FY2016 Project for Ministry of the Environment Japan

FY2016
Feasibility Study of Joint Crediting Mechanism Project by City to City Collaboration

Project for Development of JCM Projects under City to City Collaboration between Batam City and City of Yokohama (Energy Saving Sector: High Efficiency Thermal Desorption Unit)

Report

March 2017

Nippon Koei Co., Ltd.
City of Yokohama (Y-PORT center)
Finetech Co., Ltd.

FY2016
Feasibility Study of Joint Crediting Mechanism Project by City to City Collaboration

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ABBREVIATION

BIFZA	Batam Indonesia Free Zone Authority
GHG	Greenhouse Gas
IGES	Institute for Global Environmental Strategies
INDC	Intended Nationally Determined Contributions
JCM	Joint Crediting Mechanism

CHAPTER 1 OVERVIEW OF THE PROJECT

1.1 PURPOSE OF THE PROJECT

Japan Government submitted INDCs (Intended Nationally Determined Contributions) to UNFCCC (United Nations Framework Convention on Climate Change) last year, and the target reduction of GHG (Green House Gus) emission, as a feasible target by energy mix, is 26.0% (approximately 1,042,000,000 t-CO_2), compared to the emission in FY 2013 (25.4% in FY 2005). The target year to achieve is FY 2030. Japan Government intends to count reduction of GHG emission with Joint Crediting Mechanism (JCM) as Japan's reduction/sink. Japan Government introduce technologies, products, system, service and infrastructure that reduce GHG emission to developing countries, and will evaluate the reduction quantitatively for the counts. Japan must produce substantial JCM projects to achieve the reduction target using JCM.

Indonesian Government has promised to reduce 29% of GHG emission compared to Business as usual (BAU) according to their INDC, and in case JCM is introduced using international assistance, their target is 41% in the INDC. Therefore, Indonesia has strong expectation to implementation of JCM, which Indonesia and Japan signed for, taking account of the achievement of the target in the INDC.

Population in Batam city is about 1,200,000, and located in Riau Archipelago Province, distance to south coast of Singapore is about 20 km. The city is developing with Batam Island development agreement (1980) and economic cooperation agreement for development of the province (1990) through collaborative development with Singapore and Johor Province in Malaysia. However, thus, several problems such as solid waste disposal and sewage treatment has been appearing. Sufficient energy use is also an issue, while many factories has constructed mainly in industrial complexes, Batam city has designated as free trade zone. Batam city and Yokohama city have implemented technical cooperation since FY 2015, and as a 1st City-to-City Collaboration Project, FY 2015 JCM Project Formulation Study for Realizing Low Carbon Cities in Asia, Ministry of Environment, was implemented. The purpose of this project is to formulate JCM projects using information obtained during the survey, for reduction of GHG emission in Batam area.

1.2 PROJECT IMPLEMENTATION

FY 2015, Finetech Inc. conducted a survey to develop its climate change business in Batam Island, implementing an energy-saving project with PT MEGA GREEN TECHNOLOGY that is leading company in terms of waste oil recovery in Batam Island. PT MEGA GREEN TECHNOLOGY collects slop oil from vessel-docks at several dockyards and waste oil from industrial complexes in the Batam Island. The company regenerates the collected oil, and sells as recycled fuel oil. The company has been increasing annual amount of waste oil collection that is up to about 4,000 ton/year with further development of industrial complexes and extension of dockyards. PT MEGA GREEN TECHNOLOGY is using decrepit rotary kiln furnaces in oil separation step for regeneration of fuel oil. It makes the regeneration inefficient and decline productivity, therefore, replacement to highly efficient facilities is pressing need.

Finetech Inc. implemented preliminary survey at the factories of PT MEGA GREEN TECHNOLOGY in FY 2015. Thus, detail process design and introducing technology/facility design has been preceded with approximate calculation of GEG reduction, project cost estimation and preliminary calculation of payout time in FY 2016, and the companies prepared for the application to JCM Model Project.

Survey items and survey methods to formulate JCM Model Project are as follows.

Table 1-1: Survey Item and Survey Method

#	Survey Item	Survey Method
1. Consideration of JCM Project Formulation		
1-1	Detail design and calculations of economic effects with introduction of High-efficiency heating fractionation facility	・Discussion with Mega Green ・Execution of solution cost estimation ・Effectiveness survey of alternative fuel made from regenerated fuel oil in case it is used for newly introduced boiler ・Survey of regenerated fuel oil market and multifaceted utilization method ・Confirmation of disassemble cost of existing facilities and method
1-2	Establishment of monitoring plan	・Explanation of monitoring method to Mega Green ・Discussion with Mega Green and related people ・Establishment of monitoring plan and cost estimation
1-3	Confirmation of order and contract by Mega Green accompany the	・Discussion of project formation with Mega Green ・Confirmation of funding method by Mega Green

	project implementation	・Confirmation of contract format by Mega Green, and so on
1-4	Arrangement of detail condition in the consortium towards application to JCM Model Project	・Explanation of JCM Model Project ・Discussion of MOU for international consortium, and so on
1-5	Estimation and planning for horizontal development of introduction of High-efficiency heating fractionation facility in Indonesia	・Collection of information about energy-saving potential in Indonesia ・Identification of possible horizontal development and estimation of effect in Indonesia ・Coordination of a survey using other scheme
1-6	Confirmation of procedure to obtain environmental certificate	・Confirmation of certificate for project implementation and preparation to obtain ・Survey for disposal or utilization of processed sludge
1-7	Confirmation regarding operating body and plan	・Selection of project participant who is in charge of O&M after commencement of the project, and discussion ・Preparation of operation plan ・Consideration of utilization of natural gas infrastructure ・Consideration of synergy with material recycling
1-8	Confirmation of order and contract procedure with facility/equipment manufacturer by the project	・Discussion with manufacturer regarding project formulation ・Confirmation of a format to contract with manufacturer
1-9	Coordination between JCM Project and master plan of BIFZA/Batam City (activities using City-to-City Collaboration Study)	・Confirmation of output of Green Cities Program funded by ADB ・Consideration how to incorporate Japan's energy saving/GHG emission reduction project in the development plan of Indonesian side ・Consideration of project mapping
2.Participation and presentation in related meetings		
2-1	Participation in high-level meeting (if necessary) (one person)	・If requested by Ministry of Environment Japan, project participants will participate and make a presentation in high-level meeting that would be held in Bangkok
2-2	Participation in COP22 (if necessary) (one person)	・If requested by Ministry of Environment Japan, project participants will participate and make a presentation in COP 22 to be held in Marrakech

Source: Nippon Koei

1.3 BACKGROUND AND PRESENT CONDITION OF CITY-TO-CITY COLLABORATION

LoI with the City of Batam in May, 2015

Source: City of Yokohama

Batam City was one of priority areas at "17th economical cooperation and infrastructure strategy meeting on March 20, 2015 (the theme was Indonesia)", and cooperation schemes were discussed as pioneering cases, JCM Model Project by Ministry of Environment Japan and Private Sector Investment Finance by JICA. Batam City is now under the spotlight among Japanese companies that are interested in overseas operation.

In January 2011, Yokohama City launched Y-PORT Project, international technical cooperation project utilizing material and technology in Yokohama, which is core project for the policy, supporting overseas infrastructure business of enterprizes in Yokohama, under "Midterm 4-year plan 2014-2017", proceeding with overseas infrastructure business through public and private collaboration. In May 27, 2015, Yokohama City established "Y-PORT Center" to advance public private collaboration as a platform to accelerate joint projects between enterprises in Yokohama and international organizations.

In the above situation, Mayor of Batam City visited to Japan on May 27, 2015, and signed on MOU regarding technical cooperation with Yokohama City. Yokohama City and Batam City have following activities through "FY 2015 JCM Project Formulation Study for Realizing Low Carbon Cities in Asia" that is the 1st project of Y-PORT Center.

Table 1-2: Activities in FY 2015 (Batam City – Yokohama City)

Date	Project identification	FS	Place
20-24/April/ 2015	Inception meeting	―	Batam
25-27/May/ 2015	Visit to Yokohama (Sign on MOU)	―	Yokohama
17-21/August/ 2015	Business matching	Inception meeting	Batam
19-23/October /2015	**JCM Workshop, Asia smart-city meeting, site inspection, etc.**		Yokohama
30/November- 1/December/ 2015	Small scale workshop with companies that BIFZA selected	Follow up of the survey and opinion exchange	Batam
20/January/ 2016	Final debrief session (including enterprises) Task force team consists of 4 entities (founding declaration)		Batam

Source: Nippon Koei

Director General of Environment Bureau of Batam City and Managing Director of Planning Coordination Bureau of BIFZA recommended establishing a special window at JCM workshop organized by the Ministry of Environment Japan in Yokohama City in October 2015. Then, establishment of a task force (described in the following table) that comprises four entities (Batam City, BIFZA, Yokohama City and IGES) was approved. This project has planned to make further horizontal development as the 1st project that centers on the task force.

Table 1-3: Approved City-to-City Collaboration Task Force

Entity	Department
Batam City	Environmental Impact Management Board Development Planning Board MSW Management Project
BIFZA	Deputy Chairman of Other Business Facilities Directorate of Promotion and Public Relations Bureau of Program Planning and Research & Development
Yokohama City	Development Cooperation Division, International Affairs Bureau
IGES	Climate and Energy Area

Source: Nippon Koei

CHAPTER 2 SCHEDULE AND PROJECT IMPLEMENTATION FRAMEWORK

2.1 WORK SCHEDULE

Major activities of this project in this fiscal year is as follows

Table 2-1: Major Activities of this project

Time	Activity
May 2016	Kick off meeting at Ministry of Environment Japan
July 2016	Kick off meeting at Batam
Aug, 2016	Establishment of task force for City-to-City collaboration
Aug 2016	Progress debrief meeting at Ministry of Environment Japan
October 2016	Study tour in Japan Seminar for City-to-City Collaboration Project in Kitakyusyu City
November 2016	Participation in COP22 (presentation by a staff of Yokohama City) in Marrakech, Morocco Batam investment seminar in Yokohama City
December 2016	Progress debrief meeting at Ministry of Environment Japan
December 2016	Discussion of project map
January 2017	Final seminar in Batam City-to-City Collaboration Project seminar in Tokyo
February 2017	Completion of project map (1st draft)
March 2017	Final debrief meeting at Ministry of Environment Japan
March 2017	Proposal for City-to-City Collaboration Project in FY 2017
April-May 2017	Proposal for JCM Model Project in FY 2017

Source: Nippon Koei

Field trip, participation of meetings, and study tour in Japan has been carried out as follows.

