインダストリアルパーク構想及び環境教育センター運営に関する協議

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環境省　国際協力・環境インフラ戦略室　御中

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# 令和元年度低炭素社会実現のための都市間連携事業委託業務
# ベトナム・ハイフォン市低炭素化促進事業（エコインダストリアルパーク構想モデル事業の確立支援事業）／北九州市ーハイフォン市連携事業

2020年2月27日

NTTデータ経営研究所
社会・環境戦略コンサルティングユニット

1. 今年度事業の概要
2. これまでの活動
3. 3つの活動の現状
4. 今後の活動

# 1.　今年度事業の概要

# 1. 北九州市ーハイフォン市　都市間連携事業調査事業概要

**ハイフォン市における工業団地の環境改善によるEco-Industrial Parkの実現目指す**

- パリ協定の目標達成に向けて、都市部における気候変動対策の着実な実施は非常に重要である一方で、ベトナムの工業団地における産業活動についても深刻な環境汚染を引き起こし、人々の健康への脅威となっている。
- ベトナム政府の計画投資省（MPI）は、工業団地をエコインダストリアルパークのモデル候補地として注目し、工業団地地域における環境改善に向けて活動している。
- ハイフォン市では、2014年に北九州市の支援のもと、グリーン成長を促進することを目的に「ハイフォン市グリーン成長推進計画」を策定した。同計画の廃棄物、エネルギー、交通、カットバ島、上下水道・雨水排水、環境保全、グリーン生産の7分野を対象にした個別のプロジェクトの実施が進んでいる。
- 今後、継続したグリーン成長推進計画のパイロットプログラムの継続支援およびエコインダストリアルパーク実現に向けた支援が求められる。

