FY2015 Study for Ministry of the Environment Japan

FY 2015

Feasibility Study on Joint Crediting Mechanism Project For Realization fo a Low-Carbon Society in Asia

Establishment of Base for Low-carbon Project Expansion in Surabaya (Kitakyushu-Surabaya Cooperation Project)

Report

March 2016

Kitakyushu Asian Center for Low Carbon Society
NTT DATA Institute of Management Consulting, Inc.
Institute for Global Environmental Strategies
Amita Corporation

Summary

In this fiscal year, the study substantiated the benefits and effects of the JCM to effectively aim at the concrete development of projects that are already approaching the project development stage, in order to improve the total development of JCM target projects. By taking advantage of these benefits and effects, the project aims to create systems that will become the foundation to create other similar projects in succession. Through this, activities are implemented to formulate projects that will lead to the low-carbon development of the entire city of Surabaya, as well as concrete projects using JCM technical assistance in the energy and waste sectors, in particular.

As for energy sector, since two years ago, we have conducted two activities: one is introducing a combined heat and power supply (cogeneration) system featuring low carbon to industrial parks, and the other is promoting the application of distributed power supply and energy saving to buildings. These activities result in concrete project operations, such as introducing mini-cogeneration systems to hotels and changing to high-efficiency chillers in commercial facilities. In this fiscal year, we have conducted the activities ①Promoting the operation of the existing projects, ②Expanding activities and ③Area-wide expansion along with the green building certification system. As a result, several projects are actually developed as well as channels for future activities was built.

As for waste sector, we have been considering the introduction of the Amita Corporation's equipment through an EPC (engineering, procurement and construction) contract, including the exploration of the possibility of establishing a JV with a local cement manufacturer and the possibility of working with an intermediate processing company which is licensed to treat B3 waste. However, we concluded that it would not be possible to establish a project which uses the JCM scheme in the immediate future (this fiscal year or the next fiscal year) for various reasons, which include: the problems of the time it takes to establish a JV and its project risk; the complex MRV methodology and difficulties in calculating the CO2 emissions reductions accurately; and the unclear prospects for the future of the Financing Programme for JCM Model Projects. On the other hand, detailed planning is underway towards the introduction of Amita's equipment on Java, as a purely private business investment.

As for supporting Institutional design, in order to assist Surabaya City in the development of this regulation, the study therefore conducted a literature review and analysis of similar policies in Indonesia and in other countries, compiled a report and corresponding materials, and submitted them to Surabaya City. Once the regulation is enacted, buildings of a certain size and function will be subject to comply with the technical requirements that are stipulated in the regulation. It is expected that this situation will increase opportunities for JCM Model Projects in the building sector in Surabaya City because the target buildings is likely to be driven to install advanced energy efficient systems such as air conditioning and lighting. Prospective future development and application for JCM include: (i) Dissemination of information and awareness raising on JCM by linking it with the regulation; and (ii) implementation of a model project targeting government buildings.

Chapter 1

Project Background & Objectives

Chapter 1: Table of Contents

Chapter 1

Project Background & Obectives

1.1 Overview of Surabaya CIty Ⅰ-1

1.2 Greenhouse gas emission reduction policies of the Indonesia Government Ⅰ-3

1.3 Initiatives and challenges of Surabaya City in reducing greenhouse gas emissions Ⅰ-3

1.4 Cooperative relationship between the cities of Surabaya and Kitakyushu Ⅰ-5

1.5 Project objectives and overview Ⅰ-8

Chapter 2

Energy Field

“Promoting the Introduction of Energy-Saving Distributed Power Sources to Buildings and Industrial Parks”

NTT Data Institute of Management Consulting, Inc.

Chapter 2 Table of Contents

2.1. Purpose and Implementing System of Project Feasibility Study Ⅱ-1
2.1.1. Outline of the Project (Purpose and Applicable Field) Ⅱ-1
2.1.2. Applicable Technologies and Related Legal Systems Ⅱ-3
2.1.3. Implementing System Ⅱ-6
2.1.4. Investigating Method and Schedule Ⅱ-7
2.2. Results of the Project Feasibility Study Ⅱ-9
2.2.1. Summary of the Field Survey Results Ⅱ-9
2.2.2. Possibility of Reducing Greenhouse Gas Emissions (Particularly Carbon Dioxide Emitted from Energy Generation) Ⅱ-16
2.2.3. MRV Methodology and Monitoring System Ⅱ-18
2.2.4. Estimated Project Cost and its Effectiveness Ⅱ-22
2.2.5. Co-beneficial Effects Ⅱ-22
2.3. Investigation toward a JCM Project Ⅱ-23
2.3.1. Project Planning (Implementing System, Grant-in-Aid Scheme, and Schedule) Ⅱ-23
2.3.2. Issues with Project Operation Ⅱ-23
2.3.3. Future Schedule Ⅱ-25

Chapter 3

The Waste Sector:

The Promotion of the Low-carbon Industrial Waste Recycling Project

NTT DATA Institute of Management Consulting, Inc.
Amita Corporation

Chapter 3 Table of Contents

3.1 The Objectives of the Feasibility Study and the Organizational Structure for the Implementation of the Study Ⅲ-1
3.1.1 An Outline of the Project (The Objectives and the Scope of the Study) .. Ⅲ-1
3.1.2 Applicable Technologies and Relevant Legislation Ⅲ-4
3.1.3 The Organizational Structure for the Implementation of the Study..... Ⅲ-8
3.1.4 The Study Methods and the Schedule..... Ⅲ-9
3.2 The Results of the Feasibility Study Ⅲ-10
3.2.1 A Summary of the Field Surveys..... Ⅲ-10
3.2.2 The Possibility of Reducing GHG Emissions (CO2 Emissions from Energy Consumption in Particular)..... Ⅲ-16
3.2.3 The MRV Methodology Ⅲ-18
3.2.4 Estimated Project Costs and Cost-effectiveness..... Ⅲ-29
3.2.5 Co-benefits..... Ⅲ-30
3.3 A Summary of the Study and the Challenges for the Establishment of the Project..... Ⅲ-31

Chapter 4

Supporting Institutional Arrangements for Low Carbon Project Enhancement

(Kitakyushu – Surabaya Cooperation Project)

Institute for Global Environmental Strategies

Table of Contents

4.1 Assistance for Policy Design on Green Building Awareness Award (GBAA)..... Ⅳ-1
4.1.1 Summary of the Section.....Ⅳ-1
4.1.2 Background and Objectives.....Ⅳ-1
4.1.3 Methods and Schedule.....Ⅳ-2
4.1.4 Results and Achievements.....Ⅳ-2
4.1.5 Potential of Institutionalisation and Linkage with JCM.....Ⅳ-15
4.2 Modelling of Low Carbon Projects..... Ⅳ-18
4.2.1 Summary of the Section.....Ⅳ-18
4.2.2 Background and Objectives.....Ⅳ-18
4.2.3 Methods and Schedule.....Ⅳ-18
4.2.4 Results and Achievements.....Ⅳ-23
4.2.5 Potential of Institutionalisation and Linkage with JCM.....Ⅳ-23
4.3 Organising Workshops..... Ⅳ-25
4.3.1 Summary of the Section.....Ⅳ-25
4.3.2 Workshop in the Japanese Host Municipality.....Ⅳ-26
4.3.3 Workshop in the Local Host Municipality.....Ⅳ-28

Chapter 1

Project Background & Objectives

1.1 Overview of Surabaya City[1]

The capital city of East Java Province, Surabaya is Indonesia's second largest city and is home to about three million people. The city is located at the estuary of the Brantas River and is comprised of 31 small areas and 160 towns. Surabaya has a tropical climate with a rainy season (November to May) and a dry season (June to October). The annual average amount of precipitation is 1,500 mm. Located in the northeastern part of Java, Surabaya has become a key land, sea, and air network connecting points both in Indonesia and abroad. Surabaya is about one hour by plane from the capital city of Jakarta and is only a few hours away from cities in Southeast Asia. Home to Juanda International Airport and Tanjung Perak Port, these "ports" have become important gateways for East Java Province not only for the transport of passengers, but also the transport of goods. There are a number of offices and business centers in the city and it is an educational hub for students in Indonesia.

Surabaya is located about 5,700 km from Tokyo and straddles the equator. Located at 7 degrees, 21 minutes south latitude and 112 degrees, 45 minutes east latitude, most of the 290 m^2 urban area is three to six meters above sea level. The Kali Mas River, a tributary of the Brantas River (length of 314 km), Java's second largest river, meanders through the city center until it reaches Tanjung Perak in the north.

Moving south from the city center of Tunjungan, the area mainly opens up to offices, hotels, and shopping centers, and becomes a commercial and distribution center. On the outskirts of Pasuruan and Mojokerto are industrial estates where Japanese companies that have entered the Indonesia market have set up factories. Shrimp and fish farms, as well as salt fields have been developed in the wetlands in the western part of the city. Madura Island in the northern part of the city is home to Tanjung Perak Port that also plays the role of a breakwater and is the location of shipyards and factories for mills and other businesses, as well as quays and container yards for berthing large domestic and international route cargo ships and domestic passenger ships. At the eastern part of the port is the Eastern Fleet Command and a naval academy has been set up in the western part of the port. Juanda International Airport, the city's gateway to the air, can be found about 15 km south in the suburbs of the city and about 40 minutes away from the city center by car.