Table 2-2: Schedule of Field Trip

No	Title	Period	Work Contents
1	1st Field Trip	1-4/June/ 2016	♦ Discussion with Batam City and BIFZA ♦ Site observation at PT MEGA GREEN
2	2nd Field Trip	14-15/July/ 2016	♦ Discussion with PT DESA AIR CARGO and PT MEGA GREEN ♦ Site observation at oil sludge treatment plant of PT MEGA GREEN ♦ Kick of Seminar in Batam Island (14 July) ♦ Courtesy call to Chief of BIFZA and Mayor of Batam City

3	3rd Field Trip	5-7/ December/ 2016	♦ Discussion with PT DESA AIR CARGO and PT MEGA GREEN ♦ Discussion with equipment suppliers and EPC candidates ♦ Discussion with BIFZA and Batam City
4	4th Field Trip	18-20/ January/ 2017	♦ Final seminar ♦ Discussion with BIFZA and Batam City ♦ Courtesy call to Chief of BIFZA and Mayor of Batam City
5	5th Field Trip	21-24/ February/ 2017	♦ Report of FS result ♦ Discussion regarding green building ♦ Discussion with BIFZA and Batam City

Source: Nippon Koei

Table 2-3: Schedule of Study Tour in Japan

No	Title	Period	Contents
1	1st Study Tour	17-21/ October/ 2016	♦ Discussion with Yokohama City ♦ Site observation of facilities of Finetech Co., Ltd. ♦ Site observation of technology introduction facilities of iFORCOM Tokyo Co., Ltd ♦ Participation in City-to-City collaboration seminar ♦ Site observation of low carbon technology and project in Kitakyusyu City
2	2nd Study Tour	22-24/ January/ 2017	♦ Site observation of technology introduction facilities of iFORCOM Tokyo Co., Ltd ♦ Discussion with Yokohama City ♦ Site observation of enterprises in Yokohama City ♦ Participation in City-to-City collaboration seminar

Source: Nippon Koei

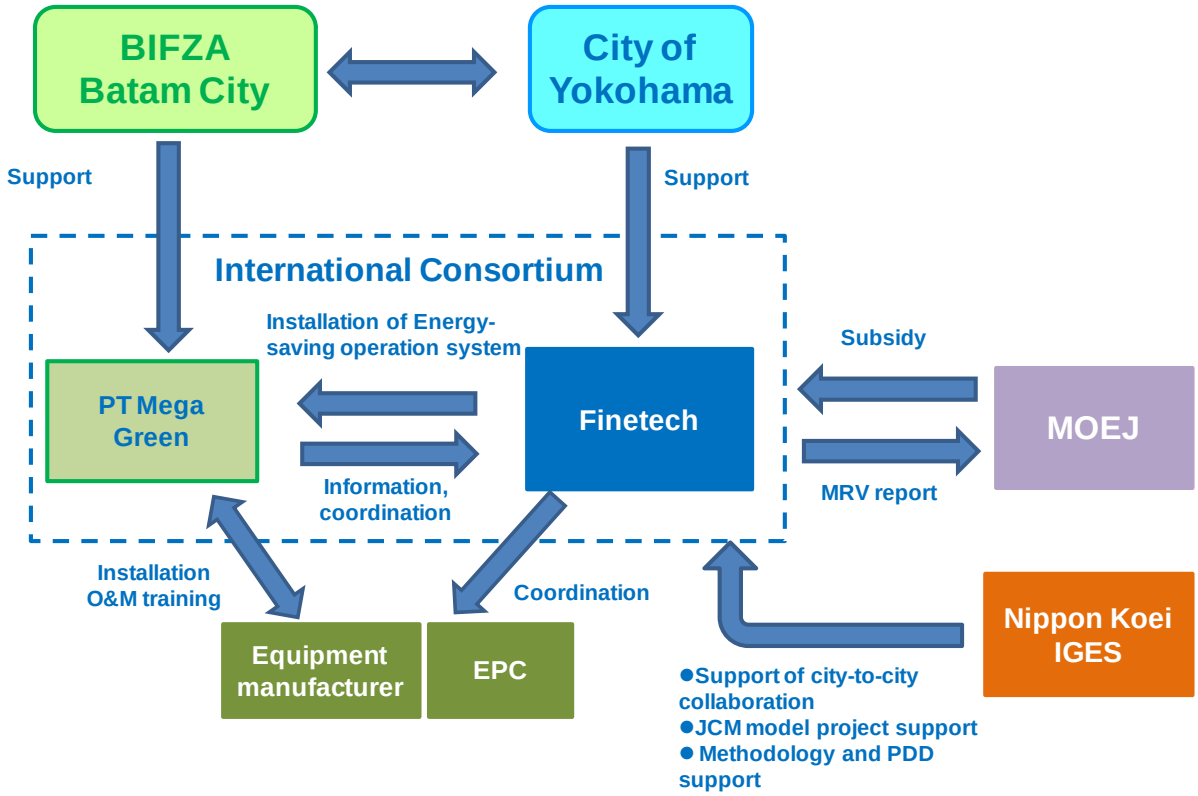
Table 2-4: Participation in International Session

No	Title	Period	Contents
1	Participation in COP	8/ November/ 2016	♦ Participation in COP (Marrakech)

Source: Nippon Koei

2.2 PROJECT IMPLEMENTATION FRAMEWORK

Project implementation framework is as follows.



Source: Nippon Koei

Figure 2-1: Project Implementation Framework

CHAPTER 3 FEASIBILITY STUDY OF JCM PROJECT

3.1 OUTLINE OF FACILITIES FOR INTRODUCTION OF HIGH-EFFICIENCY HEATING FRACTIONATION FACILITY, AND CALCULATION OF ECONOMIC EFFECT

Finetech Inc. develops a device using thermal gas including superheated steam. High-efficiency heating fractionation facility is planned to be introduced using the thermal gas within the project.

3.1.1 Present Facility Condition

Specification of a present facility is shown in Table 3-1.

Table 3-1: Specification of present facility

Item	Unit	Value
Treatment amount	ton/day	5
Treatment time	h	52
Treatment temperature	degrees C	300
Fuel consumption amount	kℓ/day	400
Electricity consumption amount	kWh/day	1,720
Oil content of residue after treatment	%	10
Number of the facility	facility	3

Source: Finetech

Setting situation of present facilities is shown in Figure 3-1

Source: Finetech

Figure 3-1: Setting situation of present facilities

Three facilities are set currently, but heat is not conducted to oil sludge in the furnace (material) as heat insulation of the furnace is not well (Figure 3-2) and the furnace is aging. Therefore, treatment time is extended and fuel consumption is increased.

Source: Finetech

Figure 3-2: Cover

As it is batch type, cold furnace must be heated until 300degrees C after input of the material into the furnace, and heating fractionation of the material begins. Temperature of the furnace is reduced for removal of treated residue, with reducing temperature of heating gas. After the temperature is reduced until 25～35 degrees C with that workers can enter inside, the residues are able to be removed. After the removal of the residues, inside of the furnace is cleaned up, and next input of the material is ready.

Source: Finetech

Figure 3-3: Structure of present facilities

3.1.2 Contents of facilities to be introduced

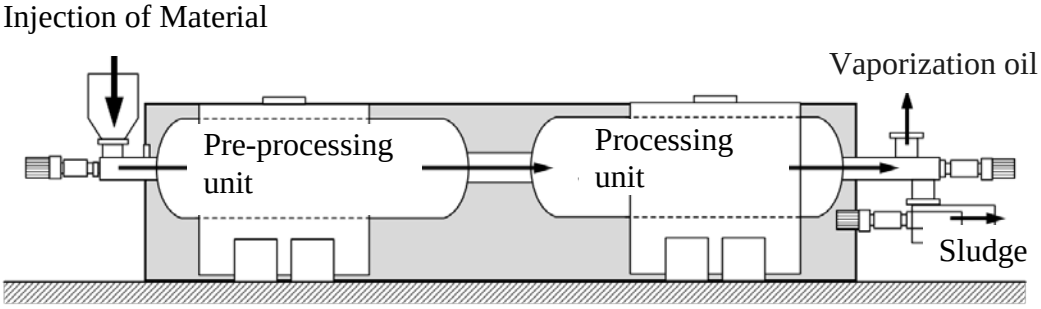
Specification of facility to be introduced is shown in Table 3-2.

Table 3-2: Specification of facility to be introduced

Item	Unit	Value
Treatment amount	ton/day	50
Treatment time	h	24
Treatment temperature	degrees C	Dry: 100, fractionation：350
Fuel consumption amount	kℓ/day	150
Electricity consumption amount	kWh/day	1,320
Oil content of residue after treatment	%	1
Number of the facility	Facility	2

Source: Finetech

The furnace of the newly introduced facility is divided for two steps, pretreatment step and main treatment step that separates the material, and steps from input of the material to removal of residues is a series of process.



Source: Finetech

Figure 3-4: Outline of new facilities

During pretreatment step, the material is heated until it becomes liquid form. The liquid form material is pumped up and sent to main treatment part.

The liquid form material is heated furthermore, oil is vaporized, and sludge is separated. Screw is used for stirring/conveying in the furnace.

Type of screw is “ribbon screw” shown in Figure 3-5. The ribbon screw has a structure to have gap between blade and shaft, and heat conduction efficiency to the material is high.

a）The furnace　　b）Ribbon screw （Source: website of Total Engineer limited company）

Source: Finetech

Figure3-5: Ribbon screw

Liquid form materials reduce heating energy to vaporize the material at main treatment step.

Source: Finetech

Figure 3-6: Facility to be introduced (sample)

3.1.3 Calculation of Economical Effect including Improvement of Productivity

Profit structure of PT MEGA GREEN TECHNOLOGY is divided into tipping fee given by collection of oil sludge and slop oil and sales of regenerated oil. The company plans to increase waste oil treatment capacity until 50-100 ton/day with replacing facility through this project. The company intends to receive 10,000 ton/year of waste oil (twice of the present amount), and is proceeding with marketing.

(Income from waste oil collection tipping fee)

- ・Acceptance tipping fee of oil sludge: Approx. 1,000,000 IRP / ton
- ・Acceptance tipping fee of slop oil: Approx. 1,500,000 IRP / ton

⇒ Income with acceptance of waste oil (10,000 ton/year)

＝ Approx. 100 million JPY (2.5 times of present income)

（Sales of regenerated oil）

- ・Sales price of regenerated oil from waste oil: Approx. 35 JPY / ℓ

⇒ Income with acceptance of waste oil (10,000 ton/year)

＝ Approx. 700 million JPY (twice of present income)

3.2 MONITORING PLAN

1. Monitoring plan
   The monitoring plan indicates the basic methodology of MRV calculating GHG emission reductions in introduction of TDU (Thermal Desorption Unit) from aged kiln type furnace in oil sludge processing factory, which supports development of JCM methodology.

Source: Finetech

Figure 3-7: TDU (Thermal Desorption Unit) to be introduced in the factory

2. Monitoring methodology

1） Summary of monitoring methodology

As for monitoring, it is considered based on discussion with PT MEGA GREEN TECHNOLOGY considering a practical implementation framework for monitoring the most important parameter, oil consumption.

2） Calculation of current emission

In case the project is not implemented, it is estimated the standard facility in the area such as rotary kiln type facility to be installed and the amount of GHG emission is calculated based on the amount of estimated consumption of coal fuel (oil) which is consumed for targeted amount of production.

3） Calculation of project emission

It is calculated based on the amount of actual consumption of coal fuel (oil) with introduced new facility after the project is implemented.