2009年
北九州市・ハイフォン市
友好・協力協定締結

→ 2014年
**北九州市・ハイフォン市　姉妹都市協定締結**
北九州市の支援の下、ハイフォン市グリーン成長推進計画　策定

→ 2015年～
北九州市・ハイフォン市
都市間連携、設備補助事業等　多数

**北九州市** ― 姉妹都市関係 ― **ハイフォン市**

蓄積したノウハウの提供

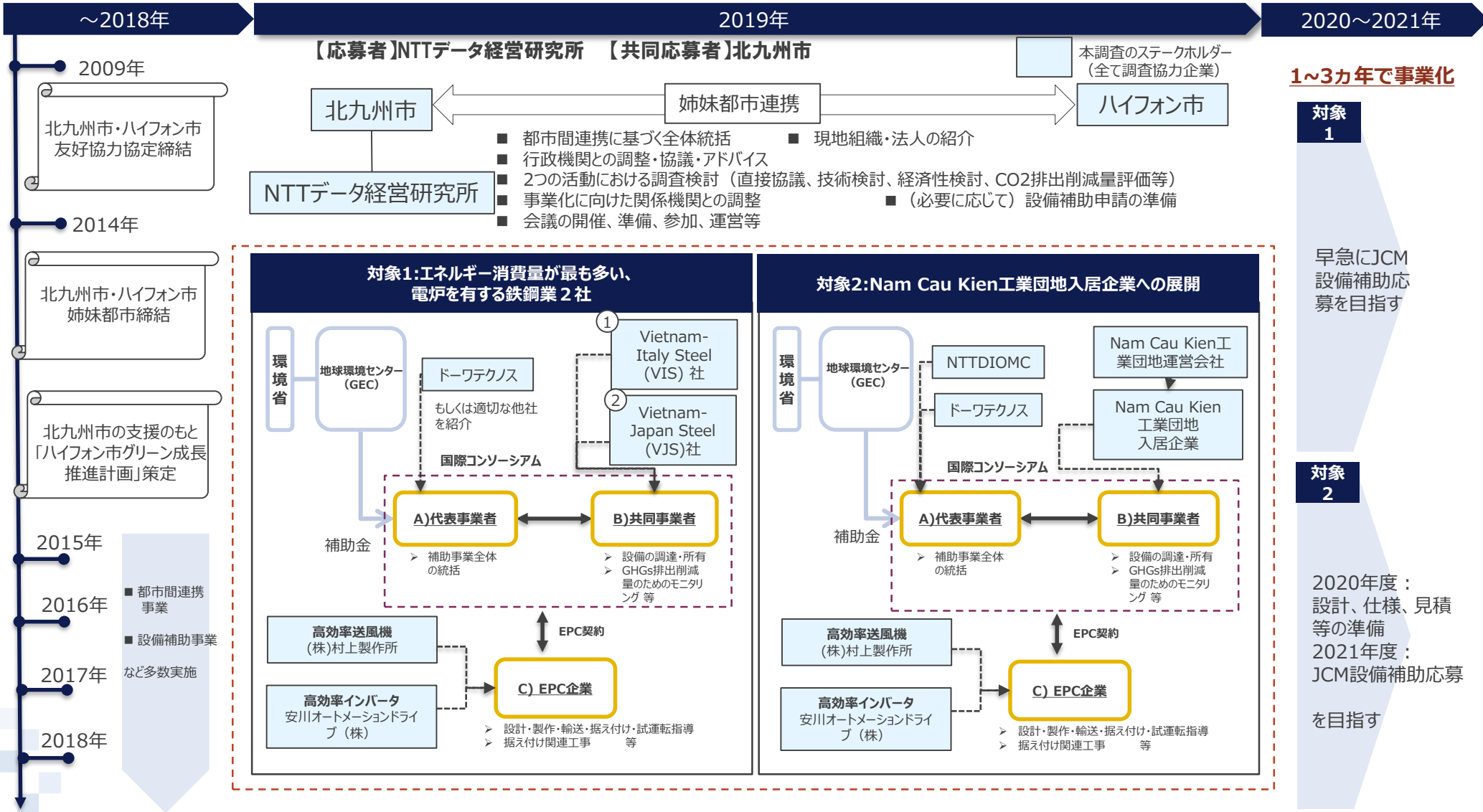
**令和元年度　低炭素社会実現のための都市間連携事業委託業務**

## ハイフォン市Nam Cau Kien工業団地におけるEco-Industrial Parkの実現

| | | |
|---|---|---|
| 対象事業者 | 対象1:エネルギー消費量が最も多い、電炉を有する鉄鋼業２社 | 対象2:Nam Cau Kien工業団地入居企業への展開 |
| 対象設備 | • 高効率送風機＋高圧インバータ<br>• 高効率ポンプ＋高圧インバータ | |
| 実現可能性・優位性など | • Eco-Industrial Parkの実現に向け、ベトナム計画投資省、ハイフォン市、北九州市のMOU締結済<br>• 工場の規模を問わず、どの工場においても送風機はほぼ利用しているため、工業団地の全入居企業に対して実施できれば削減量の拡大が見込める<br>• 設備導入候補企業２社（VIS、VJS）との協議を進めている | |

Nam Cau Kien工業団地

# 2. 北九州市ーハイフォン市間の支援・協力・案件調査等と支援先の全体像



# 2.　これまでの活動

# 3. これまでの活動

## 12月25日の中間報告以前の活動

| 活動 | 日程 | 概要 | 訪問先 |
|---|---|---|---|
| Nam Cau Kien（NCK）工業団地代表団訪日研修 | 2019年10月23日（水）～10月25日（金） | Nam Cau Kien工業団地運営企業と入居企業10社からなる訪問団によるエコパークの来日研修 | 北九州市環境ミュージアム、アジア低炭素化センター、エコタウンほか |
| 第一回現地調査 | 2019年11月10日（日）～11月15日（金） | MPIに対し今年度活動の説明とEIP構想に関する意見交換。ハイフォン市外務局に対する今年度活動の説明。NCK工業団地入居企業のJCM調査。 | ・計画投資省<br>・ハイフォン市外務局<br>・NCK工業団地運営企業<br>・NCK工業団地入居企業4社 |
| 第二回現地調査 | 2019年12月9日（月）～12月14日（土） | ハイフォン市でのワークショップ参加。NCK工業団地運営企業とのエコ・インダストリアル・パーク構想意見交換。NCK協業団地入居企業JCM調査。DEEP-C工業団地のJCM調査。 | ・ハイフォン市外務局<br>・NCK国業団地運営企業<br>・NCK工業団地入居企業3社<br>・ブリジストン・ベトナム<br>・DEEP-C |

# 3. これまでの活動

## 12月25日の中間報告以後の活動

| 活動 | 日程 | 概要 | 訪問先 |
|---|---|---|---|
| 都市間連携セミナー | 2020年1月14日（火）～1月17日（金） | MPI及びハイフォン市外務局から1名ずつの招待者に加え、ハイフォン市から5名の自費出席者、MPIから1名の招聘者が北九州市での研修及び東京でのセミナーに参加 | 北九州市環境ミュージアム、アジア低炭素化センター、エコタウンほか<br>都市間連携セミナー会場（品川プリンスホテル）ほか |
| 第三回現地調査 | 2020年2月17日（月）～2月22日（金） | VIS社に対する「高効率送風機＋高圧インバータ」の提案、VJS社の電炉電源改善調査、DEEP-Cの新エネ事業調査、ブリジストンの新エネ事業調査、カットビ空港省エネ事業調査、山九ロジスティクス・ベトナムの電動海運の調査 | ・ハイフォン市外務局<br>・NCK工業団地<br>・VIS社<br>・VJS社<br>・カットビ空港<br>・DEEP-C<br>・ブリジストン・ベトナム<br>・山九ベトナム |

# 4. NCK工業団地訪日研修

**目的：** NCK工業団地運営会社は、同団地のエコ・インダストリアル・パーク（EIP）モデル事業を目指し、現在、環境教育センターの建設中。同運営会社と入居企業10社は、北九州市のエコタウンや各種リサイクル工場を見学し、環境教育センターの運営及びエコタウンとしての企業の活動について学ぶことを目的として来日。