The mountainous region can be found in south of the city, and on clear days, the beautiful mountains can be seen from the city. The magnificent mountain in the forefront of the mountain range that looks like Mt. Fuji is called Mt. Penanggungan and has been likened to Mt. Meru at the time when Hinduism and Buddhism flourished in this area. A

[1] Reference: Consulate General of Japan in Surabaya. Overview of Surabaya, East Java (as of May 2014) http://www.surabaya.id.emb-japan.go.jp/j/consulate/outline.html

number of historical ruins can be found in on the hillsides.

Urbanization has a strong foothold in the city, with a population density of about 8,500 people per 1 km^2. The population growth rate is 0.655 per year and much of the population is concentrated in the center of the city. The number of people that commute to the city from the suburbs is increasing. The daytime population is five million people and the population of the metropolitan area, including the surrounding areas, is said to be about nine million.

The GDP of Surabaya in 2008 was USD 2.2 billion, a rate of increase of 6.3%, which is higher than the national average (6.1%). The city's main industries include hotels and restaurants (36%) and industry (32%), followed by transportation, communications, construction, financial services, and the service field. The major areas of employment are commercial facilities, hotels, and restaurants (42%), community and personal services (21%), and industry (15%).

Surabaya is well-known as being active in its initiatives to develop an environmentally-friendly city, receiving the Adipura Award[2] in 2011, as well as the ASEAN Environment Sustainable City Award.

[2] Adipura Award: Award system of the Department of the Interior that is awarded to cities that are involved in environmentally-friendly urban development.

1.2 Greenhouse gas emission reduction policies of the Indonesia Government

Greenhouse gas emissions in Indonesia, which is seeing remarkable economic growth, are on the rise. If the current situation continues, emissions from land use, land use change the forestry sector, and the energy sector, in particular, are expected to increase significantly by 2020 (below figure). As a measure to counter this, Indonesia developed the National Action Plan for Reducing Greenhouse Gas Emissions (RAN-GRK) in 2009 and has launched targets to reduce emissions to 26% through their own efforts by 2020 and to 41% with international support, without suppressing economic growth.

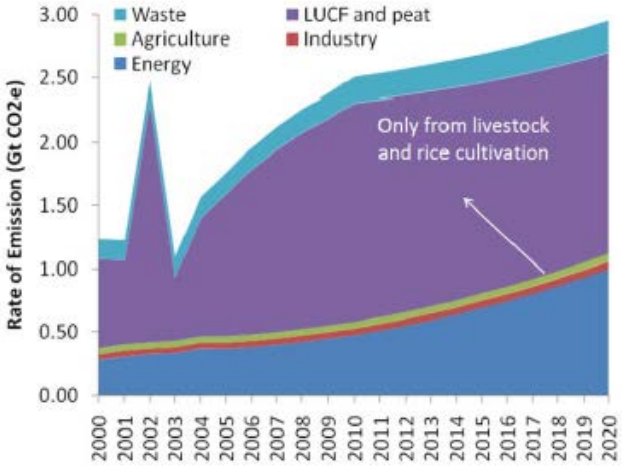


Figure: Changes and forecasts of GHG emissions by sector in Indonesia

1.3 Initiatives and challenges of Surabaya City in reducing greenhouse gas emissions

RAN-GRK requires an action plan (RAD-GRK) to be formulated at the provincial level. East Java, which includes Surabaya, announced its own action plan (No. 67/2012) in 2012. Greenhouse gas emissions in East Java in 2010, which are equivalent to about 75 million t-CO_2, can be broken down as follows: energy (625), transportation (15%), agriculture (14%), waste management (5%), industry (2%), and forestry (2%). In order to reduce emissions from the combustion of fuel, which accounts for about 80% of the emissions in East Java, by about 5% by 2020 (equivalent to about 6.2 million t-CO_2), 13 items have been put forth as mitigation actions, including energy savings and the development and improvement of transportation infrastructure. The RAD-GRK of East Java aims to reduce

emissions in the waste sector by about 1.5% (equivalent to about 1.8 million t-CO_2) by promoting the 3Rs (reduce, reuse, and recycle), as well as other actions.

In response to RAN-GRK and the RAD-GRK of East Java, the Development Planning Bureau (BAPPEKO) of the City of Surabaya and the Surabaya Institute of Technology jointly developed the “Grand Design Compilation Report on Reduction of Greenhouse Gas Emissions in Surabaya Municipality” in November 2013. This report includes basic ideas about following existing plans, such as the long-term development plan for the area (RJPPD)/land use plan for the municipality (RTRWP/K), clarification of administrative authority between the national, provincial, and municipal governments, and for the local RAD-GRK to handle priority issues in the city, when considering plans for low-carbon development. Information on mitigation measures by sector and responsible departments has been organized and an inventory prototype for greenhouse gas emissions has been developed.

In the future, it is possible that a low-carbon plan for Surabaya will also be considered in accordance with report above. In parallel with this, Surabaya aims to build a green city and has created a Green City Master Plan that consists of actions in eight areas. The stated mission of the master plan is the promotion of a green city from these eight perspectives and concrete cooperation activities are being promoted in activities for the Green Building Awareness Award, in particular.

These activities started in Surabaya in 2013 as part of the P2KH (Program Pengembangan Kota Hijau – Green Development Program) launched by the Ministry of Public Works in 2011. Target buildings are limited to existing commercial or government buildings with a floor space of 2,500m^2 or buildings that have four floors. The Green Building Awareness Award was launched in 2014 with activities to encourage understanding of the concept of “green buildings” through seminars for businesses, recruit participants, and evaluate actions. Evaluations of energy savings are carried out through self-analysis or spot inspections by experts, and businesses that achieve excellent energy savings are honored with the Green Building Awareness Award. This initiative is expected to promote energy savings in not only large-scale buildings, but also small- and medium-sized buildings that are not quite moving ahead with necessary measures. Jurisdiction for this system will shift to Cipta Karya in the next fiscal year and an examination of ordinances on “green buildings” is expected to take place. (For more information, refer to Chapter 4.)

1.4 Cooperative relationship between the cities of Surabaya and Kitakyushu

The cities of Surabaya and Kitakyushu have maintained a cooperative relationship for more than ten years. As a culmination of this achievement, both cities agreed to establish an environmental sister-city alliance in November 2012 and to continue implementing a number of cooperation projects (See figure below and table on next page.)

The start of cooperation between the cities of Surabaya and Kitakyushu was the result of the participation of staff from Surabaya in the Environmental Cooperation Network of Asian Cities (since 1997) and the Kitakyushu Initiative Network (since 2000). Since then, various activities have been developed including invitations to human resources training for environmental protection (since 2003) and a survey on proper waste treatment (JBIC, 2002). One feature of this project is that it is also based on cooperation between the two cities.

Specifically, various projects have been implemented through the cooperative relationship between the two cities. There have been major achievements seen, including widespread activities to expand composting efforts that started in 2004 that has led to an approximate 30% reduction in waste levels and contributed to the beautification and greening of the city. Other projects include support to improve capacity for quality control in the water sector (2007-2008), a JICA project on support for wastewater treatment (2011-2013), and examination of a co-generation system in the SIER industrial park that is being promoted with the Japanese Ministry of Economy, Trade and Industry in the energy sector.

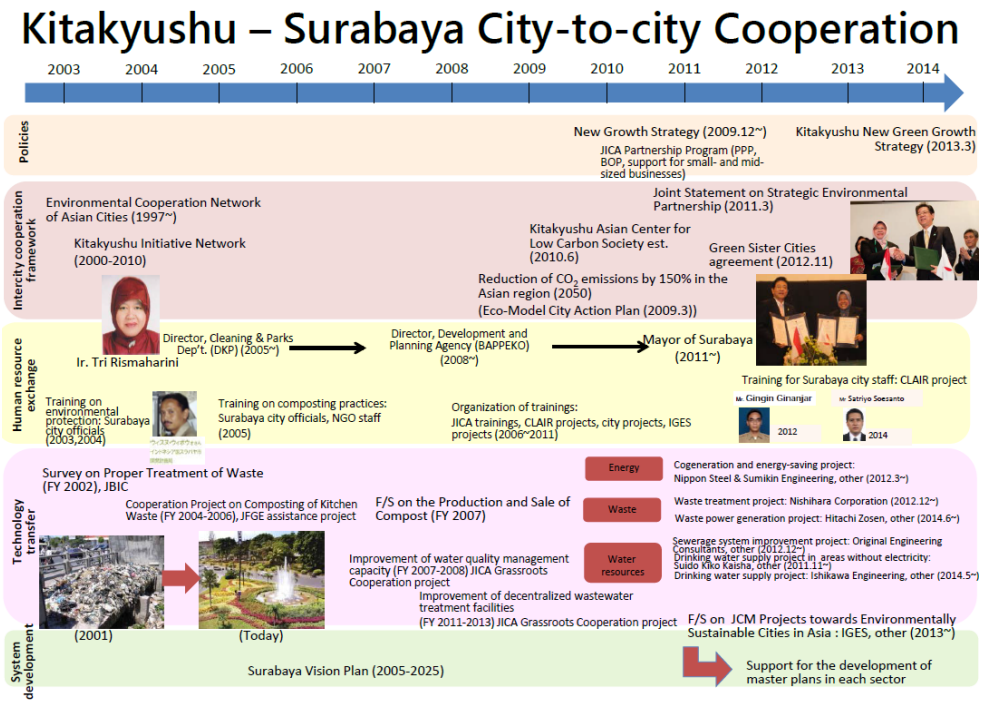


Figure: History of cooperative relationship between Kitakyushu and Surabaya

Table: Existing cooperation projects between Kitakyushu and Surabaya

Classification		Project Name	Participating Company	Overview
Business	Energy	Smart grids in industrial estates	Nippon Steel & Sumikin Engineering, Fuji Electric, NTT Data Institute of Management Consulting	【Overseas expansion of the Higashida Smart Community Project】 The unstable supply of power in industrial zones in Surabaya pose an obstacle to stable production. A feasibility study is being implemented through a low-carbon energy supply project with a focus on co-generation. ●METI/Export of infrastructure systems/FY 2011-2012
Business	Waste management	Intermediate treatment of waste	Nishihara Corporation, NTT Data Institute of	【Development of overseas model by small- and medium-sized businesses】 Examination of project on the