4） Monitoring parameter

The amount of coal fuel [liter] / the amount of production of recycle oil [t]

5） Referred calculation of emission reduction

$$ERy = REy - PEy$$

$$REy = OCPJ \times EFbo \times 1/\lambda$$

$$PEy = OCPJ \times EFbo$$

ERy: annual emission reduction (t-CO_2/y)

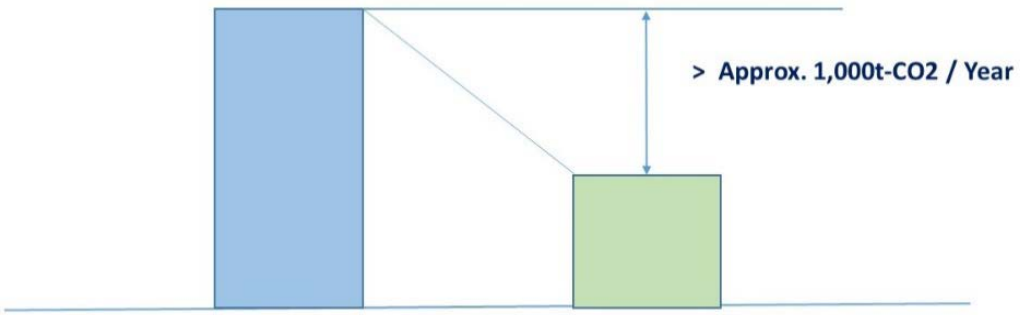
REy: annual reference emission (t-CO_2/y)

PEy: annual project emission (t-CO_2/y)

OCPJ: amount of annual consumption of oil with project facility(operation dates per year :290 days)

λ : : saving energy effect(actual data with same size facility)

EFbo: Emission factor of heavy oil (t- CO_2/t)



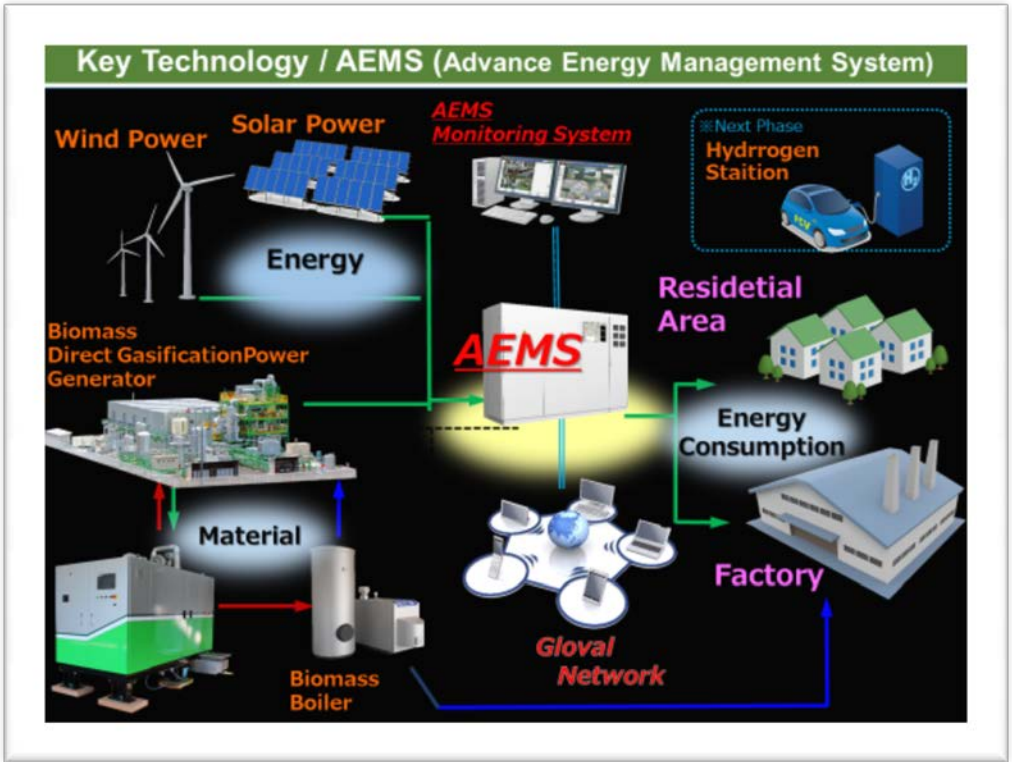
Rotary Kiln Type TDU Type

Source: Finetech

Figure 3-8: Emission Reduction

3. Development of efficient monitoring system and implementation framework with Finetech’ s core technology

As for operation of monitoring, it plans to manage monitoring data utilizing AEMS (Advanced Energy Management System and central control system which are Finetech’s core technology.



Source: Finetech

Figure 3-9: System of AEMS which is developed by Finetech

3.3 CONFIRMATION OF PROCEDURE FOR CONTACT WITH LOCAL CONTRACTOR

1. JCM model project by contracts among private companies

   The JCM model project is implemented by the international consortium which consists of Finetech as a leading company and PT MEGA GREEN TECHNOLOGY as a local partner.

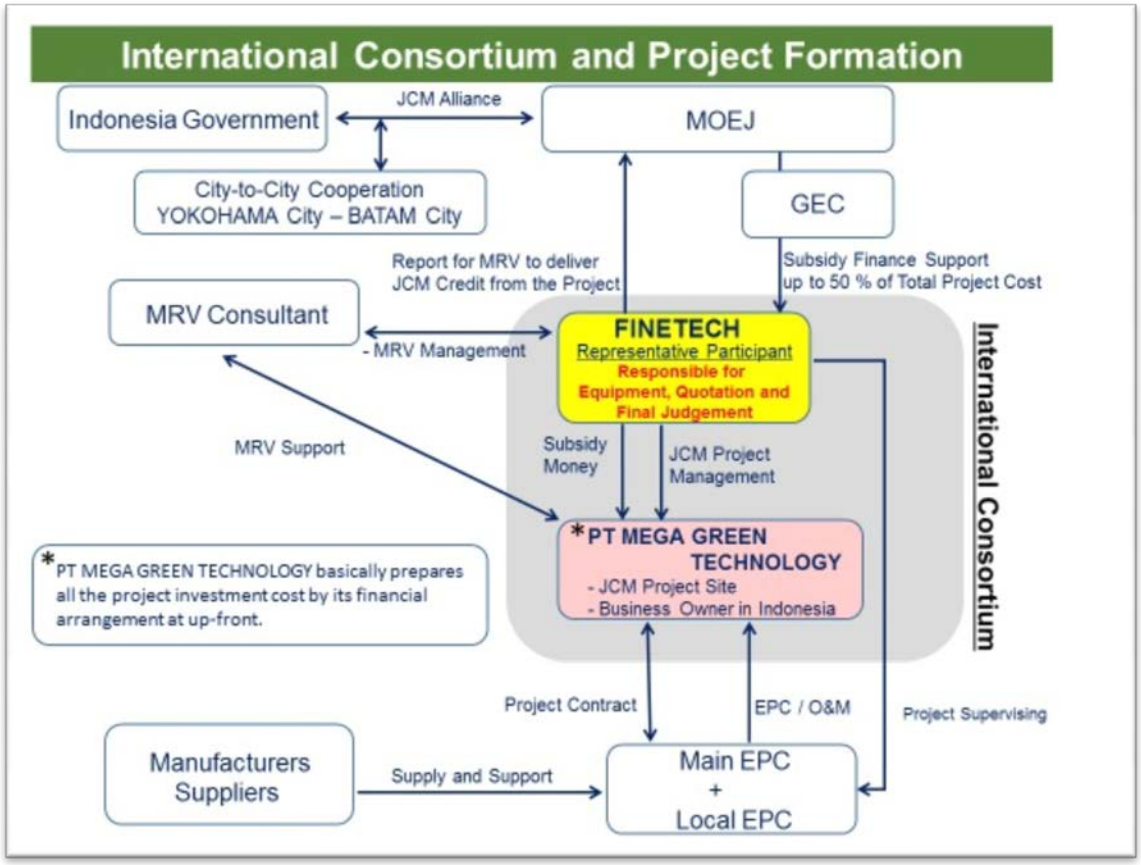
2. Consideration of introduction of lease scheme

   It considers utilizing lease service scheme to prepare better environment for implementation of JCM project and also introducing finance lease scheme which is easier for making international consortium.

3.4 CORDINATION FOR DETAILED CONDITIONS OF CONSORTIUM FOR JCM MODEL PROJECT

1. Formation for international consortium

A basic formation for JCM international consortium plans that Finetech lead the consortium and PT MEGA GREEN TECHNOLOGY take a role of the project as local partner.



Source: Finetech

Figure 3-10: Basic formation for international consortium

2. Financial plan for the project

The project cost for introduction of TDU is estimated as the range of two hundred million yen to three hundred million yen. PT MEGA GREEN TECHNOLOGY has a main factory in KABIL industrial area which is managed by BIFZA as a designated waste collector and currently collects slop oil from industrial area and sludge oil from dockyards located in Batam Island as one of the major private waste oil collectors.

Considering the background, it is supposed that the stable development of collection and waste processing for sludge oil and slop oil which comes from tanker cleaning and the project founding by PT MEGA GREEN TECHNOLOGY remain strongly to the future.

Source: Finetech

Figure 3-11: Project for development and expiation of port facility in Batam

3.5 ASSESSMENT AND PLAN FOR DEVELOPMENT OF TDU IN INDONESIA

1. Background

PT MEGA GREEN TECHNOLOGY is a leading company among private waste oil collection companies in Batam Island, Indonesia. The company collects oil sludge from vessel docks in dockyards and slop oil from industrial complex in the island, regenerating the oil and selling as recycled fuel oil (regenerated diesel oil). Major market is currently in Jakarta. There are 18 companies collecting waste oil, but only three companies are big enterprises including PT MEGA GREEN TECHNOLOGY in Batam Island now (other two are Greenido and BBTEC. Several vessels from Singapore that prohibit tank cleaning and Malaysia where treatment cost is high, hence stable collection of oil sludge and slop oil is expected from now on with advantage of site location.

2. Current situation

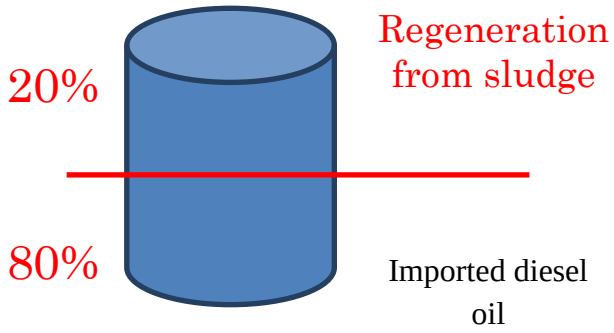
The revenue of PT MEGA GREEN TECHNOLOGY comes from tipping fee for collecting waste oils from tanker owners and industrial parks and sales of recycle diesel oil. However, it utilizes an aged furnace which is rotary kiln type and it causes the efficiency of the facility lower and the amount of processing get down to less than 5 ton per day. Considering the current situation, PT MEGA GREEN TECHNOLOGY freezes the amount of processing of waste oils and it causes sales of recycle diesel oil lose steam.

Source: Finetech

Figure 3-12: Recycle oil produced by PT MEGA GREEN TECHNOLOGY

3. The project target

PT MEGAGREEN TECHNOLOGY plans to improve the operation process considering raising the capacity of waste oil processing as to be 100 ton per day by introduction of TDU through JCM scheme. With the improvement, it is plans to expand the capacity of waste oils processing to be ten thousand ton per year and the market to be more than 2,000 ton per month of sales for recycle diesel oil



Source: Finetech

Figure 3-13: Composition of recycle diesel oil produced by PT MEGA GREEN TECHNOLOGY

4. Promotion of efficiency

By introduction of TDU, the capacity of processing is estimated to expand from 5 ton per day to 50 to 100 ton per day. Also, it is expected the effect of the improvement to be high since a part of the recycle diesel oil can be utilized as fuel for burner which needs for the facility operation.

5. New project

PT MEGA GREEN TECHNOLOGY experimented to produce blocks for building materials from sludge residue. Those blocks are utilized as the base and walls of buildings which are the company's relevant facilities. PT MEGA GREEN TECHNOLOGY considers producing blocks as to sell commercially and sell them to potential markets inside and outside of Batam Island.

Source: Finetech

Figure3-14: Blocks for building materials made from residue (prototype)

3.6 CONFIRMATION ON APPROVAL AND LICENCE FOR ENVIRONMENTAL REGULATION

1. Approval and license

In Indonesia, it sets government policy for management of harmful wastes in 1994 under ratification of Versel treaty. The government policy defines dangerous, harmful, and toxic harmful wastes as wastes to be managed, which is called as B3 from capital letters of dangerous, harmful, and toxic in Indonesia. The policy is the first regulation for industrial wastes. It regulates the ban of direct disposal of harmful wastes, the way of disposal and management, and collection and transport of harmful wastes.

PT MEGA GREEN TECHNOLOGY conducts oil sludge and slop oil processing based on the above license in KABIL industrial area as a designated wastes processing company.

2. Current issue

PT MEGA GREEN TECHNOLOGY has issues on the capacity of processing such as aged facilities and stock yard space for oil sludge and it is not improved even though the company tried to regulate the amount of processing per day. It is forced to manage oil sludge before processing with the condition of running off the yard. Under the situation that B3 regulation gets even strict, the company considers it is necessary to improve the environmental condition in the factory and plans to improve the facility including stock yard with its own budget even though it will be substantially improved with introduction of new processing facility.

