

FY2017

City to City Collaboration Program

Project for Development of Low-carbon City through City-
to-City Collaboration between Batam and Yokohama
(Support of Green City Policy of Batam by Introduction
of Smart LED Street Lighting System and Green Buildings)

Report

March 2018

Nippon Koei Co., Ltd.

Finetech Co., Ltd.

iForcom Co., Ltd.

Asahi Glass Co., Ltd

Stanley Electric Co., Ltd.

City of Yokohama (Y-PORT center)

FY2017
City to City Collaboration Program

**Project for Development of Low-carbon City through City-to-City
Collaboration between Batam and Yokohama
(Support of Green City Policy of Batam by Introduction of Smart
LED Street Lighting System and Green Buildings)**

Report

Contents

CHAPTER 1 OVERVIEW OF THE PROJECT	1
1.1 PURPOSE OF THE PROJECT	1
1.2 PROJECT IMPLEMENTATION	2
1.3 BACKGROUND AND PRESENT CONDITION OF CITY-TO-CITY COLLABORATION	3
CHAPTER 2 SCHEDULE AND PROJECT IMPLEMENTATION FRAMEWORK	7
2.1 WORK SCHEDULE.....	7
2.2 PROJECT IMPLEMENTATION FRAMEWORK	8
CHAPTER 3 FEASIBILITY STUDY OF JCM PROJECT (1)	10
3.1 PROJECT FOR INTRODUCTION OF SMART LED STREET LIGHTS AND PV SOLAR SYSTEM	10
3.1.1 Confirmation of Standard of LED Street lights.....	10
3.1.2 Overview of Project.....	11
3.1.3 Overview of Planed Introduced Equipment and System.....	12
3.1.4 Consideration of Function	13
3.2 CONSIDERATION OF INSTALLATION LOCATION.....	14
3.2.1 Finalization of Implementation Structure.....	15
3.2.2 Installation Schedule of Smart LED Street Lights and PV Solar System	16
3.3 DEVELOPMENT OF MRV PLAN.....	17
3.3.1 Eligibility Requirement	17
3.3.2 MRV Implementation Schedule	17
3.4 CONSIDERATION AND AGREEMENT ON IMPLEMENTATION STRUCTURE	

.....	18
3.4.1 MOU of International Consortium	18
3.4.2 Licence of Individual Power Producer (IPP)	18
3.4.3 Expectation of Implementation of JCM Model Project	18
CHAPTER 4 FEASIBILITY STUDY OF JCM PROJECT (2)	19
4.1 GREEN BUILDING REGULATION	19
4.1.1 Detail Design and Calculations of Economic Effects with Introduction of Energy-saving Solution	19
4.1.2 Formulation of Monitoring Plan.....	24
4.1.3 Confirmation of Ordering and Agreement Procedures of Local Entities.....	28
4.1.4 Detail Condition Adjustment of Consortium for the Application to JCM Model...28	
4.2 FORMULATION OF MRV PLAN	29
4.3 CONSIDERATION AND AGREEMENT ON IMPLEMENTATION STRUCTURE OF JCM MODEL PROJECT	29
CHAPTER 5 CONSIDERATION OF INSTITUTIONAL DEVELOPMENT THROUGH CITY TO CITY COLLABORATION WITH YOKOHAMA CITY	30
5.1 DEVELOPMENT OF GREEN BUILDING REGULATION IN BATAM	30
5.1.1 Review of Green Building Regulations in Indonesia.....	31
5.1.2 Drafting Assessment Items of Green Building Regulation in Batam	32
5.2 STANDALIZATION OF LED STREET LIGHTS	33
5.2.1 Adopted Standard of LED Street Lights in Indonesia and Batam	34
5.2.2 Japanese Standard, Guidelines and Certification System on LED Street Lights	34
5.2.3 Promotion of Standardization of LED Street Lights in Batam	34
CHAPTER 6 PROGRESS REPORT, WORKSHOP AND PRESENTATION.....	36
6.1 KICK-OFF SEMINAR (OCT 2017).....	36
6.2 FINAL WORKSHOP (JAN 2018).....	38
6.3 CITY TO CITY COLLABORATION SEMINAR AND COMPANY VISITS.....	42
6.4 YUSA TECHNOLOGY INTRODUCTION PROGRAM (DECEMBER 2017)	43
CHAPTER 7 ISSUES AND FUTURE PLANS	45
7.1 ISSUES.....	45
7.1.1 Strong Requests for Implementation of JCM Model Project	45
7.1.2 Relationship between City-to-City Collaboration Project and JCM Model Project.....	45
7.1.3 Technical Assistance through City-to-City Collaboration Project.....	46
7.1.4 Review and Reinforcement of Task Force	46
7.1.5 Challenges about Explanation of Energy Management Technologies.....	46
7.1.6 Discussion about Direction of City-to-City Collaboration during Coming 3 years	47
7.2 FUTURE PLAN	47
7.2.1 Application for JCM Model Project in FY2018.....	47
7.2.2 Application for City-to-City Collaboration Project in FY2018	47

Table Contents

TABLE 1-1 STUDY ITEMS AND METHODS (SMART LED STREET LIGHTS).....	2
TABLE 1-2 SURVEY ITEMS AND METHODS (GREEN BUILDING).....	2
TABLE 1-3 ACTIVITIES IN FY 2015, FY2016 (BATAM CITY - YOKOHAMA CITY)...	4
TABLE 1-4 MAJOR ACTIVITIES (FY2017).....	5
TABLE 1-5 CITY-TO-CITY COLLABORATION PROJECTS (FY2017)	5
TABLE 2-1 SCHEDULE OF FIELD TRIP	7
TABLE 2-2 SCHEDULE OF STUDY TOUR IN JAPAN	7
TABLE 3-1 COMPARISON OF STANDARD AND PERFORMANCE OF STREET LIGHTS	10
TABLE 3-2 FUNCTIONS OF SMART LED STREET LIGHTS	13
TABLE 3-3 FUNCTIONS OF PV SOLAR SYSTEM	14
TABLE 3-4 INTRODUCTION SCHEDULE OF EQUIPMENT	16
TABLE 3-5 MRV IMPLEMENTATION SCHEDULE	17
TABLE 4-1 STUDIED FACILITIES AND RESULTS.....	19
TABLE 4-2 MANAGING PEOPLE OF PT FEDERAL INVESTINDO (MEGA MALL) ..	20
TABLE 4-3 THE RESULT OF SURVEY REGARDING ENERGY-SAVING IN MEGA MALL	21
TABLE 4-4 SURVEY ITEMS FOR MEGA MALL	24
TABLE 5-1 PARTNER ORGANIZATION FOR SUPPORTING DEVELOPMENT OF GREEN BUILDING REGULATION	30
TABLE 5-2 MAJOR ACTIVITIES OF SUPPORT FOR DEVELOPMENT OF GREEN BUILDING REGULATION	30
TABLE 5-3 DRAFT ASSESSMENT ITEMS OF GREEN BUILDING REGULATION IN BATAM	32
TABLE 7-1 PROPOSED PROJECT FOR JCM MODEL PROJECT IN FY2018.....	47
TABLE 7-2 CANDIDATE INDUSTRIAL PARKS FOR CITY TO CITY COLLABORATION PROJECT IN FY2018	50

Figure Contents

FIGURE 2.1 PROJECT IMPLEMENTATION FRAMEWORK (SMART LED STREET LIGHTS).....	8
FIGURE 2-2 PROJECT IMPLEMENTATION FRAMEWORK (GREEN BUILDING)	9
FIGURE 3-1 BATAMINDO INDUSTRIAL PARK AND STREET LIGHTS	12
FIGURE 3-2 OVERVIEW OF PLANNED INTRODUCED EQUIPMENT	13
FIGURE 3-3 EXISTING HID STREET LIGHTS AND SWICHBOARD	14
FIGURE 3-4 IDLE LAND SURROUNDING THE CENTRAL POWER HOUSE.....	15

FIGURE 3-5 EXPECTED INTERNATIONAL CONSORTIUM	16
FIGURE 4-1 LOCATION MAP	20
FIGURE 4-2 IMAGE OF INVERTER CONTROL OF CIRCULATING PUMPS (CHILLING PUMPS).....	22
FIGURE 4-3 IMAGE OF CONSULTING TOOLS FOR OPERATION IMPROVEMENT OF ELECTRICITY	23
FIGURE 4-4 ANNUAL ELECTRICITY CONSUMPTION AND REDUCTION POTENTIALS	23
FIGURE 4-5 ANNUAL ELECTRICITY REDUCTION BY EQUIPMENT IMPROVEMENT (TRIAL CALCULATION)	24
FIGURE 4-6 REDUCTION OF ANNUAL ELECTRICITY PRICE BY IMPROVEMENT OF EQUIPMENT (TRIAL CALCULATION)	24
FIGURE 4-7 IMAGE OF THE REAL-TIME MONITORING SYSTEM FOR ELECTRICITY CONSUMPTION.....	25
FIGURE 4-8 ELECTRICITY CONSUMPTION PER DAY (7DAYS)	26
FIGURE 4-9 MONTHLY ELECTRICITY CONSUMPTION AND MAXIMUM/MINIMUM LEVEL.....	26
FIGURE 4-10 ANNUAL ELECTRICITY CONSUMPTION.....	27
FIGURE 4-11 IMAGE OF REMOTE MONITORING FUNCTION.....	27
FIGURE 4-12 STRUCTURE OF INTERNATIONAL CONSORTIUM	28
FIGURE 5-1 ASSESSED ITEMS OF EXISTING GREEN BUILDING REGULATIONS IN INDONESIA.....	31
FIGURE 5-2 DISCUSSION AMONG BIFZA, BATAM CITY, GBCI AND AGC ASIA PACIFIC.....	33
FIGURE 7-1 3-YEARS PLAN OF CITY TO CITY COLLABORATION BETWEEN BATAM AND YOKOHAMA	48

Attachment

- Attachmet 1. Kick-off seminar (October 2017)
- Attachmet 2. Final workshop in Batam (January 2018)
- Attachmet 3. JCM seminar in Tokyo (January 2018)
- Attachmet 4. Assessment items of existing green building regulations in Indonesia

ABBREVIATION

AIST	National Institute of Advanced Industrial Science and Technology
AOTS	The Association for Overseas Technical Cooperation and Sustainable Partnerships
BIFZA	Batam Indonesia Free Zone Authority
CASBEE	Comprehensive Assessment System for Built Environment Efficient
FY	Fiscal Year
GBCI	Green Building Council Indonesia
GHG	Greenhouse Gas
HID	High-Intensity Discharge Lamp
IGES	Institute for Global Environmental Strategies
INDC	Intended Nationally Determined Contributions
JCM	Joint Crediting Mechanism
JICA	Japan International Cooperation Agency
JIS	Japan Industrial Standards
JLMA	Japan Lighting Manufacturers Association
LED	Light Emitting Diode
LOI	Letter of Intent
LSC	Local Stakeholder Consultation
METI	Ministry of Economy, Trade and Industry
MLIT	Ministry of Land, Infrastructure, Transport and Tourism
MOE	Ministry of the Environment
MOU	Memorandum of Understandings
NDC	Nationally Determined Contributions
PDD	Project Design Document
PV	Photovoltaics
YUSA	Yokohama Urban Solution Alliance

CHAPTER 1 OVERVIEW OF THE PROJECT

1.1 PURPOSE OF THE PROJECT

Japan Government submitted INDC (Intended Nationally Determined Contribution) to UNFCCC (United Nations Framework Convention on Climate Change) in July 2015, and the target reduction of GHG (Green House Gas) emission, as a feasible target by energy mix, is 26.0% (approximately 1,042,000,000 t-CO₂), compared to the emission in FY 2013 (25.4% in FY 2005). The target year to achieve is FY 2030. After the Paris Agreement came into effect in November 2016, INDCs have become NDC (Nationally Determined Contribution), and re-examination of it is required every 5 years to achieve higher target. Japan Government intends to count reduction of GHG emission with Joint Crediting Mechanism (JCM) as Japan's reduction/sink. Japan Government introduces 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 international assistance such as JCM is introduced, their target is 41% in the INDC. Therefore, Indonesia has a 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 Batam city is 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 have been 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 one of the 1st City-to-City Collaboration Projects, FY 2015 JCM Project Formulation Study for Realizing Low Carbon Cities in Asia, Ministry of Environment, was implemented. In addition, 4 FS projects under the same scheme were implemented in FY 2016: introduction of high efficiency thermal desorption unit into industrial complexes and installation of energy-saving technologies into large-scale buildings. The

purpose of this project is to formulate JCM projects using information obtained in the studies in the last 2 years, for reduction of GHG emission in Batam area. To achieve the purpose, in FY2017, feasible studies for introduction of smart LED street lights into Batam, and energy-saving/renewable-energy materials and technologies into large-scale buildings were implemented in order to formulate the JCM Model Projects for next FY while the draft of the mayor is regulation regarding green building was developed.