			Management Consulting	intermediate treatment of waste and sale of valuable resources and compost in cooperation with waste pickers that make a living recovering resources, such as plastic and metals, from waste under poor working conditions. ●JICA/Overseas development assistance using ODA/FY 2012
Public works	Sewage treatment	Development of improvement plans for sewage treatment facilities	Kitakyushu Asian Center for Low Carbon Society	Domestic wastewater in Surabaya is discharged into the river untreated or after treatment with septic tanks since the city sewage system is not fully developed. Plans are being formulated that include the development of a centralized sewerage system in the long term, and distributed treatment using water purifier tanks in the short to medium term.
Business	Water supply	Drinking water supply	Ishikawa Engineering Co., Ltd.	Tap water in Surabaya is not suitable for general extraction because of water pollution in the river, which is the source for drinking water, and aging water distribution pipes. This project aims to purify tap water with independent water purification technologies in order to sell safe, secure, and economical tap water through a co-operative network.

1.5 Project objectives and overview

This project is now in the third year of a survey that has been carried out for the past two years. In fiscal 2013, activities were carried out towards the formulation of a JCM project in the areas of energy, transportation, waste, and water resources. As a result, the two sectors of energy and waste were identified as areas that had a high level of cost-effectiveness in terms of CO_2 emissions, and which have high feasibility for development as JCM projects.

Based on the results from the past two years, in this fiscal year, the project will substantiate the benefits and effects of the JCM to effectively aim at the concrete development of projects that are already approaching the project development stage, in order to improve the total development of JCM target projects. By taking advantage of these benefits and effects, the project aims to create systems that will become the foundation to create other similar projects in succession. Through this, activities will be implemented to formulate projects that will lead to the low-carbon development of the entire city of Surabaya, as well as concrete projects using JCM technical assistance in the energy and waste sectors, in particular.

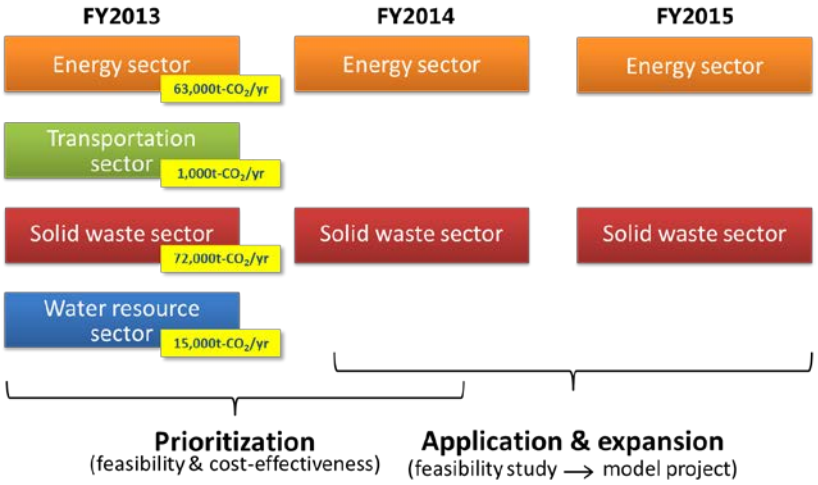


Figure: Development status of considerations in each area

Chapter 2

Energy Field

“Promoting the Introduction of Energy-Saving Distributed Power Sources to Buildings and Industrial Parks”

NTT Data Institute of Management Consulting, Inc.

2.1. Purpose and Implementing System of Project Feasibility Study

2.1.1. Outline of the Project (Purpose and Applicable Field)

This project aims to contribute to the sustainable development of Asian cities including Surabaya City, which show remarkable economic growth and rapid urbanization, by using know-how accumulated during activities in Kitakyushu City, such as overcoming the pollution, controlling the environment, developing urbanization areas and road networks, supplying houses, inviting industries, preserving green land, and preventing and reducing disasters.

(1) Promoting the operation of the existing projects

In the energy field, since two years ago, we have conducted two activities: one is introducing a combined heat and power supply (cogeneration) system featuring low carbon to industrial parks, and the other is promoting the application of distributed power supply and energy saving to buildings. These activities result in concrete project operations, such as introducing mini-cogeneration systems to hotels and changing to high-efficiency chillers in commercial facilities.

To raise awareness of JCM further, we give importance to introducing energy-saving equipment actually and making a preceding model to show its energy saving effect to many people. Toward early project operation from this aspect, we have continuously talked with stakeholders, such as building owners, Japanese-affiliated companies that use distributed power sources or energy-saving equipment, and related administrative organs. Concerning projects in which energy-saving equipment has been successfully introduced, we plan to coordinate with the stakeholders to announce the effects and fruits positively.

In projects for introducing a cogeneration system to industrial parks from a mid- to long-term point of view, we continue to make a survey and adjustment of institutional systems and to talk with the stakeholders.

(2) Expanding activities

In order to plan new JCM projects and to expand the existing projects all over the area, we conduct the following three activities:

① Area-wide expansion of real estate companies

In Indonesia whose economic growth goes on, real estate companies are increasing to own more than one building or to promote the development of certain blocks. For example, A group is a real estate enterprise that runs the largest shopping mall in Surabaya and that owns not only other shopping malls but also office buildings and hotels in Surabaya and Jakarta. Furthermore, the company promotes large-scale block development bearing its name in the former city to construct schools, shopping malls, houses, and office buildings in the area. If we can run an energy-saving equipment renewal project based on JCM in a building owned by the leading real estate enterprise and show the resulting effect to the management, the company will expand it to the other buildings.

Accordingly, we have tried to expand the existing project above all over the area by building a channel to the leading company (A group) through activities for the past two years and showing the merits of JCM to the management. Moreover, according to partnership between Kitakyushu and Surabaya Cities, we find other leading real estate companies acting in the latter city in order to establish a channel to them and to build up an infrastructure for further expansion.

② Area-wide expansion of hotel chains

In large cities like Jakarta and Surabaya, many hotels are constructed and the number is increasing in proportion to economic growth. Quite a lot of hotels aim at an international chain. Of such hotel chains, some not only conform to domestic regulations in Indonesia but also define voluntary standards on an international level to promote water and energy saving measures.

Accordingly, we plan to expand the existing projects all over the area by showing the merits of JCM to international hotel chains (e.g. Hotel E and Hotel F) we have built a channel to through activities for the past two years. Moreover, according to partnership between Kitakyushu and Surabaya Cities, we find other leading hotel chains (e.g. Hotel D) acting in the latter city in order to establish a channel to them and to build up an infrastructure for further expansion.

③ Area-wide expansion along with the green building certification system

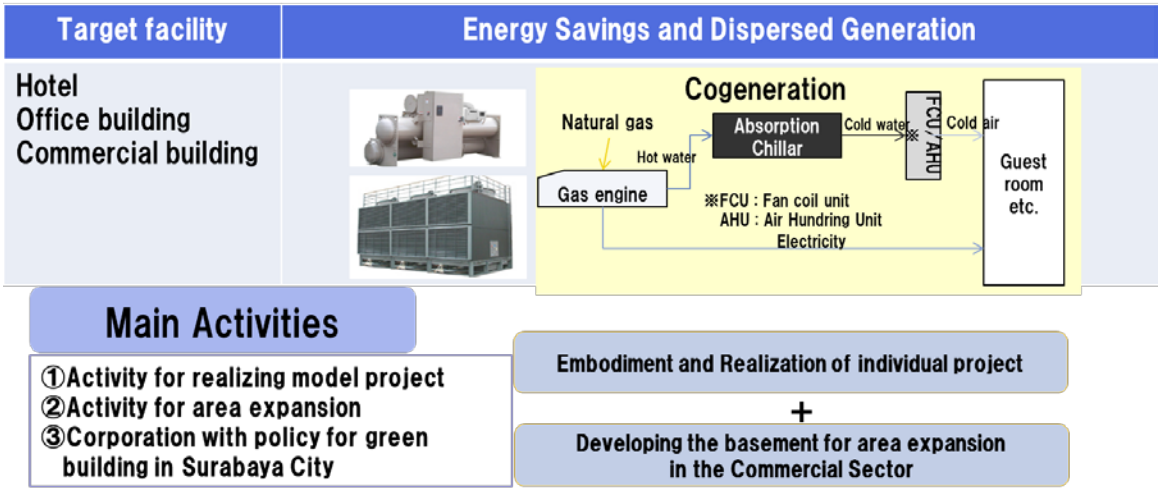
Surabaya City aims at a cutting-edge green municipality in Indonesia and has conducted a variety of activities toward low carbon so far. The city government, for example, thins lighting devices and changes to high-efficiency lamps in its office as well as switches streetlights to LED types. In addition, the feasibility study of a cogeneration (heat and power) service took place as a program commissioned by MLIT in the largest industrial park SIER in the city. As mentioned above, the city conducts many activities toward low carbon, but they are experimental and individual approaches. Accordingly, it is necessary to build a systematic mechanism of constantly

planning projects that result in CO_2 reduction. To build up the mechanism, Surabaya City makes efforts to popularize the green building certification system all over the municipality. The system now presents a green building awareness award to promote and increase green buildings. We work on technologies and systems for functioning green construction and JCM together, for example by incorporating the concept of JCM-based CO_2 reduction into the technical criteria for the award.