Situation of the stockyard of oil sludge (before processing)

Source: Finetech

Figure 3-15: Current situation of backyard in PT MEGA GREEN TECHNOLOGY

3.7 CONFIRMATION REGARDING OPERATING BODY AND PLAN

1. Implementation framework

The JCM model project is prepared by international consortium which consists of Finetech co., ltd and PT MEGA GREEN TECHNOLOGY. Finetech co., ltd shall manage

the project as the leading company of the consortium and PT MEGA GREEN TECHNOLOGY shall own the TDU which will be installed in the factory in Batam city.

2. MRV implementation framework

PT MEGA GREEN TECHNOLOGY which owns the TDU monitors data with monitoring equipment every month based on the monitoring method which is determined by MRV consultant and reports the monitoring report to the joint committee.

3. Maintenance plan

Finetech co., ltd shall manage PT MEGA GREEN TECHNOLOGY to ordinal maintenance of the introduced facility as the leading company of the consortium.

4. Public interest of the project

The project site of the JCM model project is owned by BIFZA and located in KABIL industrial area. Finetech co., ltd and PT MEGA GREEN TECHNOLOGY are designated industrial waste contractors. There is a merit of no tariff for import of waste oil from the outside of Batam Island and the project for collection and recycle of oil sludge and slop oil is expected to promote as one of the main industries in Batam.

3.8 CONFIRMATION OF CONTRUCT FOR FACILITIY MAKER

Supplier for Thermal Desorption Unit: TDU

TDU which PT MEGA GREEN TECHNOLOGY considers to install in the factory is planned to procure from Singapore's supplier which Finetech has a network and contract as EPC.

3.9 POSSIILITY OF INSTALLATION OF TDU AS NETWORK WITH PV SYSTEM POWER SUPPLY INFRASTRUCTURE

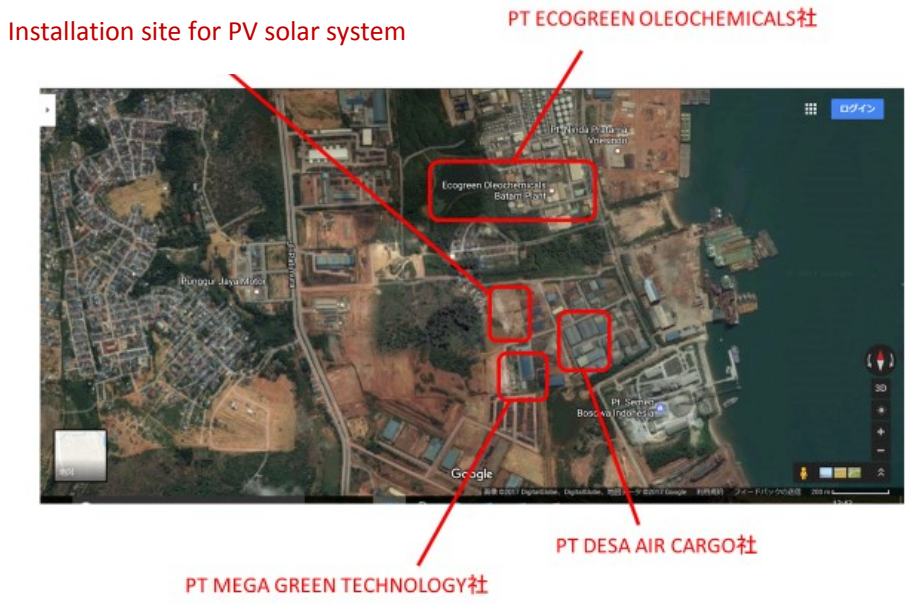
1. Background

Finetech studied the system of utilization of PV electricity as distributed power supply infrastructure in the industrial area and discussed with PT DESA AIR CARGO and other two companies which have needs for renewable energy to formulate as JCM model project. One of the companies is PT MEGA GREEN TECHNOLOGY and the other is PT

ECO GREEN OLEOCHEMICALS which is the biggest palm oil refining processing company in Batam. The three companies and Finetech discussed for installation of PV solar system which utilize the high efficiency technology of distributed power supply infrastructure in the industrial area and decided to install 2.0 MW solar system at the field and prepared the project site.

2. Project site for PV solar system

As mentioned above, the project site of PV solar system is the site with 22,000 square meters which is adjacent to the factory owned by distributed power supply infrastructure in the industrial area in KBIL industrial area. The site is located next to the factories of PT MEGA GREEN TECHNOLOGY and PT ECO GREEN OLEOCHEMICALS.



Source: Finetech

Figure 3-16: Location of the project site and three companies' factories

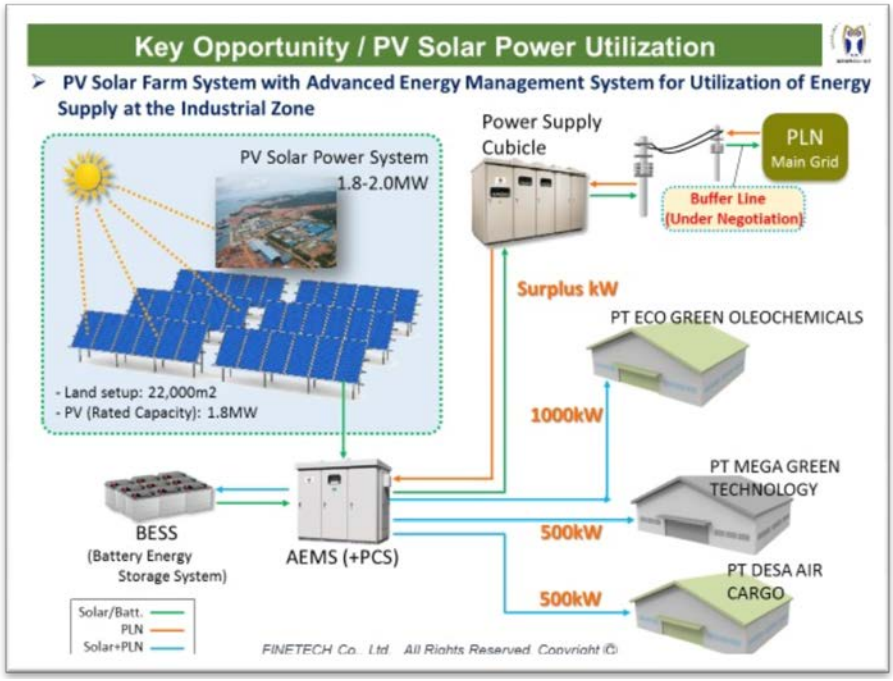
3. Installation plan for PV solar system

It is planned to install PV solar system at site with 2.0 MW based on an agreement among three companies of project participants.

- Installation site: KABIL industrial area

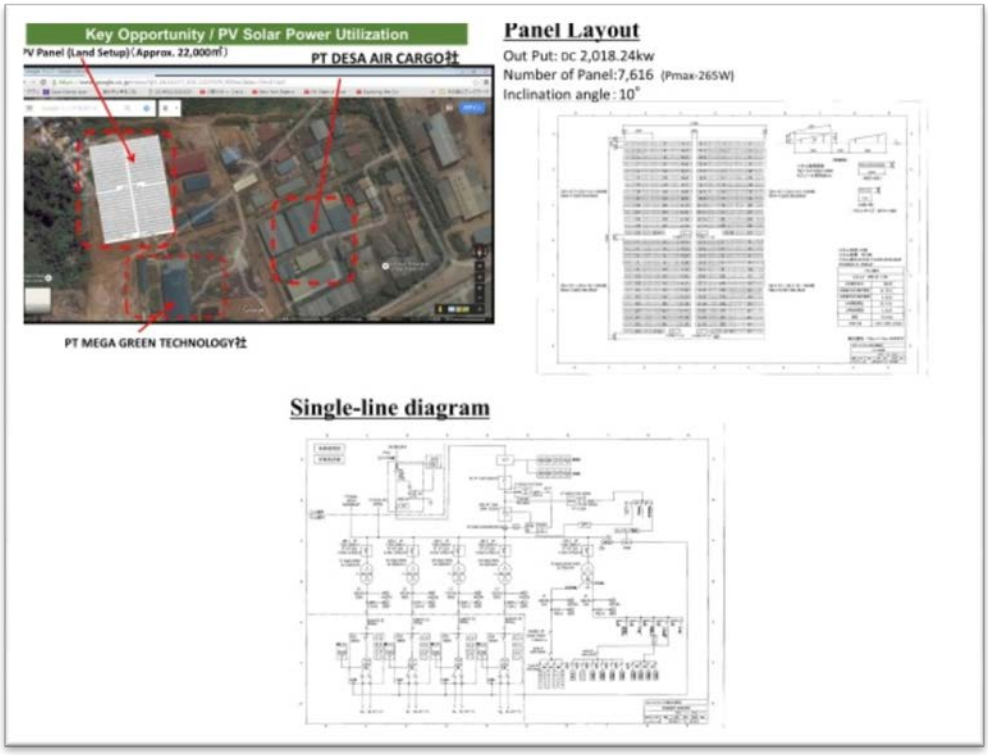
  Site with 22,000 square meter owned by PT DESA AIR CARGO

- Rated capacity： 1.8MW - 2.0MW
- Incidental equipment：Tracking type function(planned)
- AEMS: Advance Energy Management System produced by Finetech
- Panel supplier： AGC Asia Pacific Pte Ltd（planned）



Source: Finetech

Figure 3-17: Plan for installation of PV solar system



Source: Finetech

Figure 3-18: Plan for PV solar system and panel

4. Estimated GHG emission reduction

The alterable power consumption by PV solar system will be relatively large since it plans to install into several factories not single factory. It estimates based on the study to be 2,000,000kwh per year. The central grid electricity in Batam Island is originated from coal fired power generation and the emission factor is high as 0.839t CO_2 per MWh. the impact of emission reduction is estimated to be high.

（Calculation of emission reduction）

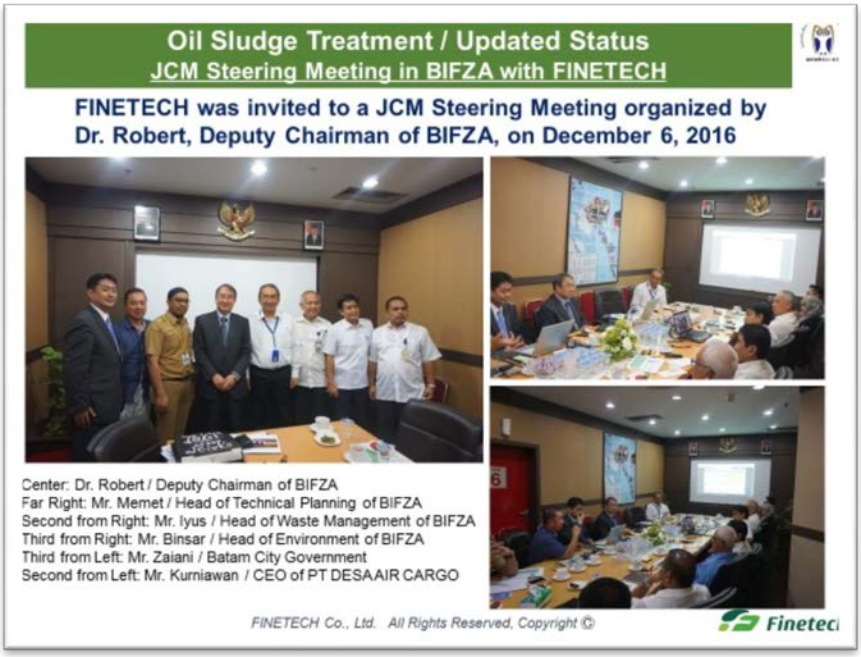
$$ERy = EGy \times EFelec$$

ERy：Amount of annual CO_2emission reduction（t CO_2 /year）
EGy：Annual electric generation（2,145 MWh/year）
EFelec：Emission factor for grid electricity（0.839 t CO_2/MWh）

The emission reduction for the project is estimated to be 1,800 t- CO_2 /year.