1.2 PROJECT IMPLEMENTATION

In this project, the following 2 FS projects were carried out.

- 1) Project for introduction of smart LED street lights
- 2) Project for introduction of Green Building

Study items and methods are as follows.

Table 1-1 Study Items and Methods (Smart LED Street lights)

#	Survey Item	Survey Method
1. Consideration of JCM Project Formulation		
1-1	Confirmation of the standard of LED	<ul style="list-style-type: none"> • Confirmation of status of the support of JLMA (Japan Lighting Manufactures Association) for LED standardization • Discussion with BIFZA and Batam City
1-2	Establishment of implementation plan	<ul style="list-style-type: none"> • Discussion with BIFZA and Batam City • Share of local governmental experience of Yokohama with Batam City
1-3	Establishment of introduction plan	<ul style="list-style-type: none"> • Field Survey in Batamindo Industrial Park and discussion • Consideration about the smartification by control system

Source: Nippon Koei

Table 1-2 Survey Items and Methods (Green Building)

#	Survey Item	Survey Method
1. Consideration of JCM Project Formulation		
1-1	Detail design and calculations of economic effects with introduction of Energy-saving solution	<ul style="list-style-type: none"> • Explanation of implementation method of energy saving to Batam City • Discussion with shopping malls • Estimation of solution cost and effects
1-2	Establishment of monitoring plan	<ul style="list-style-type: none"> • Explanation of monitoring method to Batam City • Discussion with shopping malls • Estimation of solution cost and effects
1-3	Confirmation of order and contract with local entity for project implementation	<ul style="list-style-type: none"> • Discussion of project formation with Batam City • Confirmation of fund procurement method by shopping malls • Confirmation of contract format

#	Survey Item	Survey Method
1-4	Arrangement of detail condition of international consortium for application to JCM Model Project	<ul style="list-style-type: none"> • Explanation of JCM Model Project to stakeholders • Discussion of MOU for international consortium
2. Consideration of Regulation Development		
2-1	Development of mayor ordinance regarding green building	<ul style="list-style-type: none"> • Review of Green Building Regulations in Indonesia • Drafting green building regulation in Batam, considering knowledges and experiences of GBCI and AGC Asia pacific City on green building regulations in Indonesia and in Southeast Asia and administrative experience of Yokohama City. • Explanation to staffs of Batam city and BIFZA

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 the priority areas at “17th economic 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 the 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 enterprises 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 addition, in May 2017, Yokohama Urban Solution Alliance (YUSA, general incorporated association) was established mainly by small and medium enterprises in Yokohama with a purpose to expand opportunities to implement foreign infrastructure business and to contribute to developing country by providing solutions to urban issues.

In this above situation, Mayor of Batam City visited to Japan on May 27, 2015, and signed a LOI regarding technical cooperation with Yokohama City. Yokohama City and Batam City have following activities through FS projects for JCM model project formulation by the city-to-city collaboration in FY2015 and FY2016.

Table 1-3 Activities in FY 2015, FY2016 (Batam City - Yokohama City)

Month	Activities	Place
2015 April	• Inception meeting	Batam
May	• Visit to Yokohama (Sign on LOI)	Yokohama
August	• Business matching • Inception meeting	Batam
October	• JCM Workshop, Asia Smart City Conference, site visits, etc.	Yokohama
December	• Small workshop with companies selected by BIFZA • Follow-up of studies and opinions exchange	Batam
2016 January	• Final report meeting (including related companies) • Agreement on task force consisted of 4 entities (Declaration of Formulation)	Batam
July	• Kick-off meeting for the city-to-city collaboration Project in FY2016	Batam
August	• Formation of the task force for the city-to-city collaboration	---
October	• JCM seminar	Kitakyushu
November	• Batam investment seminar	Yokohama
2017 January	• Final seminar for the city-to-city collaboration Project in FY2016	Batam
February	• Completion of 6 pillars of the city-to-city collaboration between Batam and Yokohama (1 st draft)	---

Source: Nippon Koei

FY2016's major activities are as below.

Table 1-4 Major Activities (FY2017)

Date	Activities
2017 August	MOE kick-off meeting
October	Kick-off meeting @ Batam
December	Progress report meeting to MOE
	Consideration of draft assessment items for green Building regulation in Batam
2018 January	Final workshop @ Batam
	City to City Collaboration Seminar @ Tokyo
	Finalization of draft assessment items for green building regulation in Batam
February	Final report meeting to MOE
March	Application for City-to-City Collaboration Project in FY2018 (Planned)
April-May	Application for JCM Model Project in FY 2018 (Planned)

Source: Nippon Koei

In this FY, following 4 projects were simultaneously implemented in regard with the city-to-city collaboration between Batam and Yokohama. By collaborating with this project, business matching and project development were achieved in various sectors under framework of the city-to-city collaboration. These activities were implemented with cooperation with YUSA which was established so as to carry out Y-PORT project with collaboration between public and private sectors.

Table 1-5 City-to-City Collaboration Projects (FY2017)

Project Title	Overview	Fund
Pre-feasibility Study on water and wastewater facility improvement in Batam	FS for introduction of Japanese technologies regarding water supply into Batam. The result of this study was presented in final workshop of this project.	METI
Developing the Methodology for Measuring and Realizing the Sustainability of Cities in the APEC region (Guidebook for Development of Sustainable Cities -Resource Circulation and Waste Management -)	FS to conducting quantitative evaluation of the level of Batam city's waste management and propose solutions using Japanese technology. The result of this study was presented in final workshop of this project.	METI
Consideration of Urban Solutions using technologies and products of companies in Yokohama, to Development Business in Industrializing Countries	Implementation of group study with local entities regarding waste management, sewage system and energy saving etc. Also, business matching was carried out in final workshop of this project.	Yokohama City

FY2017 City to City Collaboration Program

Project for Development of Low-carbon City through City to City Collaboration between Batam and Yokohama
(Support of Green City Policy of Batam by Introduction of Smart LED Street Lighting System and Green Building)

Project Title	Overview	Fund
The Study Tour Program on the Improvement of BATAM Island Water Supply and Sewerage Infrastructure Project for Indonesia	Invited 9 staffs from BIFZA to Japan, and implemented site visits to facilities related to water supply and sewage system including those in Yokohama. As one session, invitees participated in a technology introduction seminar organised by YUSA.	AOTS

Source: Nippon Koei

CHAPTER 2 SCHEDULE AND PROJECT IMPLEMENTATION FRAMEWORK

2.1 WORK SCHEDULE

Schedules of field trip, participation in meetings and site visits in Japan are as follows.

Table 2-1 Schedule of Field Trip

Title	Period	Work Contents
1 st Field Trip	2017 2-6 Oct	<ul style="list-style-type: none"> ◆ Kick-off seminar ◆ Courtesy call on Chairman of BIFZA and Vice Mayor of Batam City ◆ Discussion of smart LED street lights with Batamindo Industrial Park ◆ Discussion with BCS Shopping Mall and Botania 2 Shopping Mall regarding introduction of energy-saving technology ◆ Discussion with BIFZA and Batam City
2 nd Field Trip	13-22 Nov	<ul style="list-style-type: none"> ◆ Courtesy call on new Deputy Chairman of BIFZA ◆ Courtesy call on new Head of Environment Department of Batam City ◆ Discussion with BIFZA and Batam City ◆ Site visit to Batamindo Industrial Park and discussion ◆ Site visit to Botania 2 Shopping Mall and discussion
3 rd Field Trip	26-29 Dec	<ul style="list-style-type: none"> ◆ Progress report to BIFZA and Batam City ◆ Discussion with Mega Mall
4 th Field Trip	2018 15-19 Jan	<ul style="list-style-type: none"> ◆ Courtesy call on Deputy Chairman of BIFZA ◆ Final workshop ◆ Group Discussion among BIFZA, Batam City and GBCI regarding development of green building regulation ◆ Discussion with Batamindo Industrial Park regarding introduction of smart LED street lights and PV

Source: Nippon Koei

Table 2-2 Schedule of Study Tour in Japan

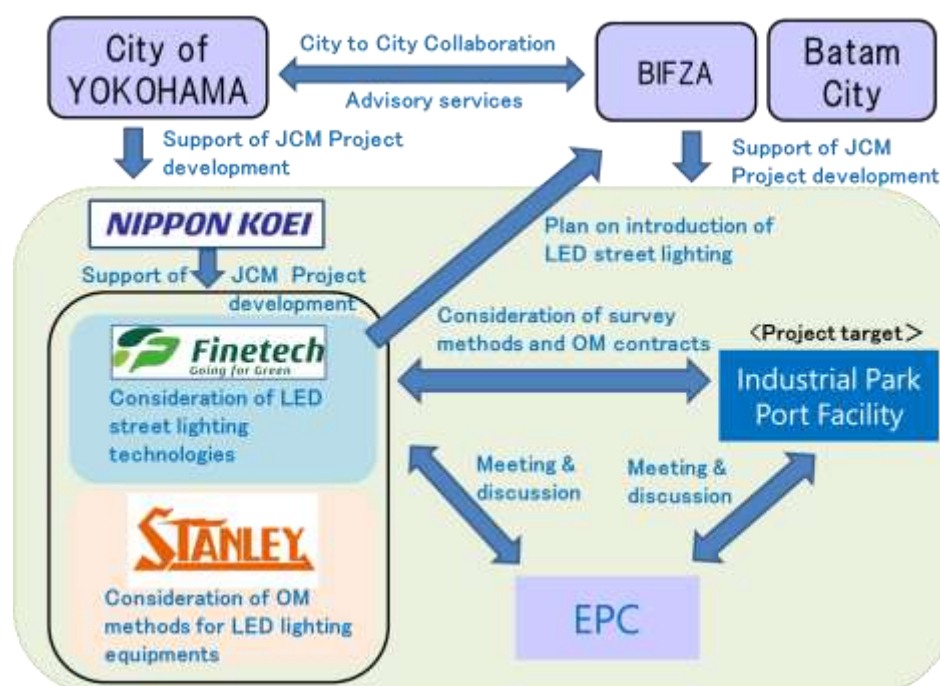
Title	Period	Contents	Participants
Study Tour Program (AOTS)	2017 11-20 Oct	<ul style="list-style-type: none"> ◆ YUSA Technology Introduction Program ◆ Courtesy call on International Affairs Bureau of Yokohama City 	9 staff from BIFZA including Deputy Chairman Mr.Eko

Title	Period	Contents	Participants
City to City Collaboration Seminar (MOE/IGES)	2018 29 Jan-1 Feb	<ul style="list-style-type: none"> City to City Collaboration Seminar Company Visits to Stanley Electric and AGC 	2 staff from BIFZA
Study Tour (University of Tokyo)	2018 26 Feb-2 Mar	<ul style="list-style-type: none"> Workshop Accelerating the transformation towards sustainable low-carbon and resilient cities in Asia (Tokyo) Site Visits (Biomass power generation and Kawasaki Environmental Research Institute (Kawasaki), Kitakyusyu Asia Centre for Low Carbon Society (Kitakyusyu), Mega Solar Power Plant (Niigata)) 	2 staff from Batam City

Source: Nippon Koei

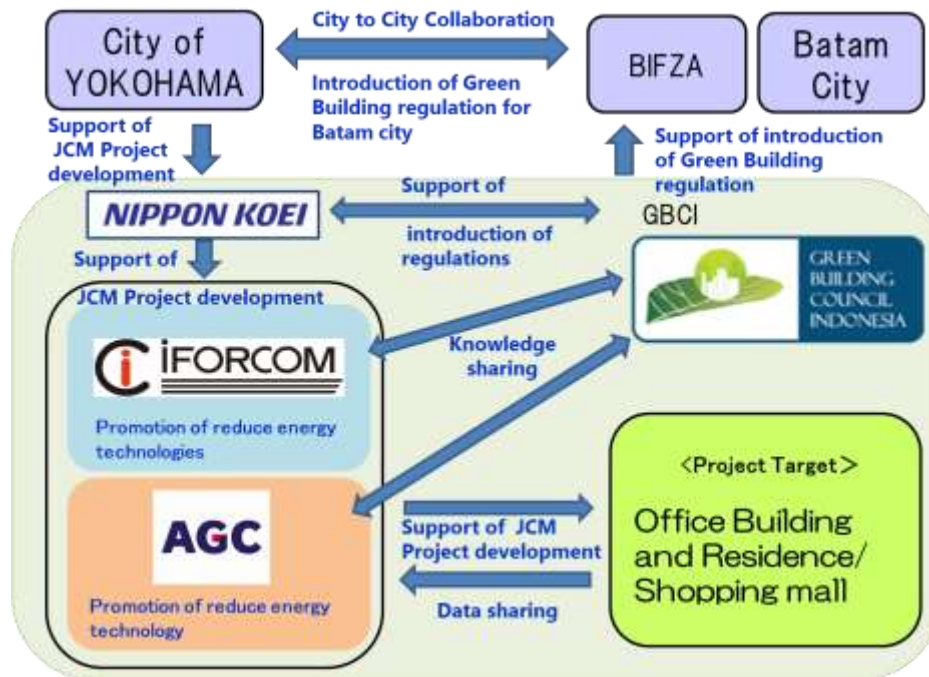
2.2 PROJECT IMPLEMENTATION FRAMEWORK

Project implementation framework is as follows.