2.1.2. Applicable Technologies and Related Legal Systems

<Applicable technologies>

The figure below is an image of technologies applicable to this project. In this fiscal year, we aim to expand various kinds of technologies organized through investigations made until the last year to hotels, office buildings, and commercial facilities.



■ Candidates for applicable technologies

- Cogeneration system
- High-efficiency air conditioning
- LED lamp

In the energy field in which this project runs, we let office buildings and shopping malls adopt air conditioning and BEMS (Building Energy Management System), while hotels use a packaged system that consists of a heat and power supply (cogeneration) unit and an absorption chiller. In addition, we apply LED lamps to other hotels.

Japan has cogeneration technologies accumulated for more than 30 years. The total energy efficiency reaches nearly to 90 percent, and painstaking services including remotely controlled

troubleshooting are differentiated from other countries' ones. In the air conditioning field, we have two strong points: one is the high efficiency of equipment attained by using inverters for compressors and pumps, while the other is technology for controlling an optimal number of air conditioning loads. Japan also takes the initiative in the development of LED lamp technologies and commands a large share of the world markets of LED packages, materials, and devices. At the present time, domestic large-scale buildings come standard with BEMS, resulting in the accumulation of advanced control technologies and operation know-how as well as the development of technologies for cooperation with community energy management systems (CEMS) and integrated control.

In this fiscal year, we fulfill our duties as activities for promoting the operation of the existing projects and expanding them all over the area in the following methods:

<Related legal systems>

(1) Receiving the approval and authorization of projects

The following describes examples of how to get the approval and authorization of cogeneration systems.

We held a meeting with Surabaya City Development Planning Agency and related organizations (Environment, House and City Planning, Communication and Information, Legal Affairs, and East Java State Energy and Mineral Resource Agencies) to check necessary permits, licenses, and procedures. As a result, we obtained the following information:

(Necessary permits and licenses)

① UKL/UPL (Upaya Pengelolaan Lingkungan / Upaya Pemantauan Lingkungan: Environment monitoring/controlling method)

It is necessary to make an application to the Environment Agency for approval.

② IMB (Izin Mendirikan Bangunan: Construction permit)

Before work starts, it is necessary to make an application to the competent agency for approval. A building drawing attached to IMB shows lines a certain distance apart from the boundary of adjacent sites, which can be used as guidelines for designing the noise-blocking wall of cogeneration equipment.

③ IO (Izin Operasi: Private generator operating license—No. 35 ESDM Ministerial Ordinance in

2013)

It is necessary to make an application to the Communication and Information Agency for approval. IO requires a preceding permit for UKL/UPL. It takes about three months to receive the license. This procedure starts after agreement to introduce equipment is concluded.

(2) Calibrating instruments

Running a JCM project requires monitoring, so we have to work on how to calibrate measuring devices.

Concerning the calibration of the instrument, to grasp the CO_2 reduction effect of the technologies mentioned above before they were introduced in Indonesia, we made an investigation of requirements for guaranteeing the correctness of measured values.

In this project, we will make measurements to find CO_2 emissions finally. Therefore, it is necessary to measure power consumption, gas consumption, temperatures, and cold water's flow rates.

According to a document[1] announced by the Japanese Ministry of the Environment (MoE), Indonesia has no system for certifying environmental measurements (formally proving that measured values are correct). Accordingly, even if the environment agency of a local government finds an offender and takes him to court, there is no means of proving that his plant discharges pollutants exceeding certain limits (values measured by the agency are correct). Finally, a warning in writing is sent to the offender.

According to another document[2] issued by the National Institute of Advanced Industrial Science and Technology (AIST), the Indonesian Department of Measurement (DoM) under the control of the Ministry of Economy and its local branches are mainly responsible for legal measurements. The Measurement Standard Research Center (KIM-LIPI) under the control of the Ministry of Science maintains most part of national measurement standards. Due to the scale of land and population, type permits and verification systems, particularly in local areas, have not yet worked well. In the power measuring field, for example, the DoM has neither good testers nor good technologies.

According to another document[3] published by Japan International Cooperation Agency (JICA), of instruments that shall be verified in accordance with the current measurement law, a little more than 50 percent (acquisition ratio) is subjected to actual calibration in Indonesia. Therefore, it is

[1] MoE's website: Building and Running Legal Systems in Indonesia
https://www.env.go.jp/air/tech/ine/asia/indonesia/files/law/files/law.pdf

[2] AIST's lecture document "Overseas Measurement Facts Viewed from APLMF Legal Measurement Training"
https://www.nmij.jp/~nmijclub/hoteikeiryo/docimgs/matsumoto_20081001.pdf

[3] JICA's press release: Overseas Economic Cooperation Funds
http://www.jica.go.jp/press/archives/jbic/japanese/base/release/oecf/1998/A17/0128-j.html

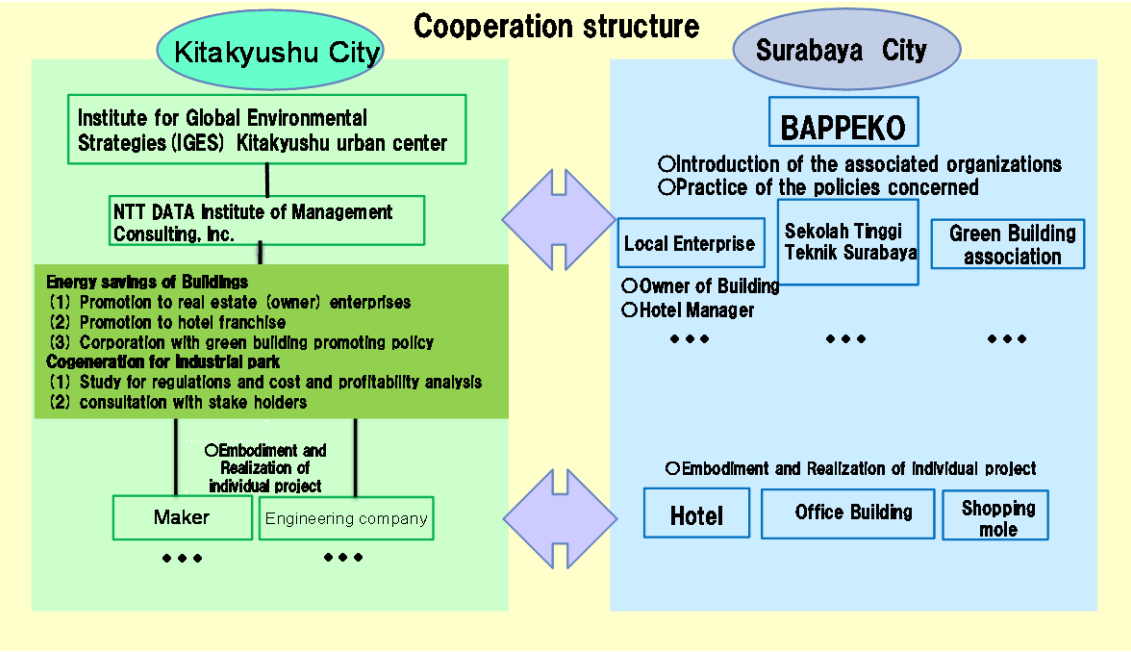
necessary to strengthen the enforcement of the law.

The above shows that Indonesia builds up no good system that presents standards for measuring CO_2 emissions with sensors and how to calibrate them.

Accordingly, in this project, we currently have no option but to guarantee the correctness of data measured with sensors by procuring them in Japan and letting the manufactures verify them in accordance with the corresponding international standards. Moreover, we calibrate appliances in the same fashion.

2.1.3. Implementing System

In this product, we have built up an implementing system based on the cooperation between Kitakyushu and Surabaya Cities.