**日程：** 2019年10月24日（木）及び25日（金）

**研修スケジュール：**

| 日程 | 活動内容 |
|---|---|
| 10月24日（木） | 01:20-07:30 ハノイ-福岡（VN356）<br>10:30-12:00 環境ミュージアム<br>（昼食）<br>14:00-16:30 商談会・面談会/水処理ヒアリング（アジア低炭素化センター）<br>14:00-15:00 NCKIPとKITAの面談<br>14:00-15:00 新ケミカル商事㈱殿との面談（Thuy Anh,Lien Minh他）<br>15:00-15:30 VJSとの面談<br>15:30-16:30 ㈱ドーワテクノス殿面談<br>15：00-16：30 JCM設備補助制度及びベトナムでのJCM事例解説 【小倉泊】 |
| 10月25日（金） | 09:00-10:00 エコタウンセンター<br>10:15-10:45 家電リサイクル工場<br>11:00-11:30 OA機器リサイクル工場<br>（昼食）<br>14:00-15:00 プラスチック資源化センター（日明） 【小倉泊】 |

# 4. NCK工業団地訪日研修

- JCM設備補助制度及びベトナムでのJCM事例解説では、以下の3つのテーマで説明を実施
  - JCM設備補助制度の概要
  - ベトナムにおけるJCM設備補助の実例（登録事例の解説）
  - JCM設備補助とエコ・インダストリアル・パーク（EIP）構想の関係
- 実例とその後のEIP構想の関係については、非常に高い興味を持ち、議論が白熱した。


# 5. 第一回現地調査

目的： 現地において関連団体とキックオフミーティングの実施、NCK工業団地内のスクラップ鉄製鉄所におけるJCMのための設備調査、及びその他JCMポテンシャル調査

日程：2019年11月10日（日）～11月15日（金）

スケジュール：

| 日程 | 訪問先 | 活動 |
|---|---|---|
| 11月10日（日） | | ハノイ入り　【ハノイ泊】 |
| 11月11日（月） | 計画投資省 | 今年度調査の説明及び同省とEIP構想の進捗に関する意見交換<br>午後： ハノイ → ハイフォンへ移動 |
| 11月12日（火） | ハイフォン市外務局<br>Vietnam-Italy Steel社 | 今年度調査の説明及び今回の調査の説明<br>JCM事業案件形成のための調査 |
| 11月13日（水） | Vietnam-Italy Steel社<br>Thanh Dai Phu My 社 | JCM事業案件形成のための調査<br>JCMポテンシャル調査 |
| 11月14日（木） | Vietnam-Japan Steel社<br>Lien Minh Import-Export Sevices & Trading社 | JCM事業案件形成のための調査<br>JCMポテンシャル調査<br><br>夕刻： ハイフォン → ハノイへ移動 |
| 11月15日（金） | | ハノイ発 |

# 5. 第一回現地調査

**MPI訪問（11月10日）**

- 今年度調査（NCK工業団地、EIP構想、JCM）の説明
- 12月のハイフォン市でのワークショップ参加の依頼
- EIP構想に関する意見交換
  - NCK工業団地以外の支援の必要性（例：バリア=ブンタオ州の新規工業団地）
  - ガイドライン作成計画
- 2020年1月都市間連携事業セミナー参加の依頼

**ハイフォン市外務局訪問（11月11日）**

- 今年度調査の説明
- 今回の活動の説明
- 2020年1月都市間連携セミナー参加の依頼

# 5.　第一回現地調査

**Vietnam-Italy Steel(VIS)社訪問**

- ◆ 電炉としてアーク炉を採用した鉄スクラップ製鉄所
- ◆ 「高効率送風機＋高圧インバーター」及び「高効率ポンプ＋高圧インバーター」導入JCM事業の調査
- ◆ 安川オートメーションドライブ社　→　高圧インバーター
- ◆ 村上製作所　→　高効率送風機
- ◆ ドーワテクノス　→　高効率ポンプ、取りまとめ

**活動**

- ◆ 上記3社の企業紹介及び導入候補の技術の説明
- ◆ 既存の集塵機及びその関連設備の現地調査
- ◆ 各種文献及びデータの収集

**結果**

- ◆ 「高効率送風機＋高圧インバーター」は実施可能
- ◆ 既設の集塵機関連のデータ不足
- ◆ 既設の性能評価のためのデータ取得依頼

# 5. 第一回現地調査

**Vietnam-Japan Steel(VJS)社訪問**

- ◆ 電炉として誘導炉を採用した鉄スクラップ製鉄所
- ◆ 「高効率送風機＋高圧インバーター」及び「高効率ポンプ＋高圧インバーター」導入JCM事業の調査
- ◆ 安川オートメーションドライブ社 → 高圧インバーター
- ◆ 村上製作所 → 高効率送風機
- ◆ ドーワテクノス → 高効率ポンプ、取りまとめ