5. Discussion with Batam city and BIFZA

As for JCM model project of installation of TDU for oil sludge processing as well as solar OV system, Finetech discussed with Robert deputy secretary of BIFZA and Batam city staff in December 6th 2016 and got understanding from both sides.



Source: Finetech

Figure 3-19: Steering meeting with BIFZA and Batam city

CHAPTER 4 HARMONIZATION OF JCM MODEL PROJECT AND THE MASTER PLAN OF BIFZA/BATAM CITY

4.1 FORMULATION OF TASK FORCE

"JCM Project Formulation Study through City-to-City Collaboration between Batam City and Yokohama City" funded by the Ministry of Japan has been conducted since FY 2015, and to firmly advance the project formulation, a task force was established this year. The purpose is to produce a sustainable urban development in Batam City, and the members are Yokohama City, Batam City, and stakeholders of City-to-City collaboration.

Major role of the task force are as follows.

(i) Regarding activities under JCM, all solutions of issues and support are implemented.

(ii) Not only JCM, priority projects are identified based on the expertise of urban development and advanced environmental technology of enterprises of Yokohama City. Using those, City-to-City collaboration is proceeded with in a wide range of areas, e.g. project map making to visualize smart green island concept in Batam City.

Responsible organization of the task force is as follows.

(a) Batam side

(i) Batam City:
Environmental Control Board

(ii) BIFZA:
Deputy Chairman of Other Business Facilities

(b) Yokohama side

(i) Yokohama City (Y-PORT center):
- International Cooperation Department, International Bureau

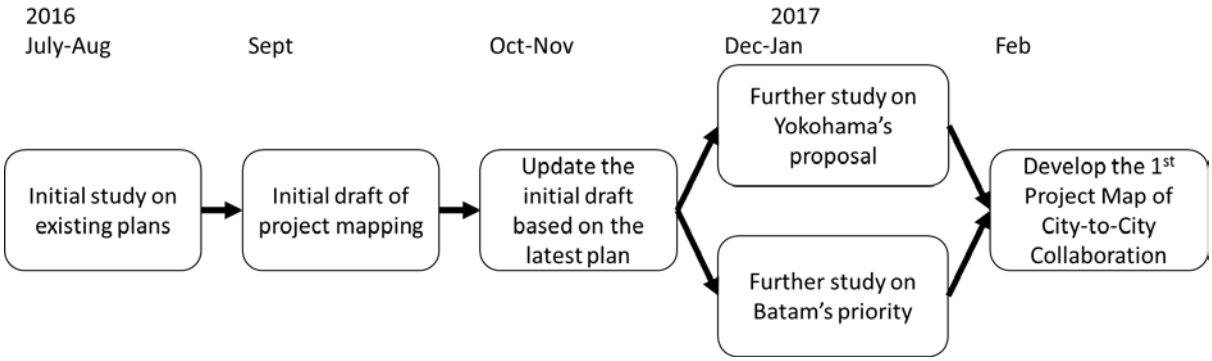
(ii) IGES (Y-PORT center):
- Climate change and energy division

During implementation period of the JCM study, related people agreed that Nippon Koei would be secretariat of the task force. The secretariat of the task force supports that members

of the task force would make good communication and they could advance the study without any delay.

4.2 STUDY OF MASTER PLANS OF BIFZA AND BATAM CITY

In this project, the project maps were developed to arrange the orientations of city-to-city collaboration between Batam and Yokohama. The flow is shown below. At first, the master plans of BIFZA and Batam City were collected and studied.



Source: Nippon Koei

Figure 4-1: Flow of Project Map Development

Summary of the master plans studied are shown as below.

Table 4-1: Studied master plans

Master Plans	Outlines of Master Plan	Note
RPJMD	Midterm (5 year) development plan of Batam City, whose target period is 2016-2020. It was revised after the new Mayor was appointed in 2016. Following 6 missions are addressed in the plan. 1. Good Governance 2. Human Resource Development 3. City with Comfort 4. Strengthening and diversifying industry 5. Community development 6. Rural area development	Plans mostly covers the activities funded by the city's budget
Green City Program	Batam City is preparing Green City Program with the support of ADB. Target year is 2050. 3 pillars of the program consist of 1. Safe and comfortable city 2. Green city which is resilient to climate change and disasters 3. Smart city which has competitiveness and	To be finalized soon

	technologies	
Green City Action Plan	Detail action plan based on Green City Program Priority program:19, Selected projects: 9	Everything are not yet budgeted
BIFZA Development Strategy	To promote industry and business, following 5 strategies are raised. 1. Improvement of investment and business environment, 2. Improvement of integrated promotion system, 3. Development and improvement of infrastructure, 4. Regulation and institution, and 5. Improvement and development of human resources.	
BIFZA Project Pipeline	Infrastructure development for transportation and water, cleaner production and renewable energy are studied are following potential projects are listed. 1. Tanjung Sauh Transshipment Container Port 2. General Cargo Port of Sekupang 3. Batam Light Rail Transit (LRT) 4. Passenger Terminal-2 hang Nadim Airport Batam 5. Cargo Terminal of Hang Nadim Airport Batam 6. Batam Toll Road (Phase-1) 7. Batam – Bintan Bridge 8. Batam Waste Water Treatment Plan (WWPT) Phase-2 9. Batam e-Government Phase-2	Considering inviting solar and LED production factory, and introducing renewable energy

Source: summary of each plan by Nippon Koei

4.3 PROJECT MAP

In this project, the objectives of project maps are arranged as below.

1. A Tool to build mutual understanding on the direction of city-to-city collaboration between Batam and Yokohama
   - Needs of Batam towards green city
   - Green technologies and partners of Yokohama
2. A tool enabling to invite outside support more smoothly, such as from Government of Japan (MoE, METI, JICA, etc.), Government of Indonesia (APBN, etc.), development banks and private investors

The expected activities and technologies in need in Batam are summarized as below and information was disseminated through the public information system of City of Yokohama (ex. Y-Port Newsletter and related seminar) and seminars conducted by the project.

Table 4-2: Expected Activities and Technologies for Batam

Sector	Expected activities	Core technology（Sample）
Saving energy	- Eco-industrial park - Support for small and Medium sized companies - Eco tourism development and promotion of tourism industry - Development of eco-friendly infrastructure - Building considered for saving energy	LED lighting, high-efficiency chillers, saving energy technology, renewable energy technology such as solar PV and wind power, utilization of natural gas, development of association for local small and medium sized companies, idea for eco-city, idea for zero-emission industrial park, eco-tourism, telecommunication technology etc
Water	- Management of water quality and river head - Conservation of dam and reservoir - Reuse of industrial and commercial waste water - Development of sludge disposal facility	SCADA system, high efficiency pump, water purification facility, flatling materials, solar PV system, development of recycling water, water treatment facility, compost of sludge, fuel compound etc
Waste management	- Development of incinerator facility - Development of waste disposal facility - implementation of 3R	Incinerator, petrochemical facility, utilization of wastes of building and tankers etc
Transportation	- Development of BRT - Development of ITS	Management of Bus operation, hybrid bus, management of road traffic, utilization of recycle material for road bed, LED street light

Source: Nippon Koei

Since RPJMD (midterm development plan of Batam City) summarizes mostly the plans which can be implemented by city budget (APBD) and administration of Batam island is unique in the sense that not only City Government but BIFZA holds the authority to promote infrastructure development, the project arranges the concept of green island under city-to-city collaboration from following 6 core aspects through the discussion with Batam side.

Table 4-3: 6 Core Aspects of Green Development

Core Aspects	Reason of setting the aspect
Green Planning	Followings are in need by the government officials: - Mainstreaming of climate change mitigation and adaptation is required for master plans such as spatial plan, energy saving plan and water resource management plan - Setting GHG reduction target
Green Water	Water is considered to be in shortage within 10 years and the bottleneck of carrying capacity of Batam Island is studied to be the water issue (without countermeasures, population of 1.7 million is

	the maximum allowable population who can live in Batam island sustainably). In the near future, best mix of rainwater, recycled water and desalination water is needed to be achieved.
Green Waste	The population is in the increasing trend and industrial waste is also significant from industrial parks, thus the appropriate management of the final disposal site, introduction of waste to energy plant, and development of industrial waste treatment plant are required.
Green Industry	There are many industrial parks since Batam is Free Trade Zone, thus the improvement is needed for energy saving in industry, energy management with peak cut technology, sustainable production (such as water and waste) etc.
Green Building	More than 25 high buildings (20-40 stories) are planned to be constructed within several years in Batam and introduction of green building concept is needed soon.
Green Transportation	Though public and smart transport is limited in Batam, introduction of LED streetlight, BRT and LRT are planned and low carbon development in the transportation sector is expected.

Source: Nippon Koei

Following is the arranged information in accordance with the 6 core aspects. Details are in Attachment 6.

Table 4-4: Project Map

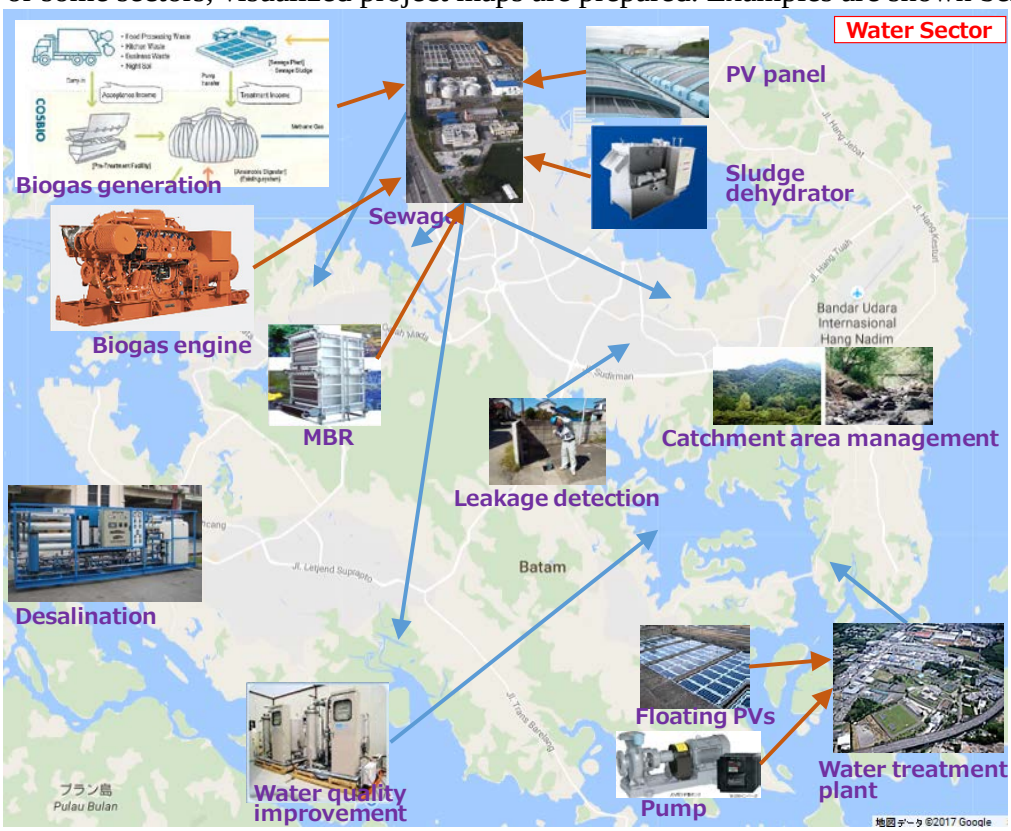
Tables of the Project Map (As of 2 March 2017)