2.1.4. Investigating Method and Schedule

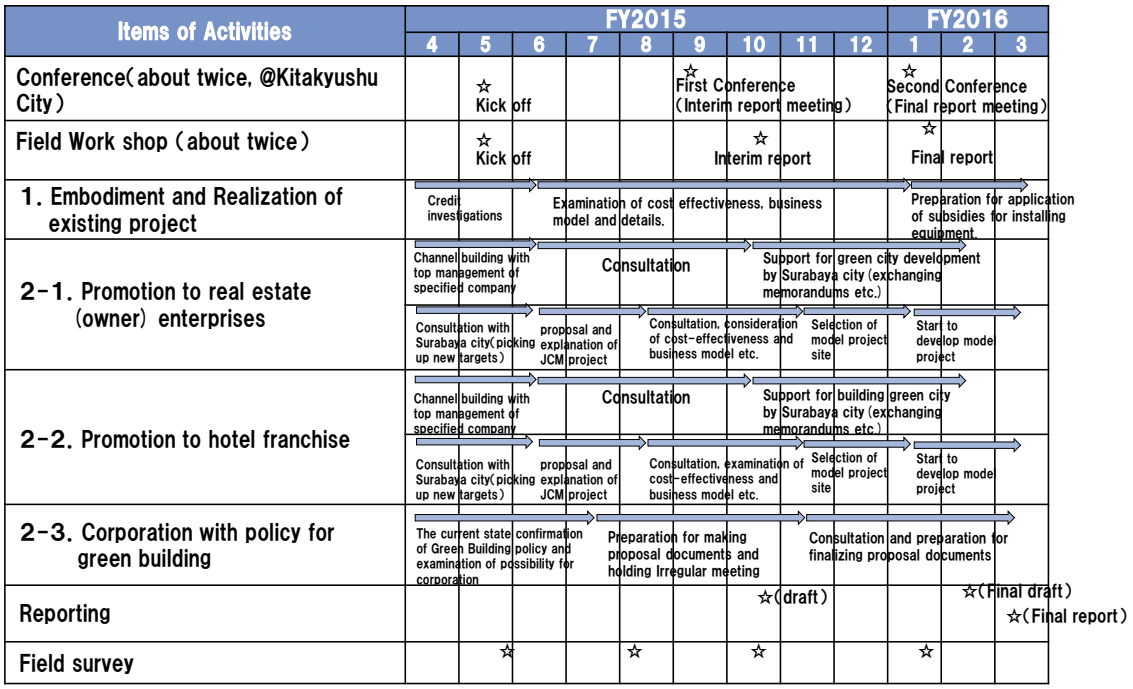
<Investigating method>

In this fiscal year, we fulfill our duties as activities for promoting the operation of the exiting projects and expanding them the all over the area in the following ways:

Activity	Method	Remarks
1. Promoting the operation of the existing projects	○ We have identified who makes an investment of energy-saving equipment and who work as vendors. ○ Survey of the former credit. It has been completed partially. The remainder requires collecting information from credit research companies. ○ Meeting for local companies to make a decision on returns on investments.	Study of MRV methodology has been already completed in a certain level.
2. Expansion all over the area 2-1. Area-wide expansion of real estate companies	○ We have discussed with the management of real estate enterprises about management strategies, such as the introduction of distributed power sources and energy-saving measures, and asked them to cooperate in the area-wide expansion of the existing projects. ○ According to partnership between Kitakyushu and Surabaya Cities, we aim to let the real estate companies agree to a memorandum of cooperation in realizing the green city targeted by Surabaya. ○ We ask Surabaya City to introduce to us leading real estate companies we have no channel to. We promote energy saving in a modeled and specified project and the construction of a comprehensive cooperation relationship similar to the above.	
2-2. Area-wide expansion of hotel chains	○ We have discussed with the management of hotel chains about management strategies, such as the introduction of distributed power sources and energy-saving measures, to ask them to cooperate in the expansion of the existing projects. ○ According to partnership between Kitakyushu and Surabaya Cities, we aim to let the hotel chains agree to a memorandum of cooperation in realizing the green city targeted by Surabaya. ○ We ask Surabaya City to introduce to us leading hotel chains we have no channel to. We promote energy saving in a modeled and specified project and the construction of a comprehensive cooperation relationship similar to the above.	
2-3. Area-wide expansion with the green city certification system	○ We talk with Surabaya City, ITS (Institut Teknologi Sepuluh), experts researching for green building standards to work on how to work with JCM.	

<Investigating schedule>

In this fiscal year, we fulfill our duties as activities for promoting the operation of the exiting projects and expanding them the all over the area according to the following schedule:



2.2. Results of the Project Feasibility Study

2.2.1. Summary of the Field Survey Results

(1) Promoting the operation of the existing projects

Concerning the existing projects, we have promoted the introduction of equipment mainly in the JCM assistant programs for equipment certified by the MoE in FY 2015.

Project	Expected reduction ($t\text{-}CO_2$/year)	Working progress
Saving energy in shopping mall's air conditioning with high-efficiency turbo-chillers	**996**	In FY 2015, we proposed a JCM grant-in-aid project for equipment, which was chosen and subjected to subsidies. It was the first phase of this project in Surabaya. Currently, we promote the introduction of equipment to operate.
Introducing cogeneration systems to hotels	**3,200**	We proposed the project and received an unofficial permit. However, we failed to make a consortium agreement between Fuji Electric and a local hotel owner to make a formal application for the project. The reasons were that stable supply could not be ensured due to failure to make a private power generation and supply contract with an electric power company to introduce cogeneration, and that cost problems occurred in a long-term gas supply agreement with a gas company. We declined the unofficial permit and gave a description to the Indonesia JCM secretariat.

(2) Companies owning real estate

We have had contact with more than one company that owns real estate to show them a concrete proposal.

Company owning real estate	Working status
A Group	The group acts as a developer for complex facilities. It owns two to three facilities, each including shopping malls, office buildings, hotels, and houses, in Surabaya. A group does business also in Jakarta. This time, we tap area-wide expansion in the process of adjusting existing project operation. The real estate company agrees

	to embody the JCM grant-in-aid projects for equipment after checking the progress of promoting the first one.
Company B	This real estate company has multiple hotels in Bali, Jakarta, and Jogjakarta. Previously, it owned facilities even in Surabaya. Company B is keen for the introduction of chillers and cogeneration systems because the operating hotels have high cooling demand, so it shows a positive attitude toward the JCM grant-in-aid project for equipment supported by the Japanese government.
C Group	The group develops shopping malls, hotels, residences, hospitals, and office buildings in Surabaya and Jakarta. We have confirmed that the shopping mall has high cooling demand, so C shows a great deal of interest in the introduction of high-efficiency chillers. Moreover, the real estate company is greatly interested in the efficiency of water treatment in the facilities.

(3) Hotel chains

We have had contact with more than one hotel chain to make a concrete proposal from an operation point of view.

Hotel chain	Working status
Hotel D	The company operates hotels in Surabaya and Jakarta. It shows considerable concern to photovoltaic power generation because the cooling demand is high in the daytime. We checked the needs by starting to make a survey of the rooftop of a hotel in Surabaya on which solar panels would be installed.
Hotel E	The company operates hotels in Surabaya and Jakarta. One of them is branded Starwood Hotels & Resorts. The global group has an energy saving policy (30% fall in power consumption and 20% reduction in water consumption by 2020). In November 2015, Marriott International announced the acquisition of the hotel.
Hotel F	We have continuously talked with the hotel chain about the operation of grant-in-aid projects for equipment.

(4) Area-wide expansion along with the green building certification system

Surabaya City presents a “Green Building Awareness Award” as part of the green building certification system, and works on cooperation with JCM projects. In this fiscal year, the city changed its policy, so embodying the system would be attained in the next fiscal year or later.

In Surabaya City, it is likely to take a long time to embody the system because the jurisdiction of the project has been changed from the Development Planning Agency to the Public Service Agency. From FY 2016, the city plans to make regulations for the system. If the regulations will be enforced, they will be a trigger for letting building owners, operators, and tenants actively introduce energy-saving facilities in the city. The municipal government searches for how to cooperate with JCM grant-in-aid projects for equipment in parallel with embodying the system in the next fiscal year or later.

In this fiscal year, we are confident that the system applies to business buildings and commercial facilities to a certain extent. Therefore, we have started to approach a different sector—the manufacturing industry.

(Information) Survey of related technologies: Marketing in Indonesia

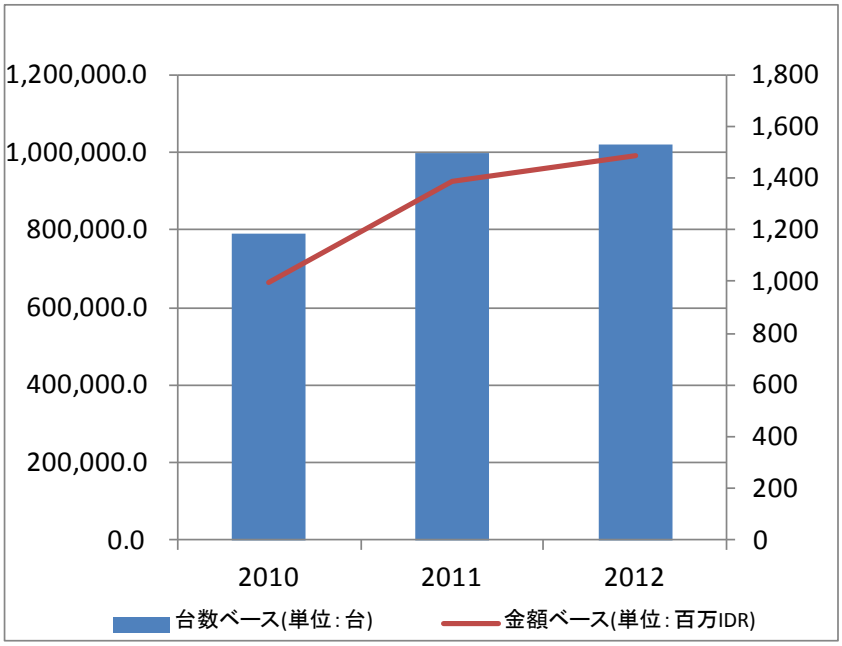
We have analyzed the status of the chiller market in Indonesia according to the marketing and survey results.

1) General trends in the chiller market

In parallel with economic growth, industrialization, and a high-rise building construction boom in Indonesia, the domestic demand for chillers is increasing.