**活動**

- ◆ 上記3社の企業紹介及び導入候補の技術の説明
- ◆ JCM設備補助制度の説明及び意見交換
- ◆ 既存の集塵機及びその関連設備の現地調査
- ◆ 結果
- ◆ 2基の集塵機は中国製高圧インバーター導入済み
- ◆ 2基の集塵機のうち、古い1基に対して「高効率送風機+高圧インバーター」の提案準備、そのためのデータ提供

# 5.　第一回現地調査

**Thanh Dai Phu My 社訪問**

- ◆ 鉄鋼スラグのリサイクル企業
- ◆ JCM制度を用いて、日本製環境設備導入希望
- ◆ 粉塵防止で常に散水　→　排水が回収されていない
- ◆ 工場内に集塵機が設置されていない

→　環境データの取得（水の使用量等）を依頼

Lien Minh Import-Export Sevices & Trading**社訪問**

- ◆ 廃プラスチックのリサイクル企業
- ◆ JCM制度を用いて、日本製環境設備導入希望
- ◆ 工場内の臭気が抜けていない

　→　換気空調系が機能していない

- ◆「高効率送風機＋高圧インバーター」の提案候補
- ◆ 既存の換気空調系設備のデータ取得を依頼

# 6. 第二回現地調査

**目的： ハイフォン市グリーン成長推進計画及びEIP推進のワークショップへの参加、NCK工業団地環境教育センター見学、JCM案件形成のための設備調査、及びその他JCMポテンシャル調査**

**日程：2019年12月9日（月）～12月14日（土）**

**スケジュール：**

| 日程 | 訪問先 | 活動 |
|---|---|---|
| 12月9日（月） | | ハノイ入り、ハノイ → ハイフォンへ移動 |
| 12月10日（火） | ヒューギ・ホテル<br><br>ハイフォン市外務局 | ハイフォン市グリーン成長推進計画の強化とエコインダストリアルパーク推進のためのワークショップ<br>新副局長に対する都市間連携事業の説明及び今回の訪問調査の説明 |
| 12月11日（水） | NCK工業団地環境教育センター<br>NCK工業団地廃水処理センター | 環境教育センターの施設及び設立趣旨の説明及びEIP構想とJCM事業案件形成への意見交換<br>NCK工業団地のEIP構想及びSDGs活動を支援するための課題解決 |
| 12月12日（木） | Vietnam-Italy Steel社<br>Thuy Anh Import Export Service and Treading Investment社<br>Vietnam-Japan Steel社 | JCM事業案件形成のための調査<br>JCMポテンシャル調査<br><br>JCM事業案件形成のための調査 |
| 12月13日（金） | ブリジストン・ベトナム<br>DEEP-C社 | JCMポテンシャル調査<br>JCMポテンシャル調査<br>夕刻： ハイフォン → ハノイへ移動 |
| 12月14日（土） | | ハノイ発 |

# 6.　第二回現地調査

**ハイフォン市グリーン成長推進計画の強化とエコインダストリアルパーク推進のためのワークショップ**

- ハイフォン市外務局　→　北九州市の支援を受け、グリーン成長推進計画（GGPP）を策定してから5年を経てのレビューと今後の活動
- コンポスト事業　→　GGPPで実施されている15の事業の中で最も成功している事例。ビジネス化目前。
- 計画投資省　→　EIP構想の現状と今後。ガイドラインの策定と公表
- NCK工業団地　→　エコ・インダストリアル・パーク構想のモデル事業を目指し、様々な活動を実施。それらを紹介。
- 北九州市　→　エコタウン及びエコタウンセンターの紹介
- J-fils　→　JICA実証事業（有機廃水処理）の紹介
- ドーワテクノス　→　「高効率送風機＋高圧インバーター」導入による省エネルギープロジェクトの紹介

# 6.　第二回現地調査

## Nam Cau Kien工業団地環境教育センター訪問

- ◆ NCK工業団地運営会社スタッフと入居企業に対する環境教育のための施設
- ◆ 北九州市のエコタウンセンターを参考に、文化の違いなどを考慮し、環境教育の拠点を目指す
- ◆ ハイフォン市と提携(MOU)し、同市が環境教育プログラムを提供
- ◆ NCK工業団地として、JCMモデルケースを作りたい