Source: Nippon Koei

Figure 2-1 Project Implementation Framework (Smart LED Street Lights)



Source: Nippon Koei

Figure 2-2 Project Implementation Framework (Green Building)

CHAPTER 3 FEASIBILITY STUDY OF JCM PROJECT (1)

3.1 PROJECT FOR INTRODUCTION OF SMART LED STREET LIGHTS AND PV SOLAR SYSTEM

3.1.1 Confirmation of Standard of LED Street lights

It was found that policies concretely referring to energy saving of street lights on national roads and roads in public facilities have not been developed through discussion with BIFZA controlling industrial parks in Batam. However, as a result of interviews to organization relating lighting equipment, administrative bodies and companies, it is also confirmed that the Indonesian government will standardize LED street lights in near future.

In addition, as a result of field study in Batamindo Industrial park, it was confirmed that existing HID street lights in Batamindo are in accordance with IEC under BIFZA's guidance. Therefore, this consideration was carried out under condition that proposed LED street lights in this project must follow IEC.

Moreover, in order to consider concrete standard of LED lights, information of street light equipment was collected and reviewed. As a result, simple comparison was conducted among three street lights below.

1. Existing HID street lights in Batam
2. General LED street lights in Southeast Asia (made in Europe)
3. Proposed LED street lighting for Batamindo Industrial Park (made by Stanley Electric)

Table 3-1 Comparison of Standard and Performance of Street Lights

Items	General HID (Existing)	General LED (European product)	Proposed LED (Japanese product)
Adaptation to IEC/CIE (Standard of safety/lighting)	Adapted	Adapted	Adapted
Adaptation to guideline of MLIT (street lights/tunnel lights)	No	No	Adapted
Price (※)	HID 180W (Approx. JPY 600,000)	120W (Approx. JPY 100,000)	75W (Approx. JPY 100,000)
Period of Insurance	No information	3 years	5 years
Efficiency (lm/W)	106	110	140
Electricity consumption	200W	120W	75W
Weight	15 k g	14kg	8Kg

Items	General HID (Existing)	General LED (European product)	Proposed LED (Japanese product)
Maintenance	Replacement of lump every 6-10 years	No need for 15 years	No need for 15 years
Color rendering index	Ra=25	Ra=70	Ra > 70
Other characteristics	<ul style="list-style-type: none"> • Non Directivity 	<ul style="list-style-type: none"> • High directivity • Low insect-attraction property 	<ul style="list-style-type: none"> • High Directivity • Suitable lighting design by technology of Stanley • Low insect-attraction Property

Source: Nippon Koei

3.1.2 Overview of Project

At the beginning of this study, introduction of smart LED street lights had been considered, but as a result of discussion with BIFZA, Batam City and Batamindo, the project site was decided to be Batamindo which was planning to introduce LED street lights. Also, because it was declared that Batamindo has a strong interest in introducing renewable energy through discussion with managers of Batamindo, PV solar system was included in the introduction plan of smart LED street lights.

Overview of the project is as follows.

Planned installed location of LED street lights: Public road in the property,

The number of LED street lights: Approx. 700

PV solar system with smart tracking system:

1. On the roofs of 7 buildings in commercial area
2. On the roofs of 3 buildings in residential area
3. On the idle land surrounding central power house (Approx. 20,000m²)

Total: 1.0 – 1.5MW



Location of Batamindo



Management Office



Map of property of Batamindo





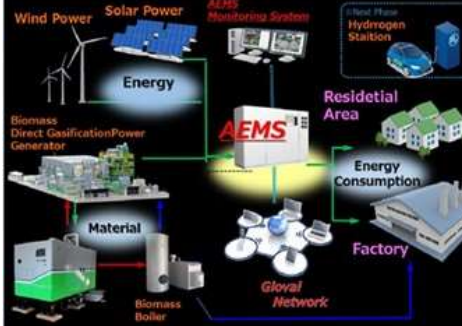
Road and street lights

Source: Nippon Koei/Finetech

Figure 3-1 Batamindo Industrial Park and street lights

3.1.3 Overview of Planed Introduced Equipment and System

As a result of discussion with related people, procurement of equipment and system is being planned as shown below.

Introduced equipment and system	Manufacturer • Product name • Function	Images
1) LED street lights	<ul style="list-style-type: none"> • Manufactured by Stanley electric • LED Street light 'YR2018' • Maximum energy-saving rate: 70% 	
2) PV Solar System	Manufactured by Topper Sun Japan PV Solar System with Tracking system, Dual-Axis Tracking System. Increasing rate of energy generation: 35~40%	
3) Energy Management System	Manufactured by Finetech Advanced Energy Management System (AEMS) (effective energy supply and monitoring and control)	

Source: Finetech

Figure 3-2 Overview of planned to be introduced equipment

3.1.4 Consideration of Function

Additional functions of planned introduced smart LED street lights and PV solar system are considered as written below.

Table 3-2 Functions of smart LED street lights

Function	Overview
Alarming function	To alarm to troubles of lighting equipment such as burn out of lights, cut of cable and leakage.
Visualization of important parameters (AEMS)	To visualize of luminance of LED, voltage level, electric current, electricity consumption by AEMS.
Control of illumination and on/off function	<ul style="list-style-type: none"> -To turn individual LED street lights on/off by remote control. -To control luminance responding to surrounding environment.

Source: Finetech

Table 3-3 Functions of PV solar system

Function	Overview
Panel with tracking system	Function to increase electricity generation with panels with tracking system of dual method of vertical and horizontal axis.
Interchange of generated electricity (AEMS)	Function to avoid surplus electricity by working with PCS. When surplus electricity is generated by PV, the surplus can be interchanged to other facility.

Source: Finetech

3.2 CONSIDERATION OF INSTALLATION LOCATION

Installation location of smart LED street lights

Replacement of approx. 700 of existing street lights (HID) along public roads in Batamindo Industrial Park is being planned. In order to smoothly monitor and control LED street lights, the optical fiber installed in 2017 can be utilized.



Source: Nippon Koei

Figure 3-3 Existing HID street lights and switchboard

Installation location of PV solar system

Planned installation location is on the vacant land surrounding the central power house (Approx.20,000m²) and on the roofs of some buildings in Batamindo.



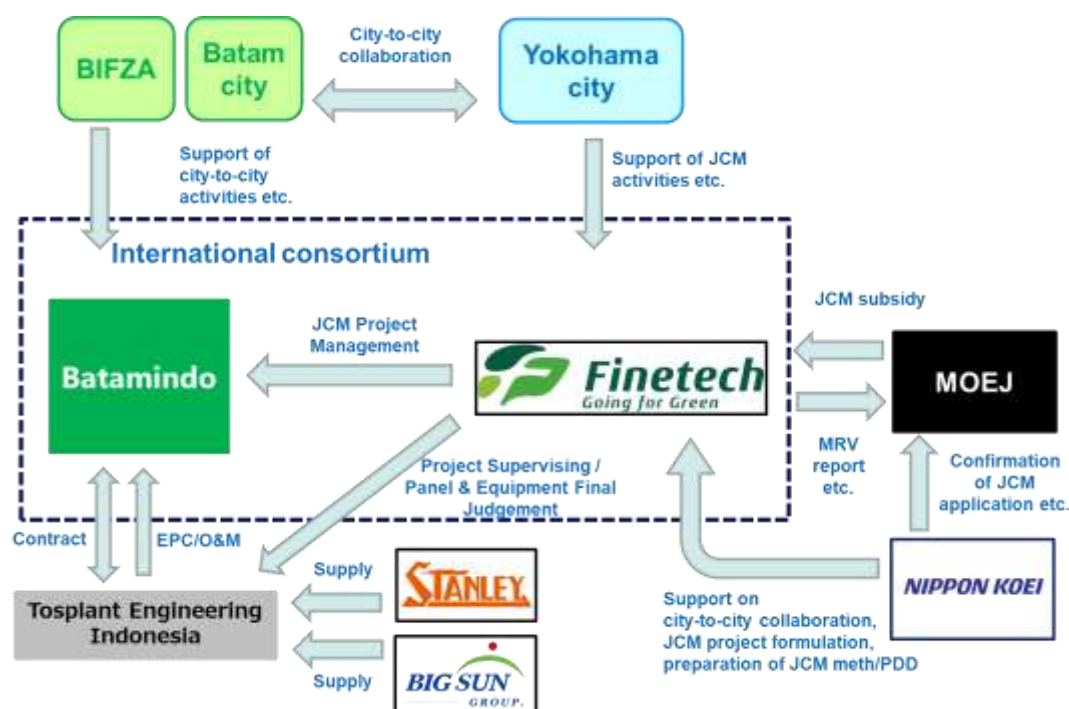
Source: Finetech

Figure 3-4 Vacant land surrounding the central power house

3.2.1 Finalization of Implementation Structure

Representative entity of JCM model project related to introduction of smart LED street lights and PV solar system into Batamindo will be Finetech. The project will be implemented by the international consortium of Finetech and PT Batamindo Investment Cakrawala as a local partner. Nippon Koei will be in charge of development and operation of MRV Methodology as an adviser.

Regarding reporting, Finetech reports to MOE while the user, PT Batamindo Investment Cakrawala, implement monitoring under management of Finetech. PT Batamindo Investment Cakrawala is responsible for inspection, replacement of parts and repairing, and is planning to make a contract with a local O&M company.



Source: Nippon Koei

Figure 3-5 Expected international consortium

3.2.2 Installation Schedule of Smart LED Street Lights and PV Solar System

As reference to schedule in FY2017, application schedule for JCM model project in FY2018 is being planned as below.

Table 3-4 Introduction schedule of equipment

Month	Activity and Process
2018 March	Explanation to Indonesia JCM Secretariat
April	Start of public offering for JCM model project
May	Deadline of application for JCM model project
June to October	Announce of adaptation results, Application for Promulgation, Announce of Promulgation, Making a contract with EPC
2019 March	Introduction of equipment
April	Trial Operation Completion inspection
May	Start of operation

Source: Finetech

Financial plan is an important point for application for JCM model project. Batamindo is planning to apply the saved personnel expenses to the CAPEX. Hereafter, in addition to implementing more accurate trial calculation, cost-estimation of candidate EPC company and optimization of expense as preparation for applying for JCM model project.

3.3 DEVELOPMENT OF MRV PLAN

3.3.1 Eligibility Requirement

As MRV methodology for JCM model project, eligibility requirement was considered as written below.

Replacement from existing HID street lights to smart LED street lights

- It is planned to adopt the methodology which will be developed through the project in Karawang Industrial Park in Indonesia titled 'The introduction of smart LED street lighting system into an industrial park'.

Introduction of PV solar system with tracing system

- It is planned to adopt ID_AM013 'Installation of Solar PV System'

Introduction of energy management system (EMS) technologies

- Finetech and National Institute of Advanced Industrial Science and Technology (AIST) are confirming emission reduction effect of EMS.
- Once the method to quantify emission reduction is decided, new methodology will be considered. (Currently, emission reduction by AEMS is not yet counted in this report)

3.3.2 MRV Implementation Schedule

Implementation schedule of MRV will be considered as follows

Table 3-5 MRV implementation schedule

Schedule	Activities
September to November 2018	Preparation for proposed methodology, Implementation of LSC
November 2018 to April 2019	Submission of proposed methodology, Integrity confirmation, Public input, Evaluation of proposed methodology, Implementation of Verification of proposed methodology
April to June 2019	Completion of PDD, Development of monitoring plan
June to August 2019	Implementation of validation, Public input, integrity confirmation, Registration
August 2019 to JCM period	Monitoring, Verification, Issue of credit

Source: Finetech

In regard with a monitoring method, electricity consumption, operation period, electricity generation and consumption of generated electricity will be automatically monitored from

remote environment by using a part of functions of AEMS introduced by Finetech. By doing this, verification regarding reporting data can be conducted efficiently and accurately.

3.4 CONSIDERATION AND AGREEMENT ON IMPLEMENTATION STRUCTURE

3.4.1 MOU of International Consortium

In March 2018, as an evidence of decision-making for participation in the project, MOU of international consortium between Finetech and Batamindo will be controlled.