Key players in the Indonesian chiller market are also leading manufacturers in the world market. To put it concretely, US companies, such as Trane, Carrier, York, and McQuay, join the former market. As shown in Figure 1, the recent Indonesian chiller market shows a rising attitude in both quantity and money[4].

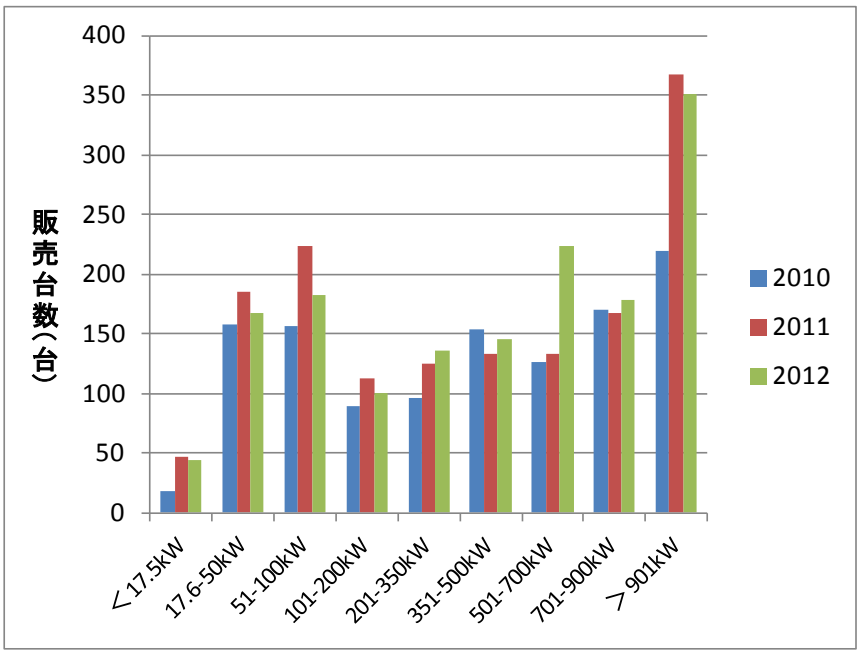
Figure 1: Recently growing chiller market in Indonesia



We pay attention to recent trends in the number of chillers on a size basis. Figure 2 shows that chillers rated at more than 900 kW are most popular in the Indonesian market. This suggests that relatively many chillers are installed in large-scale facilities, such as shopping malls and hotels.

[4] BSRIA, Chillers Indonesia: A multi client study, 2013

Figure 2: Trends in the number of size-by-size chillers sold[5],[6]



In the Indonesian chiller market expanding continuously, various kinds of chillers are available.

Table 3: Trends in type-by-type shares of the Indonesian chiller market[7],[8]

	2010		2011		2012E	
	Units	%	Units	%	Units	%
Reciprocating	436	37%	461	31%	445	29%
Screw	434	37%	516	34%	613	40%
Scroll	104	9%	220	15%	163	11%
Centrifugal	183	15%	251	17%	265	17%
Absorption (1)	31	3%	48	3%	45	3%
Total	1,188	100%	1,496	100%	1,531	100%

Source: *BSRIA*
Note: *Only AC applications. This may include up to 5% of chillers for mixed applications*
1. Includes small absorption chillers

The following tables show recent trends in the Indonesian chiller market.

5 BSRIA, Chillers Indonesia: A multi client study, 2013
6 The data in 2012 are forecasts presented by BSRIA.
7 BSRIA, Chillers Indonesia: A multi client study, 2013
8 The data in 2012 are forecasts presented by BSRIA.

Table 4: Trends in the Indonesian chiller market (selling prices in million USD)[9]

	2012	2013	2014	2015	2016	2017	Annual % change 2012-2017
Chillers							
Reciprocating, screw, scroll	43,781	41,314	41,120	41,264	41,442	41,675	-1.0%
Centrifugal	181,420	174,227	172,559	172,201	173,208	174,406	-0.8%
Absorption	172,449	165,872	166,577	169,014	171,595	174,303	0.2%
Air cooled	35,897	33,645	33,556	33,684	33,845	34,049	-1.1%
Water cooled	107,305	103,107	102,054	101,941	102,466	102,997	-0.8%
<100kW	12,217	11,414	12,672	12,657	12,710	12,767	0.9%
>100kW	91,840	89,527	86,176	86,074	86,437	86,824	-1.1%

Source: *BSRIA*
Note: *Average selling price from manufacturer/importer to first point of distribution. Current prices 2013. Constant prices from 2014 onwards.*

Figure 5: Trends in the Indonesian chiller market (the number of chillers sold)[10]

	2012	2013	2014	2015	2016	2017	Annual % change 2012-2017
Chillers							
Reciprocating, screw, scroll	1,373	1,471	1,516	1,574	1,633	1,698	4.3%
Centrifugal	225	253	258	265	274	283	4.7%
Absorption	47	39	40	41	42	43	-1.8%
Air cooled	945	1,014	1,045	1,086	1,127	1,173	4.4%
Water cooled	700	749	769	794	822	851	4.0%
<100kW	528	595	582	603	626	650	4.2%
>100kW	1,117	1,168	1,232	1,277	1,323	1,374	4.2%
Total	**1,645**	**1,763**	**1,814**	**1,880**	**1,949**	**2,024**	4.2%

Source: *BSRIA*

Figure 6: Trends in the Indonesian chiller market (sales in million USD)[11]

	2012	2013	2014	2015	2016	2017	Annual % change 2012-2017
Chillers							
Reciprocating, screw, scroll	60.1	60.8	62.3	65.0	67.7	70.8	3.3%
Centrifugal	40.8	44.1	44.5	45.6	47.5	49.4	3.9%
Absorption	8.1	6.5	6.7	6.9	7.2	7.5	-1.6%
Air cooled	33.9	34.1	35.1	36.6	38.2	39.9	3.3%
Water cooled	75.1	77.2	78.4	80.9	84.2	87.7	3.1%
<100kW	6.5	6.8	7.4	7.6	8.0	8.3	5.2%
>100kW	102.6	104.5	106.1	109.9	114.4	119.3	3.1%
Total	**109.0**	**111.3**	**113.5**	**117.5**	**122.3**	**127.6**	3.2%

Source: *BSRIA*

Key players in the Indonesian chiller market are US global companies, such as Trane, Carrier, JCI, and McQuay. A few local companies enter in the market, but they mostly handle small-scale

[9] BSRIA, Chillers Indonesia: A multi client study, 2013
[10] BSRIA, Chillers Indonesia: A multi client study, 2013
[11] BSRIA, Chillers Indonesia: A multi client study, 2013

chillers[12]. The following table indicates market leaders on a chiller capacity basis with no type-by-type distinction. They show that local companies, such as Aicool, PT Metropolitan, and Bayutama, dominate chillers rated at less than 100 kW.

Table 7: Leaders in the Indonesian chiller market (by chiller capacity)[13]

	All chillers	<100 kW	101-350 kW	>351 kW
Market leaders *(descending order)*	JCI Carrier Trane McQuay Hitachi	Aicool Carrier Trane PT Metropolitan Bayutama JCI	JCI Aicool Trane Carrier PT Metropolitan Bayutama	JCI Trane Carrier McQuay Hitachi
Their share	80%	90%	85%	85%
Other significant companies *(descending order)*	Aicool Broad PT Metropolitan Bayutama LG	Hitachi McQuay	Hitachi McQuay LG	Aicool Broad LG PT Metropolitan Bayutama

Source: BSRIA

In the table below, checking the market leaders on a chiller type basis shows that foreign companies have a 95% share of the turbo-chiller market.

Figure 8: Leaders in the Indonesian chiller market (by chiller type)[14]

	Reciprocating	Screw	Scroll	Standard Centrifugal	Turbocor Centrifugal	Absorption(1)
Market leaders *(descending order)*	Aicool Carrier JCI Trane PT Metropolitan Bayutama	JCI Trane Hitachi McQuay Carrier	PT Metropolitan Bayutama Trane JCI Aicool Carrier	JCI Carrier McQuay Trane Hitachi		Shuangualing Broad Huin LS Thermax
Their share	90%	90%	85%	95%	-	90%
Other significant companies *(descending order)*		Aicool LG	Hitachi McQuay	Aicool		Hitachi McQuay

Source: BSRIA
Note: 1. Includes small absorption chillers

To put it concretely, the companies include US ones, such as JCI, Carrier, McQuay, and Trane as well as Hitachi, a Japanese enterprise. We gave a hearing to hotels in Jakarta and Surabaya Cities where this project runs, and its results also show that most chillers are made by Trane and Carrier.

[12] BSRIA, Chillers Indonesia: A multi client study in-depth ver., 2013
[13] BSRIA, Chillers Indonesia: A multi client study in-depth ver., 2013
[14] BSRIA, Chillers Indonesia: A multi client study in-depth ver., 2013

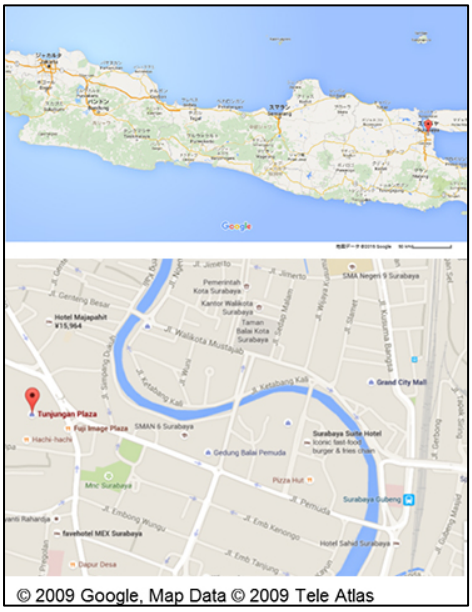
2.2.2. Possibility of Reducing Greenhouse Gas Emissions (Particularly Carbon Dioxide Emitted from Energy Generation)

(1) Introducing high-efficiency chillers to shopping malls

Now, we'd like to introduce energy saving at a shopping mall by Introducing High efficiency turbo chiller as one concrete project for the FS. This is a project in energy sector and the first JCM project in Surabaya at a shopping mall called Tunjungan Plaza.