　→　最初は製鉄所。次に、廃プラ・リサイクル工場。

## NCK工業団地廃水処理施設訪問

- ◆ NCK工業団地は拡張工事を実施しており、現在の処理能力では不足する。また、現在、廃水処理がうまく機能していない。

→ BOD濃度が低すぎる　→　活性汚泥法が適用できない

→ 活性汚泥と汚濁物質の量的バランスの管理が重要

# 6.　第二回現地調査

**VIS社訪問**

◆ 既設集塵機の性能データ確認

→ 日本より送付した圧力計のレンジが合わず、計測できず。

→ VIS社がデジタル圧力計を購入し、計測を約束。年内の測定目標。

**Thuy Anh Import Export Service and Treading Investment社訪問**

◆ 廃プラ・リサイクル工場の新設を計画。JCMを活用し、日本製設備を導入希望

→ 日本のベンダーによる廃プラ・リサイクルパッケージの提案を検討

**VJS社訪問**

◆ 集塵機リプレイスについて議論

→ 集塵機関連の図面・データ受領

JCM活用して、誘導炉のリプレイスができないか要望あり

→ 対応を検討

# 6. 第二回現地調査

## ブリジストン・ベトナム訪問

- ◆ 1年半ほど前、バイオマス発電事業計画を検討しており、JCM活用について議論したものの、当時は見送ることとなった
- ◆ 計画変更等を重ね、事業実施に進むということで、JCM活用について議論することとなった
  - → すでに、設備メーカー等の入札段階にあり、JCM活用に伴う計画の遅れ等が見込まれるため、活用は難しい。
- ◆ 新規の屋根置き型太陽光発電事業を計画中、こちらでJCM活用を考えたい。設備提案を希望する。
  - → 次回の訪問時に提案する。

## DEEP-C訪問

- ◆ NCK工業団地と同様、エコ・インダストリアル・パーク構想モデル事業を目指している。
- ◆ 太陽光発電と風力発電を組み合わせた再生可能エネルギー事業を計画中であり、それに対してJCM活用を考えたい
  - → 費用対効果の検討用資料を提供

# 7. 第三回現地調査

目的： VIS社への「高効率送風機＋高圧インバータ」の設計提案と議論、VJS社との誘導炉の省エネルギー事業に関する議論、その他JCM案件のポテンシャル調査、NCK工業団地のエコ・インダストリアル・パーク化に関する議論

日程：2020年2月17日（月）～2月22日（土）

スケジュール：

| 日程 | 訪問先 | 活動 |
|---|---|---|
| 2月17日（月） | | ハノイ入り、ハノイ → ハイフォンへ移動 |
| 2月18日（火） | ハイフォン市外務局<br><br>VIS社フンイェン工場 | 副局長に対する今回の訪問調査の説明、NCK工業団地のエコ・インダストリアル・パーク化に関する議論<br>「高効率送風機＋高圧インバータ」の提案と内容の説明 |
| 2月19日（水） | VJS社<br>NCK工業団地<br><br>カットビ空港 | 誘導炉リプレイスに関する議論<br>NCK工業団地内でのJCMの展開に関する議論、エコ・インダストリアル・パーク化のための議論<br>JCM設備補助事業の紹介、空港におけるJCM適用事業例の紹介 |
| 2月20日（木） | 山九ベトナム社<br>DEEP-C | JCM設備補助事業の紹介と電動海上輸送船に関する意見交換<br>DEEP-Cの再生可能エネルギー事業のJCM利用に関する議論及び候補地の現地調査 |
| 2月21日（金） | ブリジストン・ベトナム | 同社の再生可能エネルギー事業へのJCM設備補助適用に関する議論 |
| 2月22日（土） | | ハノイ発 |

# 7. 第三回現地調査

ハイフォン市外務局（2月18日）

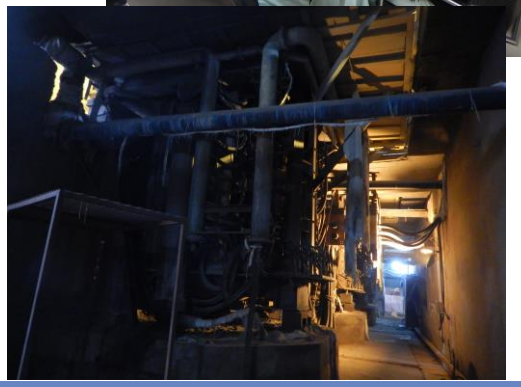
- 第三回出張の活動内容の説明
- カットビ空港での省エネルギー及びJCM適用に関する議論
- NCK工業団地のエコ・インダストリアル・パーク化に関する議論

VIS社フンイェン工場

- 「高効率送風機＋高圧インバータ」の見積・仕様の提案
- 追加のデータ計測に関する議論
- フンイェン工場で実施されている製鉄の下工程（圧延工程）の見学

VJS社

- 誘導炉のリプレイスに関する議論
- 誘導炉電源の効率化に関する議論
- 誘導炉電源系の現地踏査



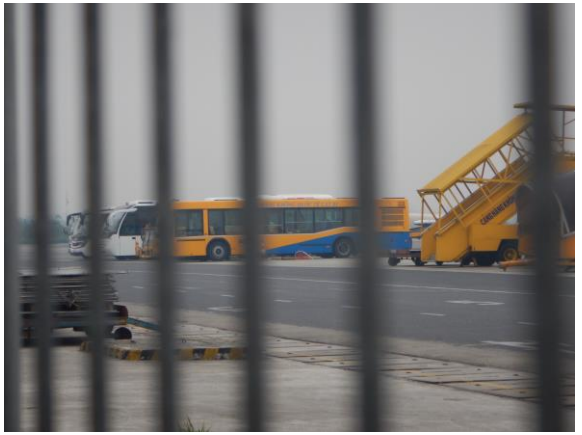
# 7. 第三回現地調査

NCK工業団地

- Nam Cau Kienクラブ発足式への出席
- 太陽光発電システム導入に関する議論
- 鉄鋼2社以外の入居企業のJCM活用に関する議論
- エコ・インダストリアル・パーク構想に関する議論