3.4.2 Licence of Individual Power Producer (IPP)

In order to install electricity generation equipment, a license from PLN (national energy distribution company in Indonesia) is required. However, the procedure to acquire the license is complicated and also it takes long period to acquire it, which might have influenced this project. Thus, at the beginning of this project, it was considered that generated energy from PV solar system is consumed in facilities in Batamindo without selling the energy to PLN.

However, it was found that Batamindo Industrial Park has the license and supplies electricity from its central power house (thermal energy) to tenants. In the future, if this project is implemented and proper energy management is operated, it becomes possible to consider developing the scheme of electricity interchange of surplus among facilities in the industrial park.

3.4.3 Expectation of Implementation of JCM Model Project

In Batam, Batamindo is considered as one of the core industrial parks. In industrial parks in Batam, introduction of LED street lights and PV solar system with mega class has not been implemented yet. If this planned project is implemented, it is expected that Batamindo will become a showcase and the possibility of dissemination to other industrial parks in Batam becomes higher, which would help not only dissemination of the energy-saving technology but also the propulsion of the concept 'Green and Smart Island Batam'

From the perspective of the industrial park policy of Batam, the improvement of the environment by installing Japanese low-carbon technology is expected to contribute to attraction to tenant companies including Japanese.

CHAPTER 4 FEASIBILITY STUDY OF JCM PROJECT (2)

4.1 GREEN BUILDING REGULATION

4.1.1 Detail Design and Calculations of Economic Effects with Introduction of Energy-saving Solution

1) Selection of Project Target Facilities

In this study, interview (about electricity consumption, annual electricity cost and operational situation and renewal timing of air conditioning equipment) and field studies of facilities were implemented at large-scale facilities in Batam city in order to discover target facilities for JCM model projects. The results of survey are written in the below.

Table 4-1 Studied Facilities and Results

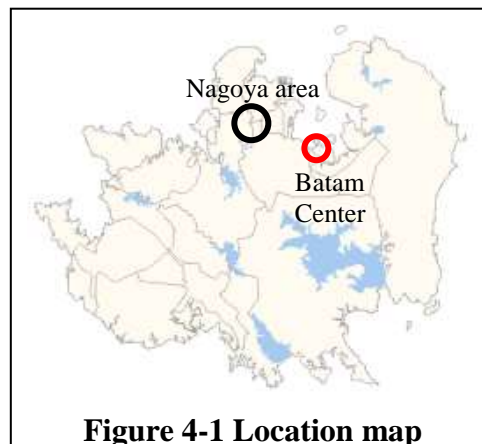
Name of Facility	Type of Facility	Feasibility of introduction of saving-energy technology	Result of selection
1. Batam City Square (BCS)	Shopping Mall	Consideration of energy-saving measures was cancelled because of the change of BCS's investment priority.	Not selected
2. Kapita Plaza	Shopping Mall	Because of too small-scale, this facility is not suitable for JCM model project.	Not selected
3. Graha Pena Batam	Office Building	Study was stopped because of sudden retirement of the contact person of this facility	Not selected
4. Botania 2 Mall	Shopping Mall (under construction)	Discussion about introduction of energy-saving technologies is planned after the open of the mall (around May 2018)	Pending till next year
5. Mega Mall	Shopping Mall	This mall showed their strong interest in introduction of energy-saving technologies. As a target facility of the JCM model project in FY2018, this mall decided to prepare for proposal for subsidy.	Selected

Source: iForcom

2) Overview of Target Facility

Project target facility, Mega Mall (Management Company: PT Federal Investindo) is located in the north part of Batam island named Batam Center district. The site area of Mega Mall is around 51,000m² (land area: 2.7ha). The building has 4 floors above the ground and is one of the largest shopping malls in Batam.

There are the Grand Mosque Batam Center, Batam Center Ferry Terminal, Mayor's office, Assembly's Office, Bank Indonesia (BI)'s office, BIFZA's office, and Costarina Modern Housing Complex around the mall. In addition, the mall is good access from city center. Hypermart (Supermarket), Matahari Department Store (department store), and Cinema XXI (movie theatre) are inside of the mall, and it has around 10,000 visitors per day.



Address : JL. Engku Putri no.1, Teluk Tering, Batam Center, Kota Batam, Kepulauan Riau 29461
 Tel: +62 778 470 100

The mall's managing people and positions are listed below.

Table 4-2 Managing People of PT Federal Investindo (Mega Mall)

No	Name	Position
1	Bowie Yoenathan	Director
2	Ir Tendessy M. Bahri	General Manager
3	Wanto, SE	Operational Manager
4	Bernard Sarumpaet	Chief Engineering
5	Tuti	Secretary

3) Interview and Field Survey for Improvement Energy-Saving Equipment

To evaluate the energy-saving potential of the mall by renewal facilities and improvement of operation, interview and field survey were conducted as described below.

Table 4-3 The Result of Survey regarding Energy-Saving in Mega Mall

Target equipment	Study Items	Results of Survey (Energy-saving potential)
Chiller (Interview, Field Study)	Number of Chiller (Operating Conditions)	<ul style="list-style-type: none"> • Controlling water temperature • Limiting the number of compressor in chiller
	Hours of Operation	<ul style="list-style-type: none"> • Shortening operating hours
	Capacity	<ul style="list-style-type: none"> • @600TR Liquid Cooled, solid state starter, 371kw 380V 50Hz • No need to change capacity
Circulating Pump (Interview, Field Survey)	Number of Chiller (Operating Conditions)	<ul style="list-style-type: none"> • Limiting the number of pumps
	Hours of Operation	<ul style="list-style-type: none"> • Shortening operating hours
	Capacity	<ul style="list-style-type: none"> • @55kw 380V 50Hz Rpm 1480 • No need to change capacity
Inside of the mall (Field Survey)	Temperature	<ul style="list-style-type: none"> • Keeping the temperature stable for energy-saving with operation control since the temperature is unstable (21.8°C~24.9°C)
	Illuminance	<ul style="list-style-type: none"> • Considering additional proposal of installing LED lights.

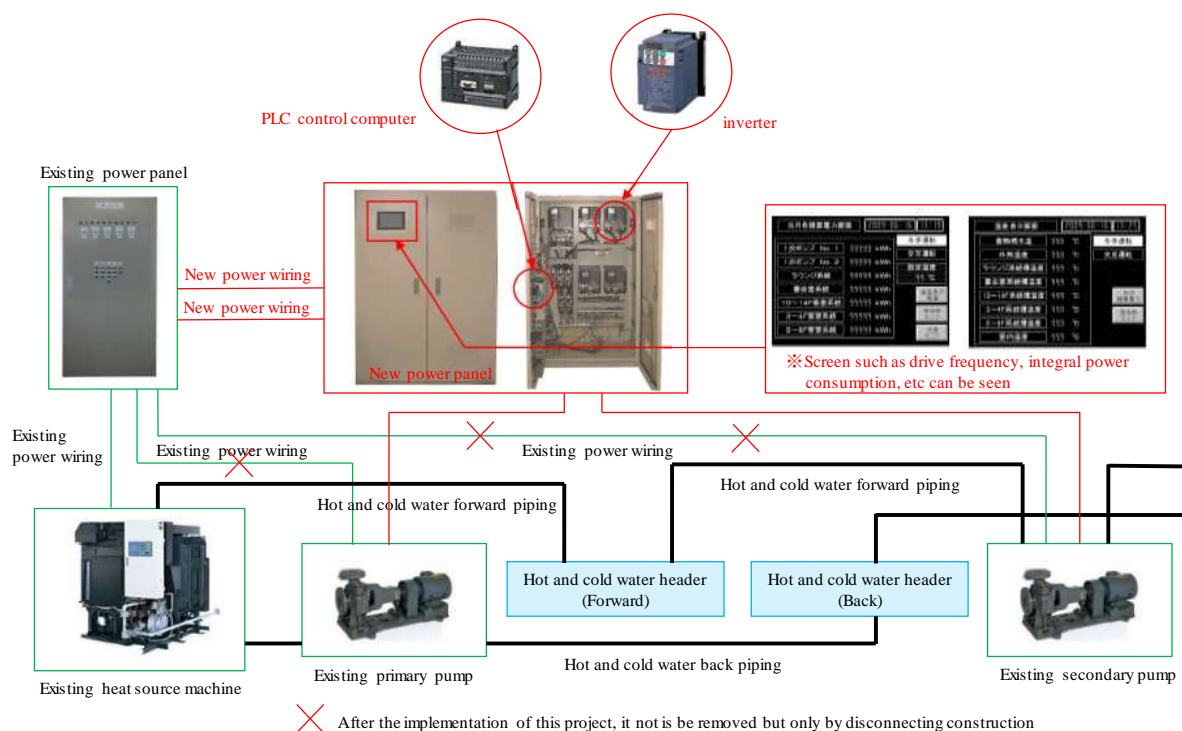
Source: iForcom

4) Proposal of introduction of Energy-Saving Equipment/Systems

Considering the results of interview and field study and taking advantage of experiences on energy-saving equipment/systems introduction in Japan, we proposed to introduce following equipment and systems to Mega Mall.

A. Inverter Control of circulating pumps (chilling pumps)

Mega Mall operates circulating pumps (chilling pumps) without inverter. Therefore, we proposed to control by introducing inverter systems in order to respond to changes of temperature and change of the number of visitor.



Source: iForcom

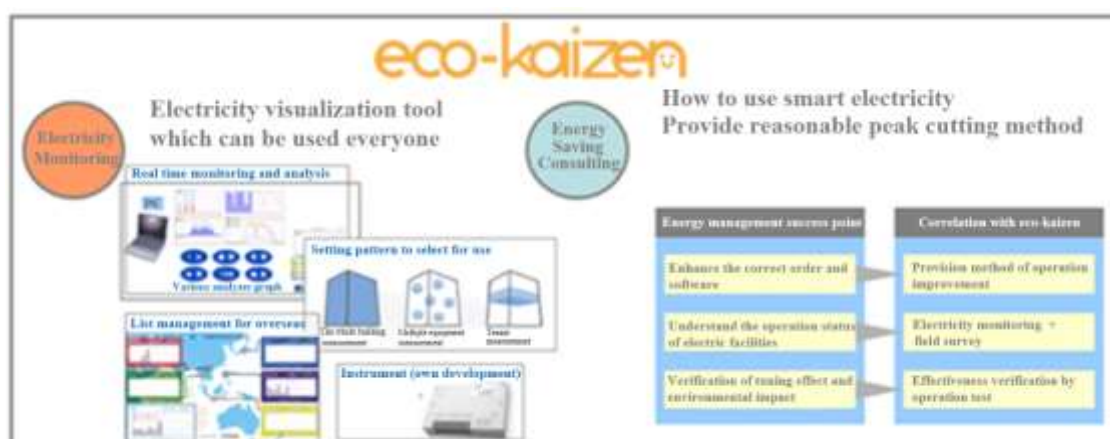
Figure 4-2 Image of inverter control of circulating pumps (chilling pumps)

B. Exchange of Chillers and Introduction of Invertor Control

We proposed to introduce turbo chiller and inverter since the renewal timing of spare chillers (3 of old fashioned chillers) in Mega Mall is coming. Type of the inverter we recommended was “HTV600BX” which has 630 (USRT) (2,215(kW)) of chilling ability and 339(kW) for output as a standard specification (temperature of cold water at exit: 7°C).

C. Introduction of Consulting Tools for Operational Improvement of Electric Power

We proposed to introduce a consulting tool for operational improvement of electric power (ECO-KAIZEN) in order to implement visualization and monitoring as best available solution of energy saving. When producing systems, it was considered that maintenance and renewal did not adversely influence on productivity and organizational structure of the mall.

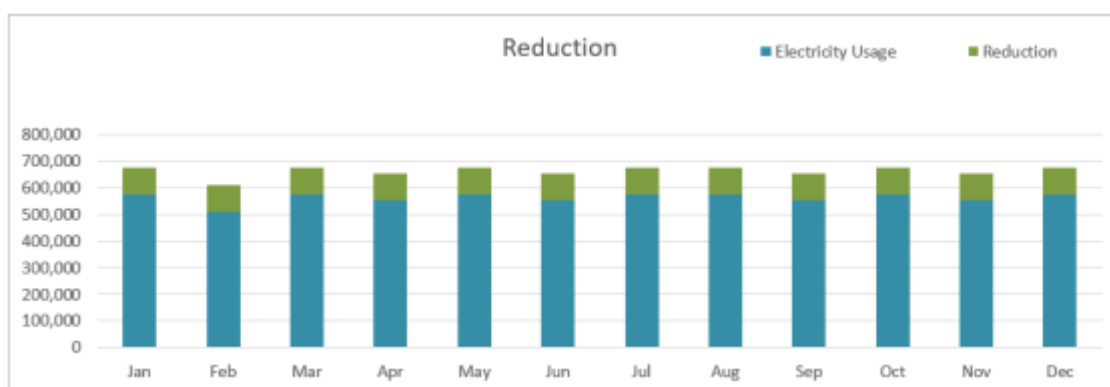


Source: iForcom

Figure 4-3 Image of consulting tools for operation improvement of electricity

5) Result of Energy-Saving Diagnosis (Calculation of Energy-Saving Potential)

To quantify electricity reduction effect of proposed equipment/systems, simple energy-saving diagnosis was carried out by using Mega Mall's annual electricity consumption data (December 2016-November 2017). The results are shown below. Annually they can reduce 1,238,354kWh and save 1 billion IDR (around 8 million yen).