Feasibility Study for Developing Joint Crediting Mechanism (JCM) Projects under City-to-City Collaboration between Batam city and Yokohama city

GOAL	PLAN	RPJMD(案2)	BIFZA		Batam City		Expected activities	Elemental Technologies	Companies in Yokohama City	[For reference] Efforts of Yokohama City	Candidate of F/S in FY2017
		Target of Draft RPJMD	Development Strategy 2017	BIFZA Project Pipeline	Green City Program	Batam Green City Action Plan					
	Source	Draft RPJMD 2016-2021	Development progress of Batam published by BIFZA	Presentation of BIFZA (final seminar etc)	Green City Program (2015-2045)	Presentation of Batam City (final seminar etc)					
Green City	Green Planning	- Availability of qualified and environmental-friendly city spatial planning. - Performed consistent control for spatial planning utilization	4. Regulation and Institution	- (Water treatment master plan) - Waste water management plan	- Green planning and design	- Spatial Planning and Control - Management of Land Use - Enhancement of Environmental Protection and Management Infrastructure - Development, Maintenance, and Enhancement of Settlement and Housing Infrastructure	・Sharing knowledge/ experience between Batam and Yokohama ・Collaboration to set target/plan	・Sustainable landuse planning ・Promotion of environmental activities ・Incentive scheme	・City of Yokohama	・CASBEE Yokohama ・City of Yokohama Master Plan	...
	Green Water	- Availability of optimum clean water and sanitation infrastructure.	...	- Water recycling - Sea water desalination - BATAM WWTP (Phase 2)	- Normalization of dam/reservoir - Landscaping - Community Resettlement - Recycle of industrial and commercial wastewater - Off-site sanitation - Sludge Treatment Plant (STP/ IPLT) - Wastewater Treatment Plant (WWTP) - Improvement of urban drainage and flood control	- 6 reservoirs -Operating Tembesi Estuary Dam - Development of Gong Estuary Dam -Developing SWRO in Belakang Padang (Small island) - Sludge Treatment Plant -Batam Centre WWTP -4 New Zone WWTP (Batu Ampar, Sagulung, Tanjungpiayu, Nongsa)	・Management of water resources ・Normalization of dam/ reservoir ・Development of drinking water ・Management of wastewater ・Water recycling ・Recycle of industrial and commercial ・Waste Water Treatment Plant (WWTP) ・Sludge Treatment Plant (STP/ IPLT) ・Improvement of urban drainage	・Management of water resources ・High efficiency pump ・Monitoring system for flood, water quality & quantity SCADA system ・Purification system of water quality ・Filtering material ・Solar power ・Water recycling ・Sewwater desalination system ・ Water purification ・water leakage detection ・Management of recycled Waste Water ・Advanced water treatment facility ・Compost / fuel oil sludge ・Anaerobic sludge fermentation facility	・Companies of Yokohama Water Business Conference ・Unimation System Inc. (River water level observation, alarm system) ・Uyeno Green Solutions (Solar power) ・Inter Action Cooperation (Solar power) ・Suidou Tecnical Service Co.Ltd (leakage survey) ・CTC TECHNOLOGY Corporation (Water quality improvement of lakes) ・Goodman Co., Ltd. (leakage survey) ・Hitachi (Seawater desalination system, Water recycling, Water purification) ・Suido Technical Service (water leakage detection) ・Companies of Yokohama Water Business Conference	・Environmental Planning Bureau, City of Yokohama "Water and Green Environmental Plan" ・Environmental Planning Bureau, City of Yokohama "Drainage Facility handbook" ・Environmental Planning Bureau, City of Yokohama "Water and Green Environmental Plan" ・Pretreatment facility water reproduction center at Kanazawa	・Wastewater treatment or water recycling for industrial park (Hitachi) ・Water leakage ditection (STS)
	Green Waste	Availability of environmental-friendly waste treatment at city and sub-district levels.	...	Industrial waste treatment	- Development of environmental friendly solid waste treatment system (final disposal of Telaga Punggur)	-Enhancement of Environmental Degradation and Pollution Control -Reduction of Domestic Solid Waste Generation -Reduction of Industrial Solid Waste Generation	・Temporary Disposal System(TPS) ・Solid waste treatment system ・Solid waste management system (3R) ・Development of small and medium business and cooperatives	・Incinerator ・Petrochemical technology/ equipment ・Effective utilization of construction waste and shipboard waste ・Development of 3R system ・Waste to energy	・JFE Engineering (WTE) ・JFE Kankyo (Treatment of industrial disposal waste and slop oil) ・Finetech ・Mamex Recycle Systems Co.,Ltd. ・CARBON FREE CONSULTING CORPORATION (e.g. waste copper wire) ・JFE Kankyo (Waste to energy)	・Environmental Planning Bureau, City of Yokohama "Sludge treatment and utilization system" ・"Basic Plan for treatment of disposal waste" ・"Yokohama 3R Yume!"	TBD
	Green Industry	(prerequisite and diversifying industry) Establishment of Batam City as destination for tourism, competitive investment for industrial sector, trade services, marine, fisheries and agriculture (Community Development) Development of potential industry sectors, creative	1. Improvement of investment and business environment 2. Improvements of integrated promotion system 3. Development and improvement of infrastructure	- Industrial waste treatment - Batam e-GOVERNMENT (phase 2) - Eco industry park (Batamindo) - IT service centre	...	...	・Eco industrial park ・Development of tourism ・Improvement of utility and infrastructure for environmental protection and management ・Energy saving building ・Harbor maintenance	・Assistance for development of small and medium business and cooperatives ・Eco Town Initiative(Zero Emissions Island Initiative) ・Eco Industrial Area Initiative (Zero Emissions Industrial Area Initiative) ・Development of harbor ・Factory diagnostic system for energy saving ・ICT ・Free wifi with LED streetlight	・Hitachi (Seawater desalination system, Water recycling, Water purification) ・NEC (ICT) ・STANLEY ELECTRIC (Free wifi with LED streetlight)	・Yokohama Green Valley (Kanazawa Area) ・Pretreatment facility water reproduction center at Kanazawa	・Replacement of Street Lights with LED Technologies in commercial areas in Batam (Finetech, STANLEY ELECTRIC) ・Comprehensive Waste Water Treatment for BATAMINDO Industrial Park in Batam (Finetech) ・Demand Response Control for Base Load Power Plant in the BATAMINDO Industrial Park (Finetech)
	Green Transportation	- Availability of integrated and comfortable city transportation. - Availability of road and bridge network with solid quality and in good condition.	...	- TOLL ROADS (Phase 1) - BATAM LIGHT RAIL TRANSIT (LRT) - Development the existing Hang Nadim Airport(terminal2) to reach an ultimate capacity of 32 million passengers and 1.6 million ton of general cargo. - Batam Bintan Bridge - Development the existing SEKUPANG CARGO PORT - Development the existing Cargo Terminal of Hang Nadim Airport	- Development of Bus Rapid Transportation (BRT) system - Traffic Signs for area - Traffic Control system (ATCS) - Intelligent Transport system (ITS) - Construction of bicycle lanes - Construction of pedestrian walk	- Walkways and Cycle lane in CBD and main urban area/ in whole areas in the future - 6-10 corridor Semi-BRT	・Mass transportation system ・Intelligent Transport System (ITS) ・Bicycle lanes ・Construction of pedestrian walk	・Traffic control system (e.g. GPS) ・Hybrid bus ・Public Transportation Priority Systems ・Road Traffic Control (signal control, disaster prevention of road) ・Using recycle material (e.g. block, roadbed material) ・Street light (LED) ・Free wifi with LED streetlight ・EV , FCV , Electrike ・Heat insulating coating structure & Solar panel	・Nissan (EV , FCV) ・Seaside line (AGT) ・Ansei Iwata (Regeneration brake) ・Kaga Inc. (street light, security lighting) ・FORCOM Tokyo Co., Ltd. (EV?) ・Finetech (slop oil) ・STANLEY ELECTRIC (Free wifi with LED streetlight) ・Hitachi (Seawater desalination system, Water recycling, Water purification) ・AGC Asahi Glass (coating film, paint, Glass Integrated PV: GIPV for sound wall or ceiling)	・"Minatomirai 2050 Project" ・Introduction of new transportation system into seaside area of the city	・Replacement of Street Lights with LED Technologies in commercial areas in Batam (Finetech, STANLEY ELECTRIC)
	Green Building	- Improvement of quality of feasible and affordable residential and settlement as well as qualified public facilities for community.	...	...	- Green building	-Development, Quality Enhancement and Supervision of Building -Development, Maintenance, and Enhancement of Settlement and Housing Infrastructure	・Energy saving building	・Eco Town Initiative(Zero Emissions Island Initiative) ・ICT ・Free wifi with LED streetlight	・FORCOM (energy saving system) ・ Finetech (PV) ・AGC (PV, Heat insulating coating structure & Solar panel)	・CASBEE Yokohama	・Standardization of green buildings in Batam – Energy saving solutions for Shopping Mall / Super Market (iForcom/AGC/ Finetech) ・Standardization of green buildings in Batam – Energy saving solutions for Office Building (iForcom/AGC/ Finetech)

Source: Nippon Koei

For some sectors, visualized project maps are prepared. Examples are shown below.



Source: Nippon Koei

Figure 4-2: Project Map: Green Water

Source: Nippon Koei

Figure 4-3 Project Map: Green Industry

4.4 INVITATION TO JAPAN (CITY OF YOKOHAMA、JCM SEMINAR(KITA-KYUSYU)、BIFZA INVESTMENT SEMINAR、JCM SEMINAR (TOKYO)

[Invitation to Yokohama City, JCM seminar (Kitakyuusyu City)]

The Study invited staff from BIFZA and Batam City respectively, when JCM seminar organized by the Ministry of Environment Japan was held in Kitakyuusyu City on 20th and 21st October 2016, the period of their trip was from 17th - 21st October 2016. They observed energy saving technology in a factory of iForcom Tokyo and Smart Green Park of Finetech that these companies participate in the Study in this Fiscal Year. They discussed on the progress, issues, and countermeasures of the project at the sites from 17th – 19th October. In JCM seminar, they presented regarding the project and observed facilities of low carbon technologies in Kitakyuusyu.

<Invitation and observation of facilities in Yokohama>

Courtesy call

Discussion with invitees from Batam City

Smart Green Park of Finetech

Smart Green Park of Finetech

Smart Green Park of Finetech

Smart Green Park of Finetech

Shiroyama Industry that use energy saving system of iFORCOM Tokyo

Shiroyama Industry that use energy saving system of iFORCOM Tokyo

Source: Nippon Koei

<JCM seminar in Kitakyuusyu City>

Presentation by Mr. Azril, Batam City

Presentation by Mr. Okuno, Yokohama City

Source: Nippon Koei

<Facilities of low carbon technology in Kitakyuusyu City>

Environmental Museum

Next-generation energy park (wind power energy)

Next-generation energy park (EV bus)

Kougasaki factory

Source: Nippon Koei

[BIFZA investment seminar (City of Yokohama)]

On 25th of November 2016, the seminar of Investment in Batam Free Zone was held by BIFZA in City of Yokohama.

Programme

Time	Program	Speaker
14:00-14:10	Opening remarks	Mr. Ben Perkasa DRAJAT (Deputy Chief of Mission, Indonesian Embassy in Tokyo)
14:10-14:50	The latest situation of investment in Indonesia	Mr. Saribua Siahaan (Representative, Tokyo Office, Indonesia Investment Coordinating Board (BKPM))
14:50-15:30	Batam Free Zone	Mr. Gusmardi (Batam Free Zone Authority, Deputy

		Chairman)
15:30-15:50	Introduction of THE YOKOHAMA RUBBER CO., LTD' factory in Batam	Mr. Tetsuya Tamashiro （THE YOKOHAMA RUBBER CO., LTD）
15:50-16:10	Introduction of Batamindo Industrial Park	Ms. Amelia Chia (Senior Executive, Riau Investment Marketing, Gallant Venture Ltd.)
16:10-16:30	Closing remarks	Mr. Hajime Kinoshita, Chairman （Senior Advisor to Batam Free Zone Authority, Jawa Timur Province）

Source: Nippon Koei

[JCM seminar (Tokyo)]

The Study invited staff from BIFZA and Batam City respectively, when JCM seminar organized by the Ministry of Environment Japan was held in Tokyo on 23rd January 2016, and each participant reported activities and outputs of the project.