カットビ空港

- JCM設備補助制度の紹介
- 空港におけるJCM適用可能な省エネ技術等の紹介



# 7. 第三回現地調査

<u>山九ベトナム</u>

JCM設備補助制度の紹介

同社が検討中の電動コンテナ船の構想についての議論

<u>DEEP-C</u>

JCM設備補助制度の詳細解説

DEEP-C工業団地事業の詳細解説

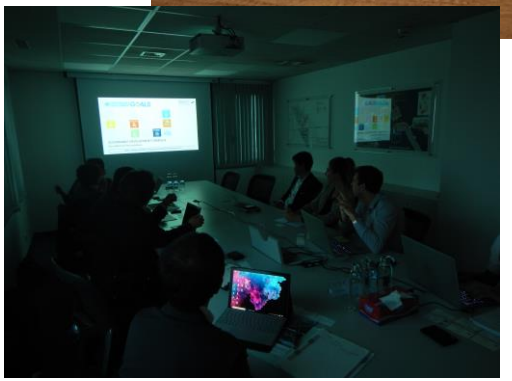
DEEP-Cの再生可能エネルギー事業の説明とJCM適用に関する議論

DEEP-C工業団地における太陽光実証設備及び立地候補地見学

<u>ブリジストン・ベトナム</u>

バイオマス燃料利用に関するJCM適用に関する議論

屋根置き太陽光発電に関する議論

# 3.　3つの活動の現状

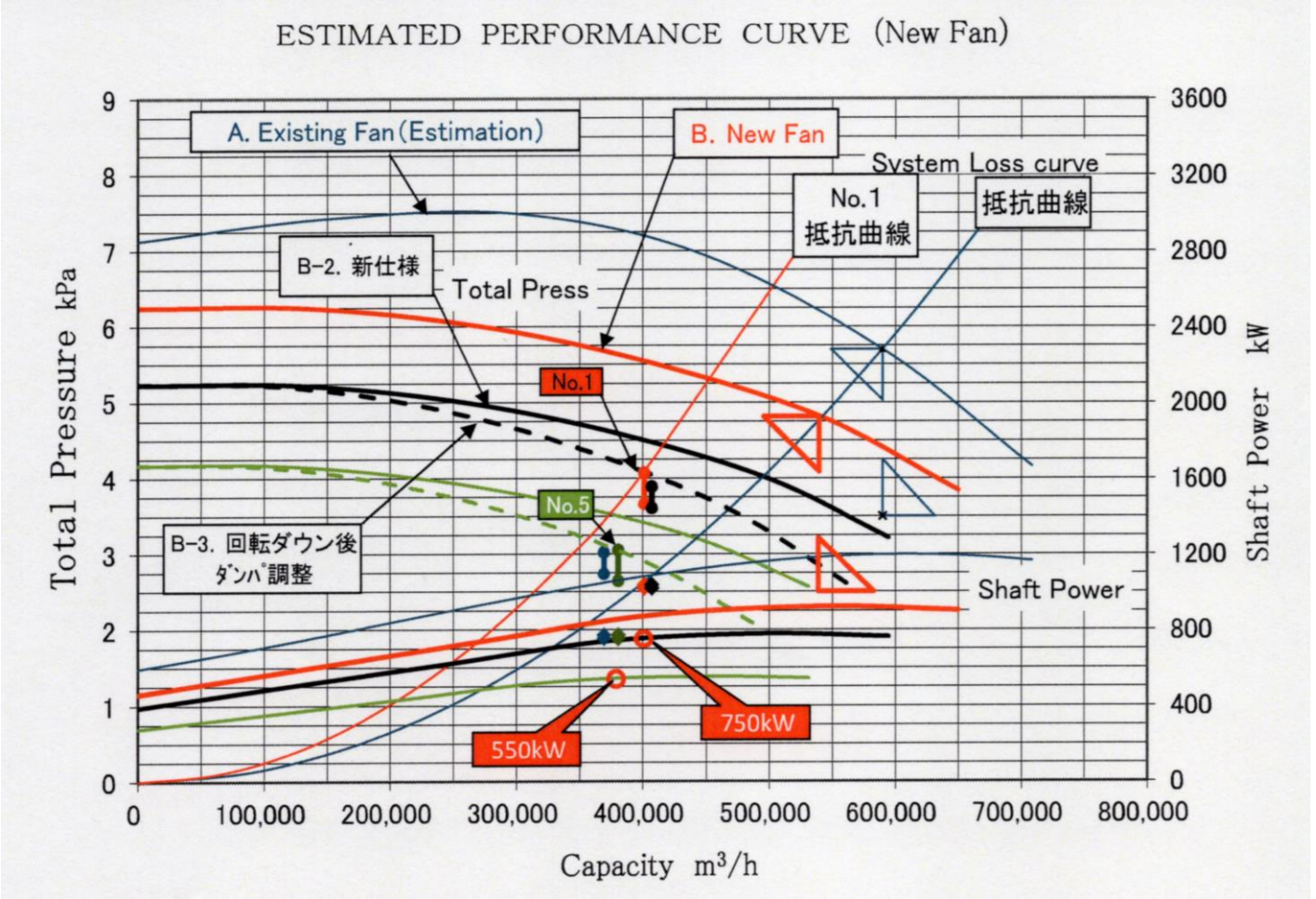
# 8.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