Source: iForcom

**Figure 4-4 Annual electricity consumption and reduction potentials
 (Blue: Electricity consumption, Green: Reduction of consumption)**

《Reduction》				
Estimation conditions				
• Operation time 12H/day				
• Week-ends and public holidays are opened				
① Chiller Control				
Power consumption of the chiller and condenser pump	x	Reduction coefficient		
4,366,860	x	8.3%	=	363,905 kWh/year
② Chiller Tuning				
Power consumption of the chiller	x	Reduction coefficient		
3,788,700	x	91.7% x 5.0%	=	173,649 kWh/year
③ Control by Inverter				
Power consumption of the chilled water pump	x	Reduction coefficient		
657,000	x	48.0%	=	315,360 kWh/year
④ AHU Operation				
Power consumption of the AHU	x	Reduction coefficient		
2,312,640	x	100.0% x 16.7%	=	385,440 kWh/year
※ Since it is estimated the potential of reduction electricity bills with the electricity consumption based on data, there is no warranty for reduction effect.				

Source: iForcom

Figure 4-5 Annual electricity reduction by equipment improvement (Trial Calculation)

① Chiller Control	363,905 kWh/year
② Chiller Tuning	173,649 kWh/year
③ Control by Inverter	315,360 kWh/year
④ AHU Operation	385,440 kWh/year
Total	1,238,354 kWh/year
Estimation conditions	Calculated using the reduction coefficient of Japan
	The safety factor of the reduction coefficient it was 20%
	Energy charge "IDR 1,100 "
Reduction amount/year	IDR 990,683,000

Source: iForcom

Figure 4-6 Reduction of annual electricity price by improvement of equipment (Trial Calculation)

4.1.2 Formulation of Monitoring Plan

1) Monitoring Items

Items for electricity monitoring in Mega Mall are supposed to be the following.

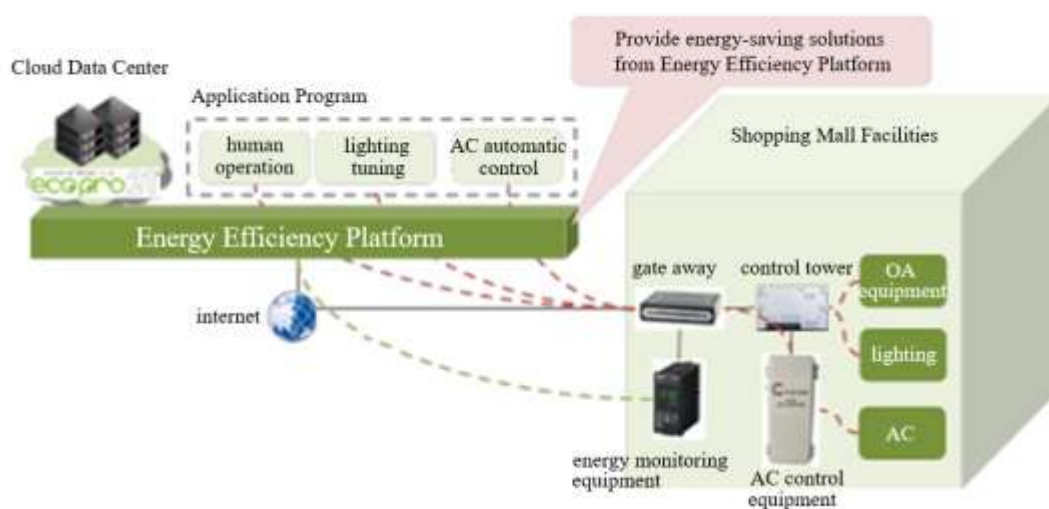
Table 4-4 Survey Items for Mega Mall

Category	Unit	Items
Electricity Consumption	kWh	Entire Facility (kWh)
	kWh	Pumps with inverter
	kWh	Electricity consumption of chiller
Temperature	°C	Indoor temperature

Source: iForcom

2) Planed Monitoring System

In this project, we are planning to introduce the real-time monitoring system into Mega Mall in order to check electricity consumption (every 30 minutes) and to improve operation. One of the advantages of this system is the ability to collect and analyze data instantly in various occasions (e.g. when introducing method of controlling air conditioning, when improving environment for energy saving and when improving operation's rules). In addition, it has an ability to collect and analyze data every 10 minutes if required.

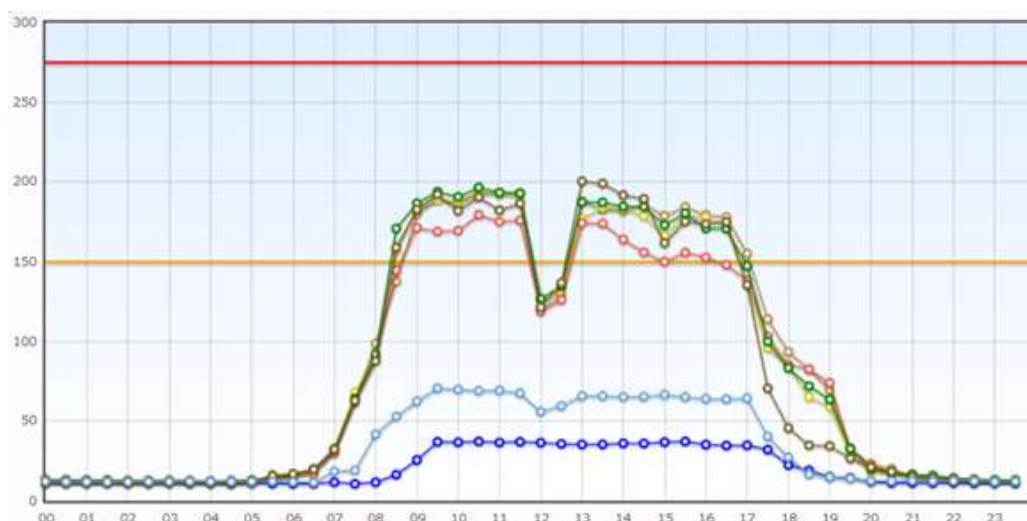


Source: iForcom

Figure 4-7 Image of the real-time monitoring system for electricity consumption

3) Image of Monitoring Data

Following figures (Figure 4-8,9,10) show the visualization examples of monitoring data. It is possible to check the trend of electricity consumption for each hour by analyzing all day, and also to check long-term tendency such as daily gaps and the day which the consumption is high/low.



Source: iForcom

Figure 4-8 Electricity Consumption per day (7days)

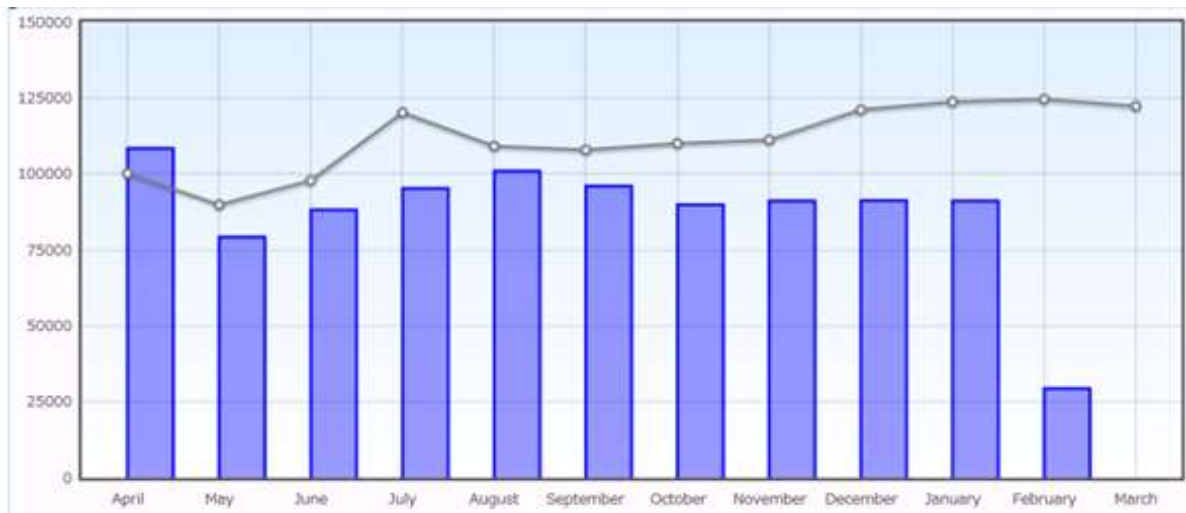
Also, it is possible to check hours which have a big potential to cut the peak by calculating monthly electricity consuming graph and maximum/minimum graph (Figure 4-8).



Source: iForcom

Figure 4-9 Monthly Electricity Consumption and Maximum/Minimum level

Moreover, it is possible to check the reduction effect of electricity consumption caused by introduction of energy-saving equipment and systems from annual electricity consumption graph (Figure 4-9).

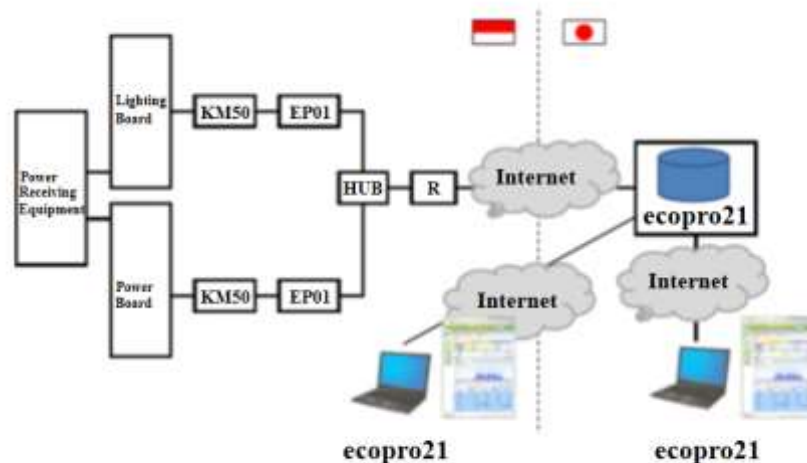


Source: iForcom

Figure 4-10 Annual electricity consumption

4) Superiority of Monitoring System to Introduce (Planned)

Proposed monitoring system has remote monitoring function which enables monitoring electricity consumption from remote even from other countries including Japan. Thus, when installing this system and starting operation, it is possible to check real-time data of electricity consumption and energy-saving effect, which materializes consultation for operational improvement.



Source: iForcom

Figure 4-11 Image of Remote Monitoring Function

4.1.3 Confirmation of Ordering and Agreement Procedures of Local Entities

As suppliers of proposed project, Japanese suppliers below are being planned (all of them have already approved for activities in overseas). Procurement of chiller is under discussion with Japanese companies, and will be decided as a result of further discussion with Mega Mall.

1. Measuring instrument

Name of company: iFORCOM Smart Ecology Co., Ltd.

Address: Kagawa Building, 1326 Nakano, Midori-ku, Sagamihara-shi, Kanagawa-ken

Phone: 042-780-7114

2. Inverter

Name of company: Technical Machine Service Co., Ltd.