Vice-Managing Director, Mr. Robert visited Japan from BIFZA, and observation of environmental technology related to the projects and meeting with the Ministry of Environment Japan were implemented on 22nd and 24th January. The schedule is as follows.

Programme

Date/ Time	Site	Contents
22/ January/ 2017 13:30～	Hotel New Akao	Explanation on invertor that is used in the hotel （iFORCOM Tokyo plans to install the same type of invertor into Hang Nadim Airport in Batam city.）
24/ January/ 2017 9:30～10:00	MOEJ	Discussion JCM model project in FY2016 in Hang Nadim Airport
13:30～16:30	JFE Kankyo	Inspection of waste disposal treatment plant 1. Introduction of JFE kankyo 2. Recycle plant for wasted fluorescent tube 3. Recycle plant for plastic material 4. The latest incineration facilities of the industrial waste 5. Discussion of potential for developing business in Batam

Source: Nippon Koei

<Observation at JFE Environment>

Explanation of JFE Environment

Recycling factory of Fluorescent light

Plastic recycling factory

Group Photo

Source: Nippon Koei

4.5 SEMINAR (KICK-OFF SEMINAR, FINAL SEMINAR)

[Kick-off seminar]

Kick-off seminar was held in July 2016

Agenda:

- Date: July 14, 2016
- Time: 13:00 to 16:00, to be determined
- Venue: Harris Hotel in Batam

Time	Program	Speaker
13:00-13:05	Introduction of participants	MC
13:05-13:15	Opening remarks	Batam city
13:15-13:25	Opening remarks	BIFZA
13:25-13:45	Opening remarks	City of Yokohama

13:45-14:00	Current situation of JCM in Indonesia (tentative)	Indonesia JCM secretariat
14:00-14:15	Key note – Master plan	Batam city
14:15-14:30	Key note – Waste to energy	Batam city
14:30-14:45	Key note – TBD	BIFZA
14:45-15:00	Tea break	---
15:00-15:15	JCM project formulation study	iFORCOM etc.
15:15-15:30	JCM project formulation study	Finetech etc.
15:30-15:40	Way forward in 2016	Nippon Koei
15:40-15:45	Announcement of new member of "Task force for the city-to-city collaboration between Batam and Yokohama"	
15:45-15:55	Closing remarks	Batam city
15:55	Close	---

Source: Nippon Koei

<Kick-off seminar>

Venue

Opening remarks by Mr. Dendi

Key note by Mr. Azril

Key note by Mr. Binsar

Discussion

Way forward in 2016 by Mr. Ohuchi

Questions and Answer

Group Photo

Source: Nippon Koei

[Final seminar]

On 18th of January 2017, the final seminar was conducted and on 19th site tour in the Batam city was held inviting Japanese companies.

Overall Agenda (18th and 19th January):

Date	Time	Program	Venue
18 Jan (Wed)	AM	**Site tour**: Visit potential project sites in Batam by Japanese companies with technologies (Sewage, water recycling, desalination, LED streetlight with Wi-Fi, waste management (municipal solid waste and industrial waste), airport expansion)	Sites in Batam island
	PM		
19 Jan (Thu)	AM	**Final Seminar**	Harris hotel Batam center
	14:00	**Courtesy call** on Chairman of BIFZA	Offices of BIFZA and Batam City
	15:00	**Courtesy call** on Mayor of Batam City	

Source: Nippon Koei

The site tour was conducted for the following agenda.

- The tour aims to give prospective business partner, which are Japanese companies with high-end environmental technologies opportunities to see potential project sites.
- It also aims to introduce Japanese technologies which help issues of Batam city to the Batam side
- It discusses with Batam side about necessary data collection and actual needs considering future project.

Several Japanese companies such as Stanley Electric Co., Ltd, AGC, Kashima Corporation, and Finetech co., ltd joined the site tour. Those companies have high technologies such as LED light, solar PV system, heat shield paint, sewage disposal, oil sludge treatment, and Advance Energy Management System (AEMS). Staffs from BIFZA and Batam city joined the tour and discussed for development policy of Batam city.

Schedule for site tour is indicated in the following table.

Time	Site	Technology	contents
08:30~10:00	Waste Water Treatment Plant in Batam Centre	Waste water treatment	
10:30~12:00	Dinas PU Kota Batam	LED streetlight	
12:30~13:30	Lunch		
14:00~14:30	Garbage Collection site	Waste disposal treatment	
15:00~16:30	Hang Nadim International Airport	Heat insulating coating structure、AEMS	

Source: Nippon Koei

Approximately 70 participants from BIFZA, Batam city, Yokohama city, and Japanese companies attended the final seminar on 19th. In the seminar, the result of the feasibility study was reported. Also, Japanese companies presented their technology and actual cases in the world.

Detail agenda for Final Seminar on 19th January 2017

Time	**Program**	**Speaker**
8:40-9:00	Registration	---
9:00-9:05	Introduction of participants	Mr. Amir Rusli (MC)
9:05-9:15	Opening remarks	Dr. Ir. Purba Robert Sianipar (BIFZA)

9:15-9:25	Opening remarks	Batam city
9:25-9:45	Presentation on City to City Collaboration/City of Yokohama	Mr. Toru Hashimoto
9:45-9:55	Overall progress of the study/Nippon Koei	Mr. SAITO Tetsuya
9:55-10:15	Result of JCM project formulation study/ iFORCOM	Mr. Erwin Avianto
10:15-10:35	Result of JCM project formulation study/ Finetech	Mr. Motoyuki Okada Mr. Kikuo Sagawa
10:35-10:50	Tea break	---
10:50-11:00	Introduction of green technologies/ Hitachi, Ltd.	Mr. Katsumi Shida
11:00-11:10	Introduction of green technologies/ AGC Asahi Glass Co., Ltd.	Mr. LIM Yew Meng
11:10-11:20	Introduction of green technologies/ Kajima Corporation	Mr. Ryohei Tsukada
11:20-11:30	Explanation of relevant technologies of 3 or 4 companies (LED: Stanley Electric and Sodick LED, water leakage monitoring system: Suido Technical Service, IT: NEC)	Nippon Koei Co., Ltd
11:30-12:20	Panel session on Project Map - Introduction of RPJMD and green city program (Batam City) - Potential development projects (BIFZA) - Draft project map (Nippon Koei) - Contribution from City of Yokohama (City of Yokohama) Discussion	BIFZA Batam City City of Yokohama Nippon Koei iFORCOM Finetech
12:20-12:30	Implementation of JCM Project in Indonesia/ Indonesia JCM secretariat	Mr. Dicky Edwin Hindarto
12:30-12:35	Closing remarks	BIFZA
12:35-12:40	Closing remarks	Batam city
12:40-12:50	Way forward to Activities in 2016/ City of Yokohama	Mr. Toru Hashimoto
12:50-	Lunch	---

Source: Nippon Koei

＜Site tour and final seminar＞

Site Tour(WWTP)

Site Tour (group photo)

Site Tour (LED streetlight)

Site Tour (Waste Disposal)

Site Tour (Hang Nadim Airport)

Final seminar: Opening remarks by Mr. Dendi (Batam City)

Presentation by AGC

Presentation by Kajima Corporation

Presentation by Mr. Dicky

Venue

Panel Discussion

Presentation by Nippon Koei

Closing remarks by Mr. Robert
(BIFZA)

Closing remarks by Mr. Hashimoto
(City of Yokohama)

Source: Nippon Koei

CHAPTER 5 ATTENDANCE TO INTERNATIONAL CONFERENCE

5.1 PARTICIPATION IN COP22

Yokohama city staff, Mr. Nakamura attended to COP22 which was held in Marrakech from 8th to 18th of November in 2016. The project for city to city collaboration between Batam city and Yokohama city was presented at Japan pavilion on 8th as one of the event of JCM seminar.

The main points of the presentation were summarized in the following.

- Overview and history of development of Yokohama city
- Activities aiming for reduction of GHG emission by Yokohama city such as private and public collaboration by YSCP and YSBA and action plan
- Feasibility study for JCM project by city to city collaboration such as B to B and B to G projects in Batam city

In the panel discussion after the presentation, the following issues were discussed.

- Merits for project formulation under city to city collaboration compared to project formulation without such scheme
- Making consensus in the city as well as the external entities for local government's international cooperation
- Issues for conducting feasibility study by city to city collaboration from the view point of under policy

＜COP22＞

Japan pavilion at COP22

Panel discussion

Booth at Japan pavilion

PR by Yokohama city

COP22 venue

COP22 venue

Source: City of Yokohama

CHAPTER 6 ISSUES AND FUTURE PLANS

6.1 ISSUES

Through this project, especially through the development of project map, various kinds of needs of Batam are confirmed and arranged. These needs are related to low carbon development and climate change mitigation and adaptation, however, there are many of them being difficult to be solved with JCM projects considering the cost effectiveness on GHG reduction from energy sources.

Not only the feasibility studies of individual projects, but also the support from City of Yokohama regarding policy planning and target setting toward Batam administrations under the umbrella of city-to-city collaboration is needed as well. Thus, it is even clearer now that promotion of city-to-city collaboration should not be limited to the project development and participation in seminars but transferring administrative knowledge, methodologies and experiences of City of Yokohama as experienced local government toward Batam is required.

More concretely, these are pointed out from Batam side.

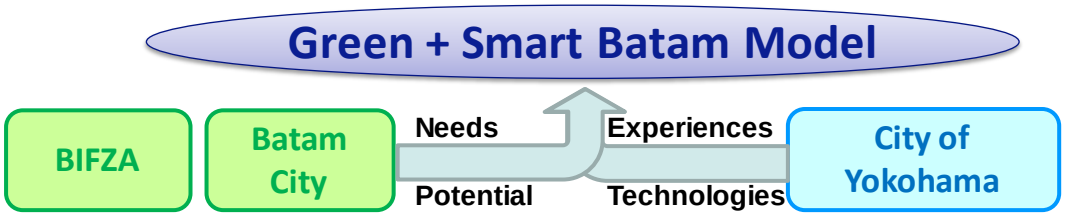
1. BIFZA requested City of Yokohama to sign officially for the collaboration.
2. Not only the technologies of companies in Yokohama, administrative capacity of City of Yokohama is expected to be transferred.
    1. Setting energy saving / GHG reduction target
    2. Promotion of green building
    3. Green land use planning
3. Comprehensive support for water sector both in planning and implementation, and participation for waste sector projects
4. Pilot projects in industrial parks

Source: Nippon Koei

Figure 6-1 2017/1/19：Courtesy call to the chairman of BIFZA (BIFZA suggested the more officialized collaboration with City of Yokohama)

6.2 FUTURE PLANS

Based on the issues identified as above, it was agreed by Batam side and City of Yokohama to find the best available solutions for Batam not by copying the experience and regulations of Yokohama, but by developing the most appropriate system through discussions in city-to-city collaboration.



Source: Nippon Koei

Figure6-2 Image of City-to-City Collaboration between Batam and Yokohama

From April 2017, based on the result of these F/S, following three JCM model projects are under development to be proposed. The ideas are already explained to Batam side and confirmed this orientation.