■ Project location

Country	Republic of Indonesia
Region/State/Province etc.:	East Java province
City/Town/Community etc:	Surabaya



■ Project Participant

(Japan): NTT FACILITIES, INC., Project Participant

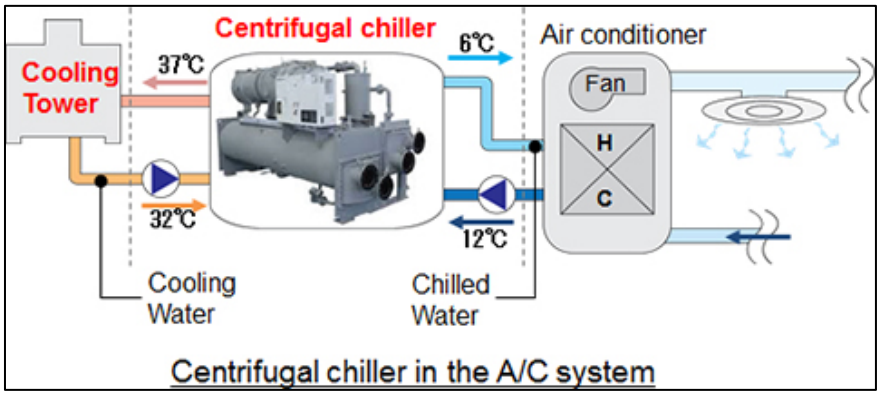
(Indonesia): Group A

■ Outline of GHG Mitigation Activity

The project aims to reduce electricity consumption in the shopping mall through introducing advanced & efficient Japanese centrifugal Chiller system. The project is to replace existing central cooling system with high efficient centrifugal chiller with capacity of 966TR *4 sets

and 569TR * 1 set in A group's shopping mall, Tunjungan Plaza, as well as to replace existing 8 cooling towers with efficient Japanese models.

(Figure) Images for Turbo Chiller



■ Expected GHG Emission Reductions

996 tCO2/ year

The GHG emission reductions are calculated based on the estimated electricity consumptions based on the conservatively estimated COP of a reference cooling system and a project COP of the centrifugal chiller as well as the grid emission factor. This project is proceeding with the mutual understanding of a joint committee between Japan Government and Indonesian Government that we should use existing MRV Methodology as a JCM project and the outline of the Methodology is as below.

2.2.3. MRV Methodology and Monitoring System

■ MRV Methodology and amount of CO2 emission reduction

➢ **Calculation of reference emissions**

$$\mathbf{RE_p = \sum_i \left\{ EC_{PJ,i,p} \times \left(COP_{PJ,tc,i} \div COP_{RE,i} \right) \times EF_{elec} \right\}}$$

RE_p : Reference emissions during the period *p* [tCO_2/p]

$EC_{PJ,i,p}$: Power consumption of project chiller *i* during the period *p* [MWh/p]

$COP_{PJ,tc,i}$: COP of project chiller *i* calculated under the standardizing temperature conditions [-]

$COP_{RE,i}$: COP of reference chiller *i* under the standardizing temperature conditions [-]

EF_{elec} : CO_2 emission factor for consumed electricity [tCO_2/MWh]

➢ **Calculation of project emissions**

$$\mathbf{PE_p = \sum_i \left(EC_{PJ,i,p} \times EF_{elec} \right)}$$

PE_p : Project emissions during the period *p* [tCO_2/p]

$EC_{PJ,i,p}$: Power consumption of project chiller *i* during the period *p* [MWh/p]

EF_{elec} : CO_2 emission factor for consumed electricity [tCO_2/MWh]

➢ **Calculation of emissions reductions**

$$\mathbf{ER_p = RE_p - PE_p}$$

ER_p : Emission reductions during the period *p* [tCO_2/p]

RE_p : Reference emissions during the period *p* [tCO_2/p]

PE_p : Project emissions during the period *p* [tCO_2/p]

➢ **Data and parameters fixed ex ante**

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
$COP_{RE,i}$	The COP of the reference chiller *i* is selected from the default COP value in the following table in line with cooling capacity of the project chiller *i*. **$COP_{RE,i}$** **Cooling capacity /unit (USRt)** | **x<300** | **300≦x<450** | **450≦x<500** | **500≦x<700** | **700≦x<1,250**	The default COP value is derived from the result of survey on COP of chillers from manufacturers

Parameter	Description of data						Source
	$COP_{RE,i}$	4.92	5.33	5.59	5.85	5.94	that has high market share. The survey should prove the use of clear methodology. The $COP_{RE,i}$ should be revised if necessary from survey result which is conducted by JC or project participants every three years.

■ The outline of technologies utilized specifically in the project is as follows:

(Table) Outline of facilities introduced for the project

Items	Unit	Project chiller	
Model No.	-	HC-F550GFG-SSCT	HC-F950GFG-SSCT
（Number. of Introduction）		(1 unit)	(4 units)
Capacity	TR	569	966
Cooling Capacity (COP)	kW/TR	0.561（COP:6.27）	0.560（COP:6.27）
Operation Rate	%	100%	100%
Operation Hour	Hour/year	8,760	4,562.5
Power Consumption	kWh/year	2,908,122	2,566,855
			（per unit）
Total Power Consumption	kWh/year		12,828,246

■ Contribution to Indonesian Sustainable Development

In preparation for the future energy demand increase, Indonesia must effectively utilize precious domestic natural resources. Also, they need to discuss the situation of electrical power shortage problems. In this case, the project aims to reduce electricity consumption in the shopping mall through introducing advanced & efficient Japanese centrifugal Chiller system.

(2) Other

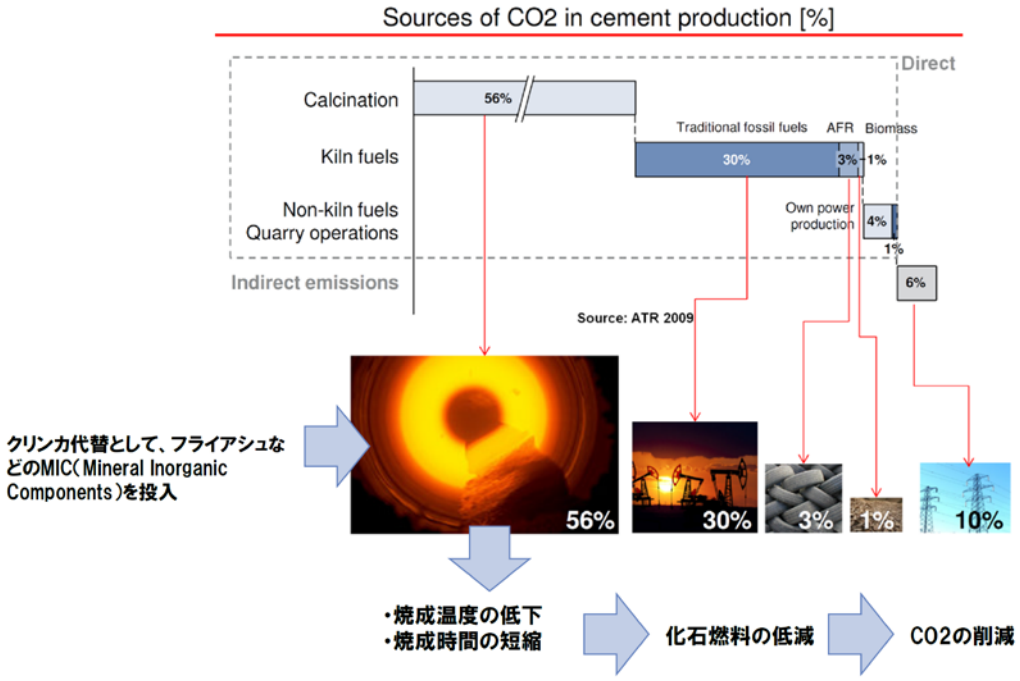
The basic concept of this project is to use methodologies already established for area-wide expansion. In addition to the methodology shown in (1), we have worked on the expansion by using the following ones:

Technology	Concept of methodology
High-efficiency chiller 2	Use of AM0060: Power saving through replacement by energy efficient chillers --- Version 1.1
Cogeneration system	Use of the methodology of introducing cogeneration systems to hotels (Indonesia) in a survey of program planning based on the joint crediting mechanism (JCM) in FY 2014

(Information) Approach to manufacturers

In this fiscal year, we have approached manufacturers as an activity in the energy field. We gave a hearing to H, an affiliated company of G, a leading cement manufacturer, and it suggested the

possibility of CO_2 reduction by using MIC in the cement calcining process to improve the energy consumption rate.