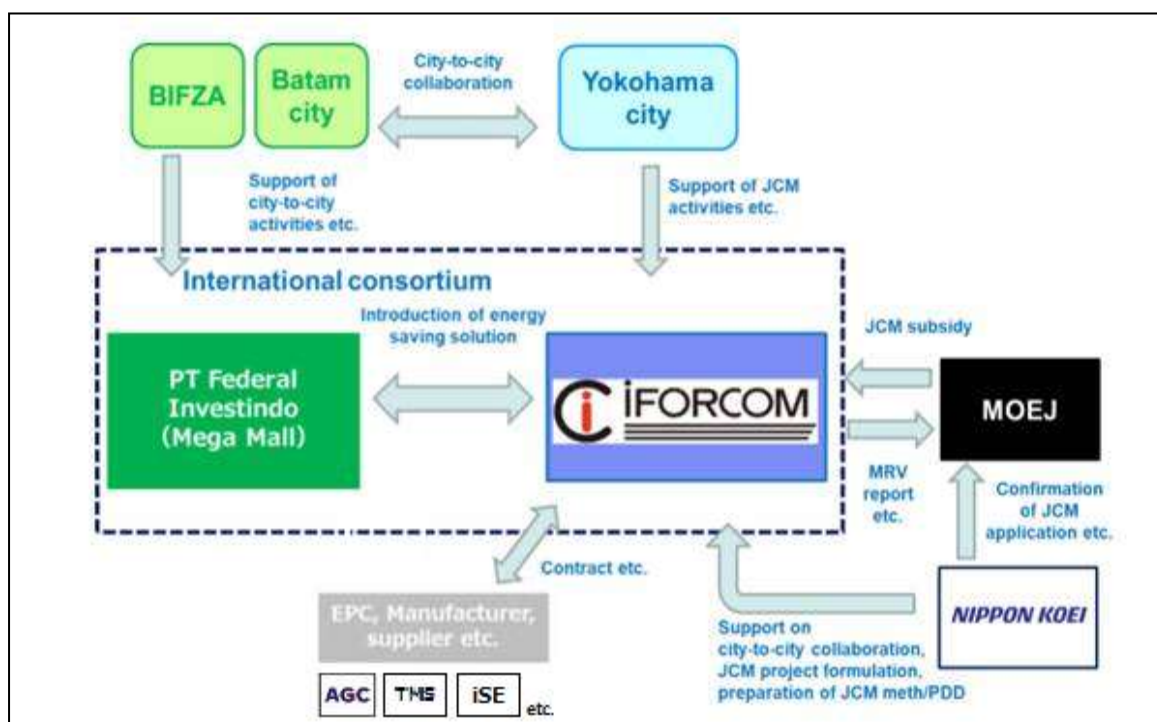
Address: 3-10-6, Momijioka, Fuchu-shi, Tokyo-to

Phone: 042-369-4221

3. Chiller: Under discussion

4.1.4 Detail Condition Adjustment of Consortium for the Application to JCM Model

Following structure is proposed toward application for “FY2018 JCM Model Project” as a result of discussion with Mega Mall and stakeholders.



Source: Nippon Koei

Figure 4-12 Structure of International Consortium

4.2 FORMULATION OF MRV PLAN

Following is the supposed implementing structure for MRV on implementation stage of JCM Model Project.

Measurement: It is always possible to access to the real time monitoring data of electricity consumption from PT Federal Investindo (Managing company of Mega Mall) .

Reporting: PT Federal Investindo selects and analyzes required data from mass data, and iFORCOM supports to create monitoring report, and then, reports to joint committee.

Verification: Nippon Koei, the secretariat entity of this project, will support verification as a MRV consultant.

4.3 CONSIDERATION AND AGREEMENT ON IMPLEMENTATION STRUCTURE OF JCM MODEL PROJECT

As of February 2018, the detail of MOU for the implementation structure (Figure 4-12) is under the final adjustment.

Representative Company: iFORCOM Co., Ltd.

Project Partner: PT Federal Investindo (Mega Mall)

CHAPTER 5 CONSIDERATION OF INSTITUTIONAL DEVELOPMENT THROUGH CITY TO CITY COLLABORATION WITH YOKOHAMA CITY

5.1 DEVELOPMENT OF GREEN BUILDING REGULATION IN BATAM

Because Batam City is small island, efficient use of water and energy and reduction of waste are necessary to realize sustainable development. However, there are many projects of large-scale buildings being planned in the city center, which is urgent matter for the city. Considering this background, support for development of green building regulation was conducted by taking advantage of knowledges and experiences of Yokohama City in this project.

In order to find Best Available Solutions for Batam City, this support was implemented under cooperation with organizations shown below.

Table 5-1 Partner organization for supporting development of green building regulation

Organization	Knowledge and experience of green building regulation
Housing and Architecture Bureau Yokohama City	This Bureau is in charge of the Environment-conscious Building Regulation being operated with individual green building rating system (CASBEE Yokohama) in Yokohama
GBCI	GBCI is NPO to promote green building in Indonesia and has experiences of supporting development of green building regulation in DKI Jakarta and Bandung City.
AGC Asia pacific	One of the partner companies of World Green Building Council Asia Network. They have abundant knowledges of green building regulations in South-east Asian nations.

Source: Nippon Koei

Major activities are shown below.

Table 5-2 Major activities of support for development of green building regulation

Month	Activities
2017 OCT	<ul style="list-style-type: none"> • Kick-off seminar in Batam • Discussion of assessment items of green building regulation with the Environment Department of Batam City • Participation to Asia Smart City Conference
NOV	<ul style="list-style-type: none"> • Reviewing existing green building regulation in Indonesia • Confirming stakeholders of development of green building regulation • Confirming the procedure of green building regulation
DEC	<ul style="list-style-type: none"> • Support for documentation of commitment letter from Batam City to GBCI

Month	Activities
	<ul style="list-style-type: none"> Discussing green building regulation with AGC Discussing support for development of green building regulation with GBCI Hearing study to Housing and Architecture Bureau of Yokohama City as for governmental experiences of green building regulation with Yokohama Starting to draft assessed items of green building regulation
2018 JAN	<ul style="list-style-type: none"> Discussion of GBCI and AGC Asia Pacific (completion of assessed items) Final Workshop (Presentation of Housing and Architecture Bureau, GBCI, Institute of Technology Bandung and panel discussion in regard with development of green building regulation) Discussion among BIFZA, Batam City and GBCI

Source: Nippon Koei

5.1.1 Review of Green Building Regulations in Indonesia

In Indonesia, Law of Green Building has already been developed by the Ministry of Public Works and Housing (Kementerian Pekerjaan Umum dan Perumahan Rakyat). In addition, DKI Jakarta and Bandung City have also introduced individual green building regulation. In order to develop green building regulation in Batam, these three regulations were reviewed. The figure below is the list categorizing each assessment item. For more detail, see attachment 4.

Phase	INDONESIA		JAKARTA	BANDUNG	
	Categories	Sub-Categories	New Building	New Building / Extension (500+sqm)	Extension (500+sqm)
Planning	1. Site Management	a. Orientation planning b. Site planning and landscape planning c. Management of infrastructure and landscape d. Parking lot area e. Management of landscape f. Stormwater g. Green lighting system h. Construction safety	a. Site planning (landscape, parking lot, etc.) b. Site planning (landscape, parking lot, etc.) c. Management of infrastructure and landscape d. Parking lot area e. Management of landscape f. Stormwater g. Green lighting system h. Construction safety	a. Site planning (landscape, parking lot, etc.) b. Site planning (landscape, parking lot, etc.) c. Management of infrastructure and landscape d. Parking lot area e. Management of landscape f. Stormwater g. Green lighting system h. Construction safety	a. Site planning (landscape, parking lot, etc.) b. Site planning (landscape, parking lot, etc.) c. Management of infrastructure and landscape d. Parking lot area e. Management of landscape f. Stormwater g. Green lighting system h. Construction safety
	2. Energy efficiency	a. Building envelope b. Thermal insulation c. Air conditioning d. Water supply system e. Water supply system f. Water supply system	a. Building envelope b. Thermal insulation c. Air conditioning d. Water supply system e. Water supply system f. Water supply system	a. Building envelope b. Thermal insulation c. Air conditioning d. Water supply system e. Water supply system f. Water supply system	a. Building envelope b. Thermal insulation c. Air conditioning d. Water supply system e. Water supply system f. Water supply system
	3. Efficiency of water use	a. Water supply b. Water supply c. Water supply	a. Water supply b. Water supply c. Water supply	a. Water supply b. Water supply c. Water supply	a. Water supply b. Water supply c. Water supply
	4. Indoor air quality	a. Ventilation b. Ventilation c. Ventilation	a. Ventilation b. Ventilation c. Ventilation	a. Ventilation b. Ventilation c. Ventilation	a. Ventilation b. Ventilation c. Ventilation
	5. Environmentally friendly materials	a. Environmentally friendly materials b. Environmentally friendly materials c. Environmentally friendly materials	a. Environmentally friendly materials b. Environmentally friendly materials c. Environmentally friendly materials	a. Environmentally friendly materials b. Environmentally friendly materials c. Environmentally friendly materials	a. Environmentally friendly materials b. Environmentally friendly materials c. Environmentally friendly materials
	6. Waste management	a. Waste management b. Waste management c. Waste management	a. Waste management b. Waste management c. Waste management	a. Waste management b. Waste management c. Waste management	a. Waste management b. Waste management c. Waste management
	7. Water management	a. Water management b. Water management c. Water management	a. Water management b. Water management c. Water management	a. Water management b. Water management c. Water management	a. Water management b. Water management c. Water management
Construction	Non-mentioned in Indonesian Law				
	8. Green construction process	a. Application of green construction management b. Application of green construction management c. Application of green construction management	a. Application of green construction management b. Application of green construction management c. Application of green construction management	a. Application of green construction management b. Application of green construction management c. Application of green construction management	a. Application of green construction management b. Application of green construction management c. Application of green construction management
	9. Practices of green behavior	a. Practices of green behavior b. Practices of green behavior c. Practices of green behavior	a. Practices of green behavior b. Practices of green behavior c. Practices of green behavior	a. Practices of green behavior b. Practices of green behavior c. Practices of green behavior	a. Practices of green behavior b. Practices of green behavior c. Practices of green behavior
	10. Green supply chain	a. Green supply chain b. Green supply chain c. Green supply chain	a. Green supply chain b. Green supply chain c. Green supply chain	a. Green supply chain b. Green supply chain c. Green supply chain	a. Green supply chain b. Green supply chain c. Green supply chain

Figure 5-1 Assessment items of existing green building regulations in Indonesia

5.1.2 Drafting Assessment Items of Green Building Regulation in Batam

In addition to review study mentioned above, assessment items of green building regulation were drafted with cooperation with Housing and Architecture Bureau of Yokohama City, GBCI and AGC Asia Pacific. As a result of consideration, while 7 categories for planning phase and 1 category were set, Energy efficiency, Efficiency of water use and Waste management were designated as important categories.

Following is the draft assessed items.

Table 5-3 Draft assessment items of green building regulation in Batam

Planning Phase

1. Site Management	1-a. Green open space 1-b. Pedestrian walk
2. Energy efficiency	2-a. Building cover system (OTTV 45 watt/m ²) 2-b. Air conditioning system 2-c. Lighting system (use of energy-saving lightbulb such as LED, CFL, T5 fluorescent, others with 75 lumen/watt and natural lighting) 2-d. Conducting energy saving assessment 2-e. Application of energy management system 2-f. Preparation of energy management plan / manual
3. Efficiency of water use	3-a. Planning for water sources (rainwater harvesting and recycling water) 3-b. Planning for water utilization 3-c. Planning for water-saving sanitary equipment 3-d. Planning of Water recycling
4. Indoor air quality (Indoor Environment)	4-a. Control of CO ₂ at certain spaces (monitoring device with alarm & mechanical ventilation) 4-b. Control of CO at closed parking area (monitoring device with alarm & mechanical ventilation) 4-c. VOC monitoring 4-d. Noise
5. Environmentally friendly materials	5-a. The use of certified environmentally friendly materials (Eco-labelling) 5-b. The use of recycled material 5-c. The use of durable materials in tropical climate (considering lifecycle cost) 5-d. Ease of maintenance
6. Waste management	6-a. 3R concept (especially segregation of Solid waste)
7. Innovation (Bonus)	7-a. Innovative technology 7-b. ZEB (Net Zero Emission Building)

Operation Phase

8. Operation	8-a. Monitoring (Planned performance) 8-b. Maintenance
---------------------	---

Source: Nippon Koei

After final workshop in Batam (see. CHAPTER 6), discussion among BIFZA, Batam City, GBCI, AGC Asia Pacific and Nippon Koei was implemented and the plan for the development of green building regulation was discussed. As a result of discussion, following activities are determined to be implemented

1. Formulation of forum group discussion
2. Dispatching staff of Batam City to DKI Jakarta or Bandung City



Source: Nippon Koei

Figure 5-2 Discussion among BIFZA, Batam City, GBCI and AGC Asia Pacific

5.2 STANDALIZATION OF LED STREET LIGHTS

In considering the introduction of LED street lights in urban areas under the jurisdiction of Batam city or at industrial parks and port facilities under the jurisdiction of BIFZA, the policy of appropriate standardization for Batam City was discussed base on following standards and official guidelines.

- International standard (IEC, CIE, ISO)
- Japanese standards and guidelines (JIS, Guidelines in Energy Efficiency of Public Street Lighting by the Ministry of Land, Infrastructure, Transport and Tourism, Guideline of LED lighting for Port Area by Class-NK)

Additionally, a hearing survey was conducted on Japan Lighting Manufacturing Association (JLMA) which has supported the standardization of LED street lights for the Government of Indonesia. It was discussed the contents of supports by JLMA, progress of standardization in Indonesia, and exchanged opinions on introduction Batam's own standard.