Table 6-1 JCM Model Projects to be proposed in FY2017

	Company	Project	Cost (million JPY)	Emission Reduction (tCO_2) *
1)	iForcom	Energy saving of Hang Nadim Airport	40	585
2)	iForcom	Energy saving of Haris Hotels/18 hotels	100	2,368
3)	Finetech	Thermal desorption unit ＋ PV(2MW)	700-800	12,000

Source: Nippon Koei
*Emission reduction is under review

For FY 2017, both Batam side and City of Yokohama showed strong interest in continuing this city-to-city collaboration scheme and considering the preparation of several proposals. Followings are the key points for developing F/S idea in FY2017 through the experiences of this project.

1. Proposal of rules, regulations and/or institutions
   (I) Introduction of green building concept
   In the center of Batam, many high buildings are planned to be constructed. Considering the urgent needs of water and energy conservation, green buildings

are highly expected.

Department of Environment of Batam City and JCM secretariat of Indonesia mentions that Batam needs the regulations on green buildings like Jakarta and Bandung and support from City of Yokohama through city-to-city collaboration is important to introduce systems to promote green buildings in Batam.

(II) Setting emission reduction target

Government of Indonesia commits the GHG emission reduction to the international society following Paris agreement. Currently, GHG emission reduction action plan is under development in the central and provincial level in Indonesia, but not in the city and regency level. Through city-to-city collaboration it is expected that Batam city becomes one of the pioneer local government body to set such target.

(III) Incentives and drivers for better spatial management, permissions for construction and energy saving

It is necessary to issue Mayor's decree in line with promoting system for green building. Sharing experience and advice from City of Yokohama would be beneficial for drafting such decrees.

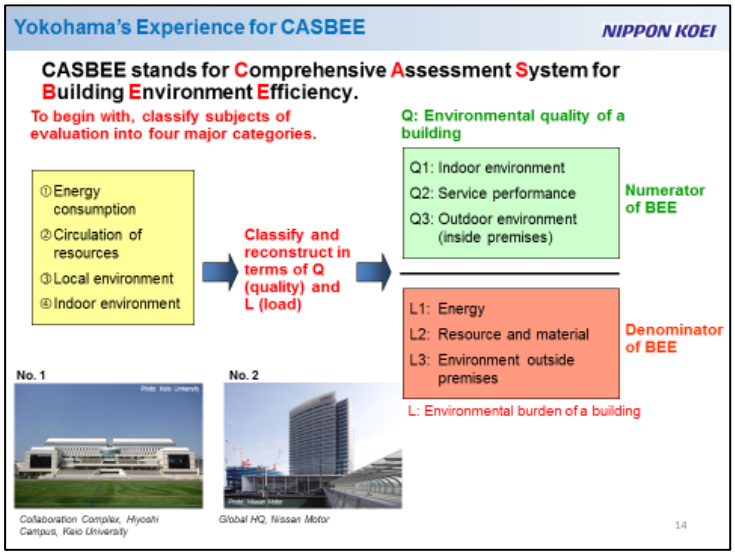
2. Matching with the needs of Batam side

(I) Reference to the project map

It is good to utilize the project map developed by this project since it is prepared to share the common understanding on the orientation of city-to-city collaboration and to mobilize outside finance. It is also important to continue updating this project maps.

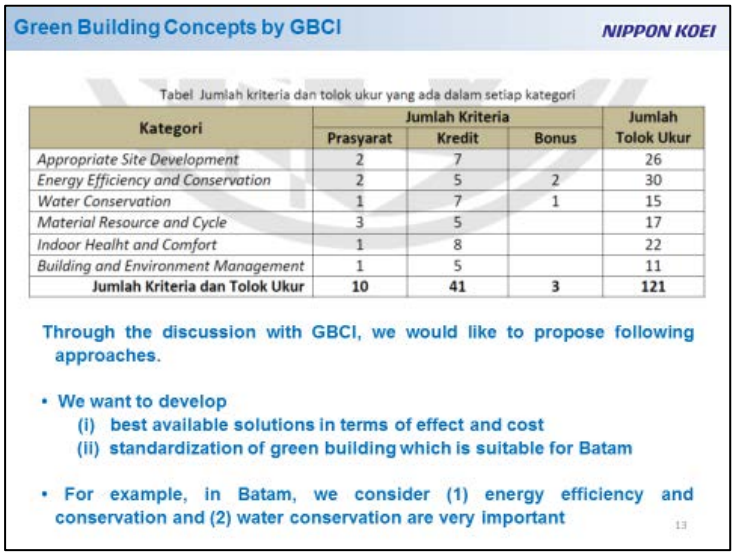
(II) Green building

As above, green building initiative especially regarding energy and water conservation needs to be promoted soonest.



Source: Nippon Koei based on the presentation material of City of Yokohama

Figure6-3 Yokohama's experience in Green Building



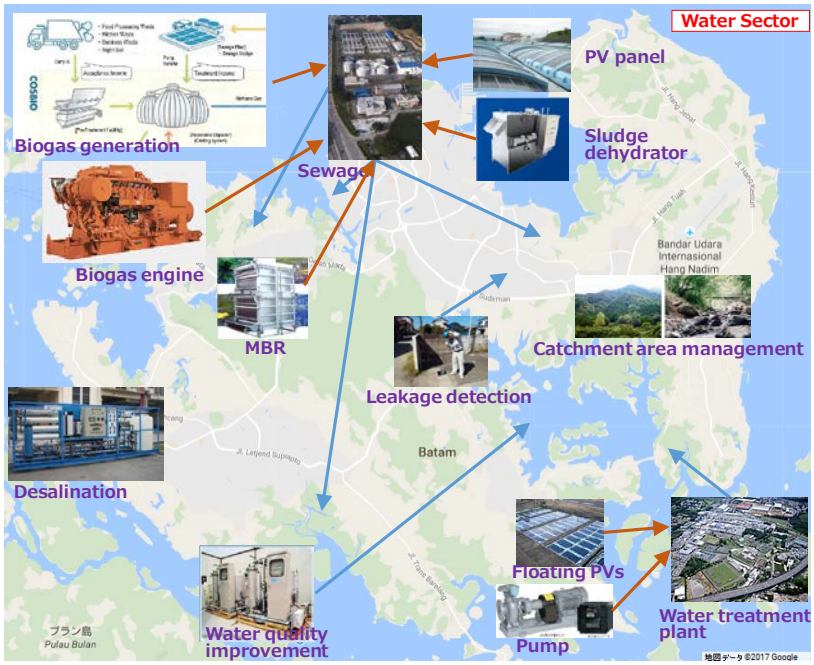
Kategori	Jumlah Kriteria			Jumlah Tolok Ukur
	Prasyarat	Kredit	Bonus	
Appropriate Site Development	2	7		26
Energy Efficiency and Conservation	2	5	2	30
Water Conservation	1	7	1	15
Material Resource and Cycle	3	5		17
Indoor Healht and Comfort	1	8		22
Building and Environment Management	1	5		11
Jumlah Kriteria dan Tolok Ukur	**10**	**41**	**3**	**121**

Source: Nippon Koei based on the document of GBCI

Figure6-4 Green building concepts of GBCI

(III) Water sector

Considering high needs from Batam side, initially the application of JCM is required to be studied. Additionally, it is required to explore the potential supporting scheme and finance other than JCM.



Source: Nippon Koei

Figure6-5 Project Map: Green Water (Re)

(IV) Support of Industrial Park

Batam side requires the implementation of symbolic project and expects the pilot project with large scale industrial parks in Batam. It is also noted that the large industrial parks can be good partner organization for development of JCM Model Project.

Source: Nippon Koei

Figure6-6 Project Map: Green Industry

3. Priority in potential collaboration with Industrial Parks

(I) JCM projects with B to B concept

When infrastructure project is developed with JCM, Batam Island is so big that the target should be limited and pilot project approach should work better. “Industrial park” is good as a unit to implement JCM projects in the perspective of the scale, and B to B approach would be smoother to formulate JCM projects, and industrial parks are better in financial terms compared with the individual companies.

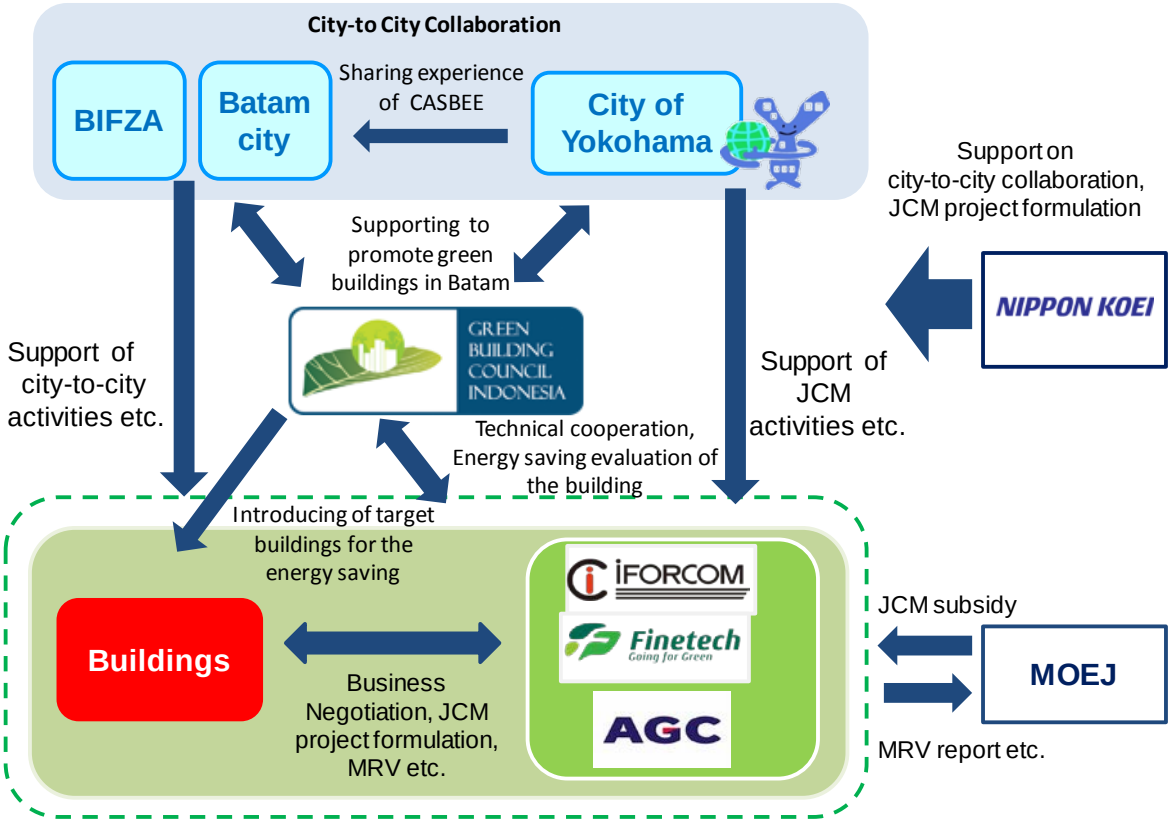
4. Project development considering the characteristic of city-to-city collaboration

(I) JCM projects with B to G concept

Besides the discussion above, it is needed to explore the potential of B to G project to maximize the merit of city-to-city collaboration. Especially, JCM project for Hang Nadim airport is highly prioritized to be successful so that other B to G projects can be promoted.

Finally, implementation structure for potential F/S is shown below. By cooperation with Green Building Council Indonesia (GBCI), a NGO which promotes green building concepts in Indonesia, it is enabled to establish green building promotion system such as local regulations. It is finally to standardize the green building concepts for each building type in Batam Island.

GBCI employs 6 criteria (site development, energy saving, water conservation, construction material, internal environment, and environmental management) to assess buildings, and among 6 criteria, energy and water conservation is the most important. The project members already agree to propose two F/S regarding this theme to localize GBCI’s initiative in Batam.



Source: Nippon Koei

Figure6-7 Concept of F/S in FY2017: Standardization of Green Building