**Vietnam-Italy Steel社（アーク炉）**

- ①「高効率送風機＋高圧インバータ」導入は費用対効果が高く、VIS社も希望
- ②「高効率ポンプ＋高圧インバータ」導入は費用対効果がそれほど見込めないため見送り
- ①のJCM化のため、既設の集塵システムの情報収集を行ったところ、設計図書等が存在しないことが判明
- 現在の性能評価のため、必要パラメータの実測を実施　←　目的：設計提案及びリファレンスケースの設定
- VIS社が、停止時に風量、圧力等について計測
- 既設の性能曲線等の想定、新設送風機の設計

# 8.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

## 既設の送風機及び新設送風機の性能曲線



# 8.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

## 既設及び新設のファンの仕様

| 項目 | 既設送風機 | 新設送風機（案） |
|---|---|---|
| ファン定格流量（m3/h） | 590,000 | 540,000 |
| ファン定格圧力（kPa） | 5.7 | 4.8 |
| 電動機容量（kW） | 1,400 | 1,000 |
| 電動機定格回転数（/m） | 985 | 920 |
| 電動機定格電流（A） | 158 | 121 |
| 電動機効率（－） | 0.89 | 0.95 |
| データ測定時の流体温度（℃） | 20 | N/A |
| 操業時の流体温度（℃） | 85 | 85 |
| インバータ効率（－） | N/A | 0.95 |
| ファン効率（－） | N/A | 0.72<br>（400,000 m3h、85℃） |

# 8.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

$$\mathrm{Pd} = \frac{QH}{3600\eta_f\eta_m}$$ ：送風機軸動力の基本式

$$\mathrm{Pi} = \frac{(Q/Q_0)3}{3600\eta_f\eta_m\eta_i} \times Q_0H_0$$ ：インバータ制御時の送風機軸動力の基本式

Pd：　軸動力（kW）
Q：　流量（m3/h）
H：　圧力（kPa）
ηf：　ファン効率（ー）（流量依存）
ηm：　モーター効率（ー）
Pi：インバータ出力動力（kW）
Q0：ファン定格流量（m3/h）
H0：ファン定格圧力（kPa）
ηi：インバータ効率（ー）

# 8.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

## 省エネルギー量の試算

| ファン | 既設の測定データ | | | | | | プロジェクト実施後の省エネ効果 | | |
|---|---|---|---|---|---|---|---|---|---|
| | 流量 (m3/h) | 圧力 (kPa) | 回転数 (/min) | モーター電流 (A) | 軸動力 (kW) | 85℃換算軸動力 (kW) | 軸動力 (kW) | 軸動力省エネ分 (kW) | 省エネルギー量 (kWh) |
| No.1 | 401,300 | 4.07 | 721 | 116 | 1028 | 841 | 455 | 386 | 1,852,800 |
| No.2 | 407,340 | 3.89 | 727 | 116 | 1028 | 841 | 476 | 365 | 1,752,000 |