5.2.1 Adopted Standard of LED Street Lights in Indonesia and Batam

Currently, the Indonesian government has a policy to adopt International Standard (IEC) for LED. It was also followed “Guidelines in Energy Efficiency of Public Street Lighting by the Japanese government” regarding LED street/tunnel lighting.

However, the promotion of these standards has not progressed to local government such as Batam yet. According to JLMA, the government of Indonesia is planning to consider these standards/guidelines as compulsory standards in the future.

Although there are no specific rules regarding to purchasing LED light in Batam City, it was confirmed that IEC compliant “High pressure sodium light (HID)” was installed for the street light in Batamindo Industrial Park under BIFZA’s guidance.

5.2.2 Japanese Standard, Guidelines and Certification System on LED Street Lights

(1) Guidelines in Energy Efficiency of Public Street Lighting by the Ministry of Land, Infrastructure, Transport and Tourism

Based on IEC, ISO and JIS, the guidelines specified method of calculating performance standards, product life, life cycle costs of Street lights including LED was adopted by the Indonesian government. Indonesian and English version has also been prepared for dissemination abroad. According to JLMA, at the present, this guideline has not been fully disseminated or notified in domestic due to constraints of the budget of the Indonesian government. Therefore, JICA’S technical cooperation (dispatch of experts) is scheduled to start in 2018 for capacity building of standardization of LED lights.

(2) Guideline of LED lighting for Port Area by Class-NK (Nihon Kaiji Kyokai)

This guideline is for a Japanese certification system of LED lights standard specialized in port area. International standard such as IEC60598-1, ISO9227, ISO9001 is also cited as a part of this guideline. It is standardized about performance concerning type of test, authentication method, specified salt tolerance and durability. In Japan, LED lights of Stanley Electric (one of partner company of the study) for the port area has the first certification.

5.2.3 Promotion of Standardization of LED Street Lights in Batam

In the study, the standardization of LED street light was considered for introducing smart LED street light into Batamindo Industrial Park.

Through the participation of kickoff seminar and final workshop in Batam and attend to the seminar in Japan, the stakeholders including Batam City and BIFZA have been provided useful information regarding Japanese LED technology and the standard.

It is prospected that demand and interest of LED as an energy saving technology would be increased based on the concept of “Green and Smart Island Batam” in the future.

Although the Indonesian government follows international standard (IEC), to ensure of the

safety and the performance of LED street lights, City of Batam is required to promote high standard of LED street lights into Batam.

In Batam island, especially industrial park nearby costal area, there are high interests in the concept of Class-NK as the specific standard of LED for Port area. It is appreciated to discuss the standardization of LED street lights to suit for regional characteristics continually.

CHAPTER 6 PROGRESS REPORT, WORKSHOP AND PRESENTATION

6.1 KICK-OFF SEMINAR (OCT 2017)

On October 2, 2017, kick-off seminar for this project was held. BIFZA, Batam City and Indonesia JCM secretariat from Indonesian side and Yokohama City, Nippon Koei, Finetech iForcom, AGC Asia Pacific and Mitsubishi Research Institute attended the seminar.

In this seminar, in addition to presentation of a plan of this project, plans of 2 projects (commissioned by METI) simultaneously implemented in Batam this fiscal year were presented.

Total attendance was more than 50 including attendants from local companies.

Agenda:

- Date: Oct 2, 2017
- Venue: Tokyo Room, Harmoni One Convention Hotel & Service Apartment

Time	Program	Speaker
13:10-13:30	Registration	-
13:30-13:35	Introduction of participants	Mr. Amir Rusli, Senior Researcher-Project Coordinator, Batam City
13:35-13:40	Opening remarks	Dr. Ir.Purba Robert M. Sianipar, Deputy Chairman for Other Facilities, BIFZA
13:40-14:00	Presentation on City to City Collaboration	Mr.Yasuaki Nakamura, Deputy Director for Development Cooperation International Affairs Bureau, the City of Yokohama
14:00-14:25	Progress of city-to-city collaboration and targets of the study this year	Mr. SAITO Tetsuya, Team Leader, Nippon Koei
14:25-14:35	Pre-F/S on Water and Wastewater Facility Improvement in Batam City	Mr. Shoichiro MISAKI, Team Leader, Nippon Koei
14:35-14:45	Sustainability Evaluation: Waste Management	Ms. Rie ARAI, Senior Researcher of Sustainability Strategy Group, Mitsubishi Research Institute
14:45-15:00	Presentation of needs of green city Batam (1): Water Management and Industrial Waste	Mr. Iyus Rusmana, Head of Waste Management, BIFZA
15:00-15:15	Presentation of needs of green city Batam (2): LED street light and Green building	Mr. Amir Rusli, Senior Researcher-Project Coordinator, Batam City
15:15-15:30	Presentation on smart LED street light project	Mr. Kikuo Sagawa, GM of International Strategic Business Development Department, Finetech
15:30-15:45	Presentation on green building project	Mr. Erwin Avianto, Manager of ASEAN Group, iFORCOM

Time	Program	Speaker
15:45-15:55	Promotion of Green Building in Singapore	Mr. LIM Yew Meng, Executive Director, AGC Asia Pacific
15:55-16:05	Implementation of JCM Scheme in Indonesia	Ms.Vionita Permana, Monitoring Evaluation and Dissemination specialist, Indonesia JCM Secretariat
16:05-16:20	Toward standardization of LED and green buildings with Q&A sessions	Nippon Koei
16:20-16:25	Closing remarks	Batam city

Source: Nippon Koei

< Kick-off Seminar >



Venue



Introduction by Mr.Amir



Opening Remarks by Mr.Roberto (BIFZA)



Presentation by Mr.Nakamura (Yokohama City)



Presentation by Mr.Saito (Nippon Koei)



Group Photo

Source: Nippon Koei

6.2 FINAL WORKSHOP (JAN 2018)

Final workshop of this project was held on January 25, 2018. In addition to BIFZA, Batam City, Yokohama City and companies implementing this project, companies implementing projects commissioned by METI, companies participating in business matching organized by Yokohama City and owners of industrial parks and large-scale facilities in the city attended the workshop. Total attendance was over 80.

<Morning Session : City to City Collaboration FS >

Yokohama City presented the overview of the city-to-city collaboration between Batam and Yokohama in the last 3 years, implementing companies reported the progress of the study, professor of Institute of Technology Bandung reported the result of Smart City Assessment in Batam, GBCI presented trends of green building regulations in Indonesia and finally, Housing and Architecture Bureau of Yokohama city explained Environment-conscious Building Regulation in Yokohama.

Besides, 2 panel discussions were conducted.

1. Development of green building regulation in Batam: panellists discussed developed draft of assessed items of green building regulation in Batam whereas it was confirmed that green building regulation is important to make Batam City low-carbon society.
2. City to city collaboration project in FY2018: While the strong opinions to implement JCM model project were emphasised, one panellist mentioned that collaboration with Yokohama City is essential for accelerating Batam's economic development.

<Afternoon Session : Report of METI Projects and business matching >

Nippon Koei and Mitsubishi Research Institute reported the result of the projects commissioned by METI (water resource sector and waste management sector, respectively). Following them, as one session of business matching organized by Yokohama City, member companies of YUSA (Finetech, Macnica and Suido Technical Service) introduced their technologies.

Agenda:

- Date: January 25, 2018
- Venue: Harris Hotel Batam Center

Time	Program	Speaker
8:40-9:00	Registration	---
9:00-9:05	Introduction of participants	MC
9:05-9:15	Opening remarks	Mr.Binsar Tambunan, BIFZA
9:15-9:25	Opening remarks	Mr.Gintoyono, Batam City
9:25-9:40	Presentation on City to City Collaboration	Mr.Toru Hashimoto, Yokohama City
9:40-9:55	Overall progress of the study	Mr.Tetsuya Saito, Nippon Koei
9:55-10:15	Result of Feasibility Study for Introduction of LED Street Lightning and PV in Industrial Park	Mr.Kikuo Sagawa Finetech/Stanley Electric
10:15-10:35	Result of Feasibility Study for Introduction of Energy Saving Technology in Shopping Mall	Mr.Erwin Avianto iFORCOM/AGC
10:35-10:50	Smart City Matured Level	Prof.Suhono Harso Supangkat, Institute of Technology Bandung
10:50-11:20	General Concept of Green Building in Indonesia	Mr.Surendro, Green Building Council Indonesia (GBCI)
11:20-11:40	CASBEE Yokohama	Ms.Akiko Masaki, Yokohama City
11:40-12:40	Panel Session on Green & Smart Development in Batam	
	1: Standardization of Green Building in Batam	BIFZA, Batam City, Yokohama City, Nippon Koei, GBCI, iForcom, AMG
	2: City-to-City Collaboration between Batam City and Yokohama City in FY2018	BIFZA, Batam City, Yokohama City, Nippon Koei, Finetech, iForcom

Time	Program	Speaker
12:40-13:40	Lunch Break	
13:40-13:55	Result of METI Project (Water Management)	Mr.Shoichiro Misaki, Nippon Koei
13:55-14:10	Result of METI Project (Sustainable Evaluation for Waste Management)	Mr.Ami Togami, Mitsubishi Research Institute (MRI)
14:10-14:25	Break / Setting Change	
14:25-16:05	Business Matching Seminar	MRI
	14:25-14:30 Opening of the Session: Brief Introduction of the session and the Yokohama Urban Solution Alliance (YUSA) 14:30-14:50 On-going project of the Recycling of Hazardous Waste(Finotech) 14:50-15:00 Smart Energy Management System (Macnica) 15:00-15:10 Water Leakage Detection Technology (Suido Technical Service) 15:10-16:05 Discussion with companies in Batam 16:05 Closing of the Session	
16:05-16:10	Closing Remarks	Batam city
16:10-16:15	Closing Remarks	BIFZA
16:15-16:20	Closing Remarks	Yokohama City

Source: Nippon Koei

< Final Workshop >



Opening Remarks by Mr.Binsar (BIFZA)



Opening Remarks by Mr.Gintoyono (Batam City)

*FY2017 City to City Collaboration Program
Project for Development of Low-carbon City through City to City Collaboration between Batam and Yokohama
(Support of Green City Policy of Batam by Introduction of Smart LED Street Lighting System and Green Building)*



Presentation by Ms. Masaki (Housing and Architecture Bureau of Yokohama City)



Presentation by Prof. Suhono
(Institute of Technology Bandung)



Panel Discussion



Venue



Group Photo



Mr.Surendro (GBCI) and Mr.Saito (Nippon Koei) being interviewed

Source: Nippon Koei

6.3 CITY TO CITY COLLABORATION SEMINAR AND COMPANY VISITS

This project invited 2 staff from BIFZA (Ms.Lusy and Ms.Ratih). City to City Collaboration Seminar organized by MOE and IGES was held in Tokyo on January 30, 2018, the period of their trip was from January 29 to February 2018. In the seminar, regarding the city-to-city collaboration projects in this FY, presenters reported their activities and results. For the collaboration between Batam and Yokohama, Ms.Lusy presented upcoming development plans of BIFZA and Mr.Okuno (Yokohama City) and Mr.Saito (Nippon Koei) presented about the history of the collaboration and progress of this project.

On January 31 and February 1, invitees visited the head office of Stanley Electric and the head office of AGC and a showroom (AGC Studio) participants of this project. In Stanley Electric, invitees were introduced LED products and the head office which obtained green building certificate (CASBEE-S) whereas AGC explained products relating to green building and introduction example.



Presentation by Ms. Lusy (BIFZA)



Presentation by Mr. Okuno (Yokohama City)



Presentation by Mr. Saito (Nippon Koei)



Company introduction by AGC



Technology introduction by Stanley Electric

Source: Nippon Koei



Technology introduction by AGC

6.4 YUSA TECHNOLOGY INTRODUCTION PROGRAM (DECEMBER 2017)

On December 2017, AOTS implemented ‘Study Tour Program on the Improvement of BATAM Island Water Supply and Sewerage Infrastructure Project for Indonesia’ and invited 9 staff from BIFZA including Deputy Chairman, Mr.Eko.

As one session of the study tour program, YUSA Technology Introduction Program was conducted and companies including participating companies of this project introduced their technologies and products on December 14. Also, on December 15, invitees implemented courtesy call on International Affairs Bureau of Yokohama City and confirmed to strengthen their collaboration together.



BIFZA staff in YUSA Program



Presentation by Mr.Yokohama
(Stanley Electric)



Presentation by Mr.Abe (Macnica)



Courtesy call on International Affairs
Bureau of Yokohama City

Source: Nippon Koei

CHAPTER 7 ISSUES AND FUTURE PLANS

The city-to-city collaboration between Batam City and Yokohama City began in FY2015. Conducted activities, in this 3rd year, focussed on “Introduction of smart LED street lights (Green Industry although it was considered as Green Transportation at the beginning of this project) and “Energy saving of Shopping Malls (Green Building)” from 6 pillars of the city-to-city collaboration which was developed in the 2nd year. As a result of the review of activities last year, in order to make JCM model project disseminated in the future, it seems to be important to input plans and policies of Batam side through the framework of the city-to-city collaboration. Moreover, Batam side has started to demand the support for development of plans and capacity development “Green Planning” by taking advantage of the experience of regional governor and consulting in Yokohama City.

Based on the above situation, challenges for the future was categorized as follows.

7.1 ISSUES

7.1.1 Strong Requests for Implementation of JCM Model Project

FSs in different sectors, were carried out, as a step to JCM Model Project, under the city-to-city collaboration in the last 3 years. However, there are no adoption as JCM Model Project to date, even though energy saving project in an airport was tentatively adopted twice. BIFZA, a manager of the airport, and Indonesia JCM Secretariat kindly supported for the implementation of the project, but it was impossible to reach official adoption because of the difficulty of public procurement.

In the next year, it is being planned to propose 2 projects, and these projects should be implemented as JCM Model Projects. In order to avoid public procurement and develop JCM model project more feasibly, the study site of “Introduction of smart LED street lights project” was changed from City Center of Batam to an industrial park. Our plan is to expand JCM model project to whole city by piling up achievements of JCM Model Project at industrial parks.

7.1.2 Relationship between City-to-City Collaboration Project and JCM Model Project

Batam’s needs were confirmed in last FY. This year, several projects corresponding to the needs were conducted by using budgets of not only MOE but also other ministries and Yokohama City under the framework of the city-to-city collaboration.

Although there are strong needs regarding water resource management and waste management, it is quite difficult to make those a JCM model project because of the small GHG emission reduction. It should be considered how to implement those projects to answer expectation of Batam side. This year, it is supposed that all projects was implemented smoothly based on the good relationship and trust between Batam and Yokohama. Therefore, the city-to-city collaboration Project is a quite valuable scheme.

Also, compared with individual JCM model project, the city-to-city collaboration Projects

can directly appeal to local government. By taking advantage of this point, dissemination of JCM should be achieved by combining introduced technologies in JCM with regulation development/standardizations.

7.1.3 Technical Assistance through City-to-City Collaboration Project

In the city-to-city collaboration Project, Batam side expects not only FS but also learning from the experience and history of Yokohama. Because of this, we implemented the activities for the development of draft mayor regulation regarding green building by sharing examples in Yokohama and experiences as local government in parallel with the study for installation of energy-saving technology into shopping malls and office buildings.

To date, draft assessment items have been decided and it will take more time to issue the regulation since it is important to coordinate it with several related departments from now on. We will keep implementing the activities relating to governmental capacity development such as green building regulation because experiences and abilities of City of Yokohama is advantages in these activities. Even if these activities are not related with targeted project of FS, these can directly contribute to expansion of JCM model project related to Green Building considered and carried out in previous FSs.

7.1.4 Review and Reinforcement of Task Force

Key persons of Batam side were changed because of an arrest of head of Environmental Department of Batam City and reshuffle of all of top executives of BIFZA which had a huge impact on this project. However, we made efforts such as explanation to new stakeholders by cooperating with the member of task force who is in charge of the city-to-city collaboration Projects.

Through activities of this year, we have recognized that task force is essential, and to include several members, who has an authority to decide, in the task force is important. In addition, we are planning to have a discussion with stakeholders so that we may add necessary staff to the task force corresponding to activities.

7.1.5 Challenges about Explanation of Energy Management Technologies

In Yokohama city, there are companies which have a variety of energy management technologies. However, it is not easy to make stakeholders understood how the effect can be achieved, and we are on the stage to gradually deepen their understandings by repeating explanation.

Previous study tours in Japan were effective to deepen their understanding by visiting facilities and directly hearing opinions of users. We will keep offering valuable opportunities like this since we will introduce more advanced technologies such as the demand response.

Also, if we can introduce energy-saving technologies into a shopping mall as JCM model project, it will be a “show case”.

We think repeating explanation in long period through the city-to-city collaboration Projects is effective for the introduction of such energy-saving technologies.

7.1.6 Discussion about Direction of City-to-City Collaboration during Coming 3 years

Batam City and Yokohama City are planning to update LOI for next 3 years in March 2018 because current LOI will be expired. In parallel, Yokohama City is considering individually signing LOI with BIFZA for more active support to the city-to-city collaboration Projects.

Yokohama City is planning to support Batam Island based on 6 pillars, and considering the collaboration especially in Green Planning aspect important and effective. Because Paris Agreement will start in 2020, in regard with GHG emission reduction and adaptation to climate change, it would be important to support planning and implementation of policy and action plan of city level referencing targets of the Indonesian NDC.

7.2 FUTURE PLAN

7.2.1 Application for JCM Model Project in FY2018

Under the scheme of the city-to-city collaboration between Batam and Yokohama, 2 projects will be applied for JCM model project in the next FY. Batam side also has confirmed this plan.

Table 7-1 Proposed project for JCM model project in FY2018

Company	Proposed project	Project Cost (JPY)	Emission reduction (tCO ₂)	Cost-effectiveness (JPY/tCO ₂)
Finetech	Smart LED street lights and PV (1 MW)	400 million	3,500	2,750
iForcom	Energy saving in a shopping mall	54 million	1,300	1,050

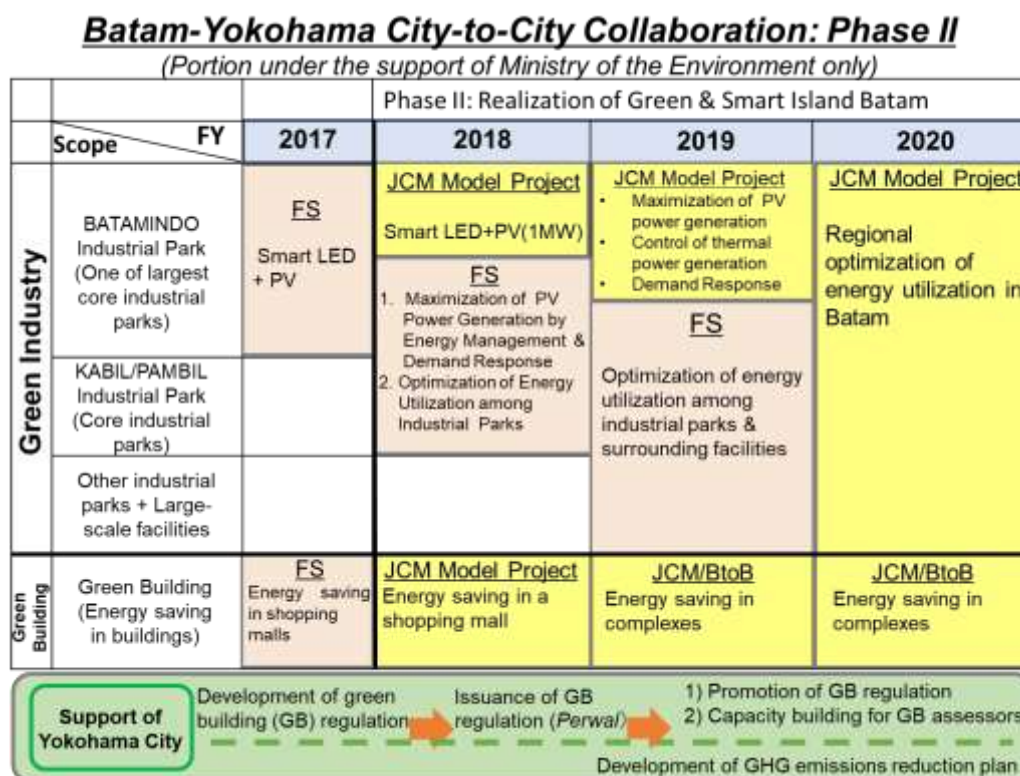
Source: Nippon Koei

7.2.2 Application for City-to-City Collaboration Project in FY2018

A project under the city-to-city collaboration scheme will be proposed in the next FY because of the strong demands of both Batam City and Yokohama city.

Proposed project will be implemented as a start of phase 2 of the city-to-city collaboration between Batam and Yokohama, namely, the phase to realize ‘Smart & Green Island Batam’ concept because the LOI between Batam and Yokohama will be revised in March 2018. From this perspective, in the city-to-city collaboration projects in the next 3 years will be carried out under the 2 themes, ‘Development of green building regulation’ and ‘Maximization of renewable energy in industrial parks and surrounding facilities’.

Following is an image of the planned projects in the next 3 years.



Source: Nippon Koei

Figure 7-1 3-years plan of City-to-City Collaboration between Batam and Yokohama

The City-to-city collaboration between Batam and Yokohama in the Phase 2, (1) Green Planning: Development of green building regulation, (2) Green Planning: Support for development of GHG emission reduction plan, (3) Green Industry: Maximization of renewable energy and efficient utilisation of energy in industrial parks, (4) Green Building: Introduction of technologies regarding green building into buildings in parallel to development of the regulation.

(1) Development of Green Building Regulation

In this project, the support for development of green building regulation in Batam was implemented by cooperating with the Housing and Architecture Bureau of Yokohama City, GBCI and AGC Asia pacific, which resulted in the formulation of draft assessment items of the regulation. This draft assessment items were agreed by panelists of the panel discussion in the final workshop and also participants of group discussion among BIFZA, Batam City, GBCI and AGC Asia pacific. Also, it was agreed that a forum group consisted of stakeholders will be formulated and discussion of the green building regulation began with the draft assessment items as a starting point. On the other hand, when developing the regulation in Batam, it is required to not only develop the regulation and also promote capacity building of both governmental and public sides for enforcement of the regulation. To deal with this aspect, projects in Phase 2 of the City-to-city collaboration, aims at the development of the regulation and capacity building for enforcement.

The activities for the regulation development in the next fiscal year will be implemented with taking the 4 points below into account.

- Finalization of assessment items
- Consideration of application process
- Consideration of incentives
- Development of a plan for capacity building for assessor of the regulation and local contractors

These activities will be implemented by cooperation with Housing and Architecture Bureau of Yokohama City and sharing their knowledges and experiences with Batam City in order to take advantage of the framework of the city-to-city collaboration. Cooperation with GBCI is also necessary for the development of green building suitable for Batam City. Between 2019 and 2020, for proper operation, supports for capacity building and consideration of operating incentives will be supported by this project activities.

(2) Consideration of GHG emission reduction plan

The development of the green building regulation enables setting of target for GHG emission reduction from buildings. Therefore, especially from 2019, development of the GHG emission reduction plan (RAD-GRK) in Batam may be supported by the city-to-city collaboration projects. Mainly because the Paris Agreement will begin in 2020, it can be anticipated that the importance of the plan corresponding to NDC of Indonesia will be higher even at the city level.

Yokohama City has already developed ‘Implementation Plan of Global Warming Countermeasure in Yokohama’ and set the target of emission reduction in the plan. This experience would be quite valuable for Batam City.

(3) Maximization of renewable energy utilization in industrial parks and surrounding facilities

As a result of studies in this project, it is planned to introduce smart LED street lights and PV solar system (1MW) into Batamindo, one of the most important industrial parks in Batam as a JCM model project. In Batam Island, there are many industrial parks, thus, the impact of introduction of renewable energy in the industrial park is quite huge. On the other hand, because Batamindo is not only managing company of industrial park but a power producer, stability of power generation is recognized important and their attitude is conservative to the expansion of PV solar system in spite of their strong interest in it.

From this perspective, by using smart meter which Batamindo installed last year, the feasibility of introduction of energy management system and demand response technology so as to achieve maximization of solar power generation and optimization of energy utilization. This study aims at applying for JCM Model Project in FY2019.

In addition, power interchange, which recently began to be introduced in Japan to aim solar

power generation with local production for local consumption scheme, will also studied for introduction into some core industrial parks in Batam. By doing this, it would be possible to consider the measure to increase the number of introduction of PV solar power system. In regard with this technology, further study for the feasibility of power interchange among some core industrial parks including surrounding facilities will be carried out so as to implement a project as a JCM model project.

The three candidate industrial parks for study in FY2018 are below.

Table 7-2 Candidate industrial parks for City to City Collaboration project in FY2018

Industrial Park	Floor area (ha)	Number of Tenants	Contact to City to City Collaboration Projects
Batamindo Industrial Park	320	68	Participants of Business Matching in the project of FY 2015. In the project of FY 2016 and FY 2017, there were supports to field surveys and participations to workshops from them.
Kabil Integrated Industrial Estate	520	44	Site Visit was implemented in this FY as a session of Business Matching Seminar organized by Yokohama City
Pambil Industrial Estate	103	24	Participants of Business Matching in the project of FY 2015.

Source: Nippon Koei