## CO2排出削減効果の試算

**ベトナムの系統電力CO2排出原単位:**0.8154 t-CO2/MWh

[3,604,800(kWh)／1,000 (kWh/MWh)]×0.8154 (t-CO2/MWh)＝2,939 t-CO2/年

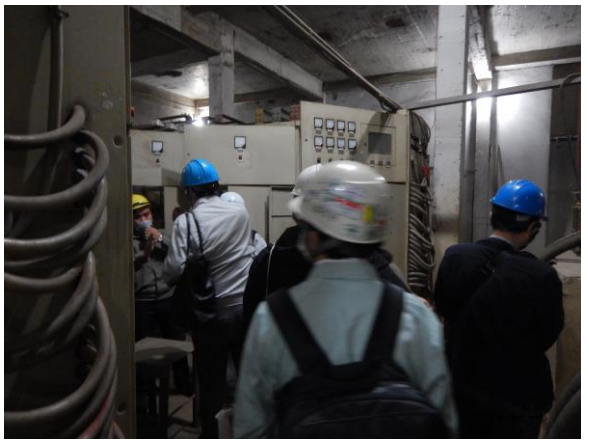
**対象設備の設備耐用年数:**10年

2,939 (t-CO2/年) × 10 (年) ＝ 29,390 t-CO2

# 8.　活動1:エネルギー消費量が最も多い、電炉を有する鉄鋼業2社に対する①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

**Vietnam-Japan Steel社（誘導炉）**

- ◆ 工場施設そのものが新しく、対象となりうるのは2基ある集塵システムのうちの1基のみ。
- ◆ 第二回現地調査にて、集塵システム関連の資料を入手。設計提案へ。
- ◆ 中国製誘導炉の故障が多いため、日本製へリプレイスを検討したいという依頼あり　→　設備提案のための検討を実施
- ◆ 既設誘導炉の容量の規模　→　本邦企業ではオーダーメードとなる
- ◆ VJS側から誘導炉の電源系の効率改善要望あり　→　提案作成へ



# 8. 活動2: Nam Cau Kien工業団地入居企業への①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

**Thanh Dai Phu My社（鉄鋼スラグリサイクル企業）**

- 集塵設備なし
- 粉塵防止のため常に散水 → 排水の回収も行われていない
  → 環境データ（水の使用量等）の記録を依頼

**Lien Minh Import-Export Services & Trading社（廃プラリサイクル企業）**

- 工場内に強い臭気 → 換気空調系が機能していない
- ①「高効率送風機＋高圧インバータ」導入候補
- 既存の換気空調系設備の運転データの記録を依頼

**Thy Anh Import-Export Service and Trading Investment社（廃プラリサイクル企業）**

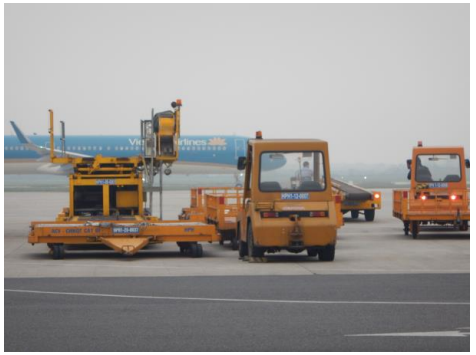
- 廃プラリサイクル工場の増設にJCMを活用して日本製設備の導入を希望
- 日本の廃プラリサイクル工場とNCK工業団地の廃プラリサイクル工場の違い
- 日本型のリサイクル工場のパッケージ化提案と省エネ効果の算定

# 8. 活動2: Nam Cau Kien工業団地入居企業への①高効率送風機＋高圧インバータ及び②高効率ポンプ＋高圧インバータの導入調査

## NCK工業団地外でのJCMポテンシャル調査

- ◆ DEEP-C
  - ➢ 同社のエネルギー供給会社による再生可能エネルギー事業（太陽光発電と風力発電）（EPC事業者選定中、タイミングが合えばJCM応募へ）
- ◆ ブリジストン・ベトナム
  - ➢ バイオマスボイラーの導入 （サービス提供企業決定済み、タイミングが合えばJCM応募へ）
  - ➢ 屋根置き型太陽光発電 （これからFS実施へ）
- ◆ カットビ国際空港
  - ➢ GPU導入事業、空港車両の電動化、高効率換気空調系の導入について、もう一歩進んだ提案の作成



# 9. 活動3:エコインダストリアルパークのモデルとなることを目指すNam Cau Kien工業団地に対するSDGsへの貢献活動の支援の実施

**Nam Cau Kien工業団地の課題**

- 排水処理施設の容量不足
- 入居企業の環境データあるいは運転データの取得状況
- リサイクル工場の簡易的な設備と近代化
- 工場内廃棄物の処理
- 大気汚染や工場内環境の改善

**課題解決へ向けて**

- 排水処理施設への助言(KITAの専門家による)
- 環境教育センター活動への助言(北九州市アジア低炭素化センターの支援)
- エコインダストリアルパーク構想に対する理解及びSDGsに対する理解の促進
- JCM設備補助制度を活用するための理解の推進

# 4. 今後の活動

# 10.　今後の活動

## 2020年度に向けた活動

- VIS社：　製鉄所集塵設備のリプレイスについて、要望を受けた提案の改訂版を提出　→　JCM設備補助応募へ
- VJS社：　誘導炉電源系の効率改善案の作成　→　VJS社への提示
- NCK工業団地入居企業：　環境データ取得状況の確認
- DEEP-C:　再生可能エネルギー事業のJCM設備補助適用に関する協議
- ブリジストン・ベトナム：　バイオガスボイラー導入事業のJCM希望があった場合の対応、屋根置き型太陽光発電システムの提案
- ハイフォン市カットビ空港：　GPU導入事業、空港内車両の電動化、高効率空調システムの導入について、具体的な提案の作成へ
- NCk工業団地：エコ・インダストリアル・パーク構想モデル事業へ向けた支援

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