Technology	Concept of MRV methodology
Saving energy by carrying out blended cement production alternative to clinker	Use of ACM0005: Consolidated Baseline Methodology for Increasing the Blend in Cement Production --- Version 5.0

2.2.4. Estimated Project Cost and its Effectiveness

(1) Office buildings (replacement with high-efficiency chillers)
[Feasibility of the whole project]

(1) Investment recovery years (without subsidies): 3.9years

(2) Investment recovery years (with subsidies): 2.3 years

(3) Internal rate of return (with subsidies): 43.7%

(4) Annual cash flow: 72,978 thousand yen

(5) Expected risks in the operation of the project and measures against them

① The project cost increases if planned incidental equipment including existing pipes are difficult to reuse.

⇒ We plan a reserve for the project cost.

② The energy saving performance of the whole air conditioning system reduces due to aging degradation in incidental equipment including pipes.

⇒ We take preventive measures including regular maintenance.

<Effects of the project>

① Reduction in energy-caused carbon dioxide: 996 t-CO_2/year

② Subsidy effectiveness of reduction in energy-caused carbon dioxide:7,857 yen/t-CO_2

③ Planned total expenditure effectiveness of reduction in energy-caused carbon dioxide: 19,179 yen/t-CO_2

2.2.5. Co-beneficial Effects

In the energy field, the co-beneficial effect (side effect on environment and society) of energy saving in buildings is small. We venture to say that it would raise related people's awareness of power saving, but direct electric charge saving has a greater effect on economy. Cogeneration features more stable power supply than grid power and lighter environmental load thank to exhaust gas from natural gas used as the fuel.

2.3. Investigation toward a JCM Project

2.3.1. Project Planning (Implementing System, Grant-in-Aid Scheme, and Schedule)

(1) Promoting the operation of the existing projects(Plan of Grant application stage)

[Funding plan]

In this plan, all funds to be on hand.

[Schedule]

Oct. 2015: Start of the project (placing an order) after the determination of grant-in-aid

Oct. 2015: Commencement of work

March 2016: Installation of main equipment (chillers) and then interim inspection by GEC

Sept. 2016: Completion of the work, trial operation, and confirmation inspection by GEC in June

Oct. 2016: Start of monitoring

[Schedule of MRV and PDD]

June 2016: Completion of methodologies (existing ones already approved will be used)

June 2016: Registration of the methodologies

June 2016: Development of PDD

Sept. 2016: Validation

Sept. 2016: Application for registration as a JCM project

Oct. 2016 or later: Transfer of credit to Japanese government's account

(2) Activities for area-wide expansion

Concerning activities for expansion all over the area, we will take account of (1) to serially identify whether projects will go to JCM assistant programs for equipment or will be based on other schemes, draw up concrete operation plans project by project, and implement them in the next year or later.

2.3.2. Issues with Project Operation

(1) Promoting the operation of the existing projects

The existing projects have already started and carried on smoothly. This program results in the first JCM assistant program for equipment in Surabaya City, so we need to organize the results as a model for promoting the other projects effectively.

(2) Activities for area-wide expansion

Approaches to hotel owners have the following issues. If real estate owners are publicly traded companies, they have no trouble disclosing their financial states, but some of non-public companies may refuse it. Moreover, when introducing cogeneration, they may express the fear whether to make a contract with local electric power and gas companies. Promoting JCM grant-in-aid projects for equipment in the future requires introducing optimal elementary technologies to the site in question in the development and design process. We leave management including equipment renewal to operating companies and hold a decision-making meeting regularly.

Approaches to hotel chains have the following issues. Most of them make a contract to operate hotels by using established brands. Therefore, they are interested in the rational and stable use of energy and measures against disasters. If the real estate owner possesses hotel equipment and pays money for fuel and light, the operator—contractor—is in a neutral position when new equipment is introduced. The owner has the right to make a final decision to install or update equipment, it is recommended to negotiate with the owner in parallel. Anyway, we have to build a project scheme advantageous to both the hotel operator and real estate owner.

2.3.3. Future Schedule

In June 2016, chillers plan to run as the first JCM project at Tunjungan Plaza in Surabaya City. We will take account of the results to expand the project to the following facilities in the next fiscal year or later.

- Shopping malls and hotels operated by A Group whose needs we have rechecked this time
- Facilities owned by other companies, such as offices, shopping malls, and hotels
- Hotel E and other hotel chains
- Manufacturers

Chapter 3

The Waste Sector:

The Promotion of the Low-carbon Industrial Waste Recycling Project

NTT DATA Institute of Management Consulting, Inc.
Amita Corporation

3.1 The Objectives of the Feasibility Study and the Organizational Structure for the Implementation of the Study

3.1.1 An Outline of the Project (The Objectives and the Scope of the Study)

The study was conducted based on the results of the feasibility studies implemented in the 2013 fiscal year and the 2014 fiscal year regarding the Low-carbon Industrial Waste Recycling Project in Surabaya. The objectives of the project are to contribute to material recycling by manufacturing alternative raw materials and fuels for cement manufacturing, from industrial waste which contains hazardous waste (B3 waste).[1] Through these activities, the project aims to reduce the consumption of fossil fuels and natural resources, thereby reducing greenhouse gas (GHG) emissions.

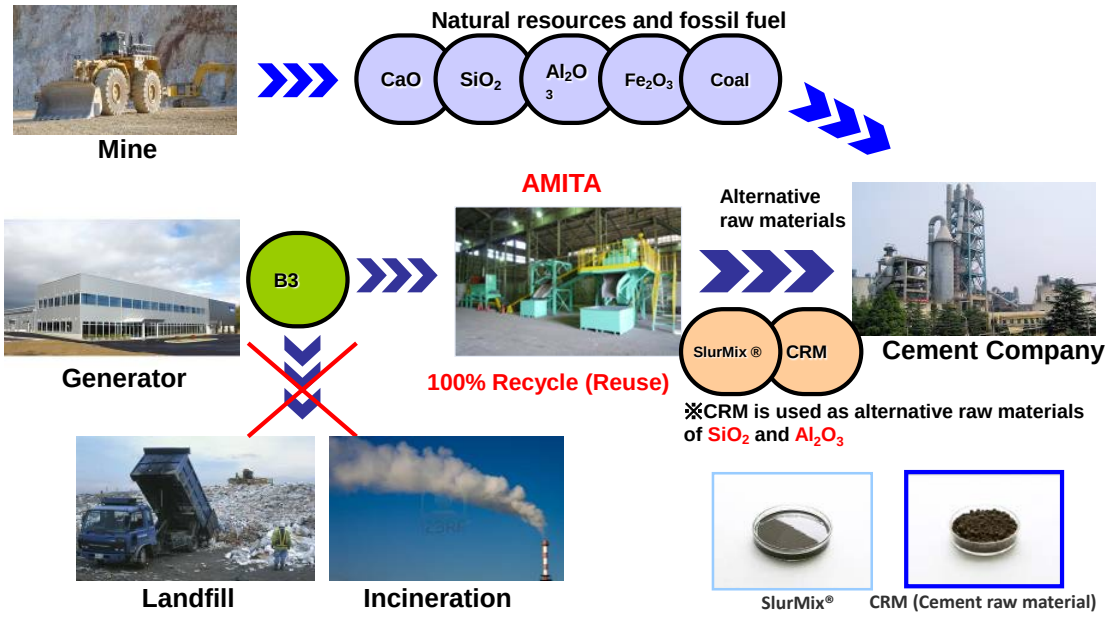


Fig. 3-1 Schematic Diagram of the Project

Past studies revealed the following points regarding the environment surrounding the project

[1] In Indonesia, industrial waste is defined as “the residue left by an undertaking and/or activity,” by the Government Regulation of the Republic of Indonesia (No. 18 of 1999) on Waste Management of Hazardous and Toxic Materials. Hazardous industrial waste which is explosive, inflammable, reactive, toxic, infectious or corrosive is referred to as B3 waste (Limbah Bahan Berbahaya dan Beracun). The producers of B3 waste must have it treated by a processor who has obtained all the necessary permits. The amount of B3 waste generated is increasing as economic activity increases in the country. Although up-to-date accurate statistics are not available, hazardous waste emissions in 2006 totaled 7.02 million tons (2006, Indonesian Environment Status).

and the background to the project.

(1) Much of the industrial waste (hazardous waste) generated by factories, business facilities, etc. in and outside Surabaya is transported to a treatment facility situated in Bogor in West Java, which is more than 800 km away from Surabaya. Through utilizing the hazardous waste as raw materials and fuels for cement manufacturing at cement plants in the suburbs of Surabaya, it will be possible to reduce the transportation costs as well as reducing fuel consumption, thereby reducing CO2 emissions.

(2) Currently, local cement plants accept copper slag, blast furnace slag, biomass waste, etc. as raw materials and fuels, but the ratio of waste to the other raw materials and fuels is low when compared to cement plants in Japan (about one third in Indonesia versus about half in Japan). They should have room to accept more raw materials and fuels derived from other waste.

(3) According to the results of interview surveys of local Japanese-affiliated companies, compliance provisions on the appropriate treatment of hazardous waste became stricter after the revision of the Waste Management Act in Indonesia. The demand for business operators who can conduct appropriate waste treatment is increasing as companies have to fulfill their responsibilities as waste producers.

This fiscal year, we conducted a study, with a view to launching the operation of recycling plant facilities in the 2017 fiscal year. This fiscal year's study included: activities for establishing the JCM project by having discussions with relevant entities including local cement companies and candidate partner companies which have been identified in the past; activities for the quantification of CO2 emissions reductions; and the creation of the MRV (measurement, reporting and verification) methodology.

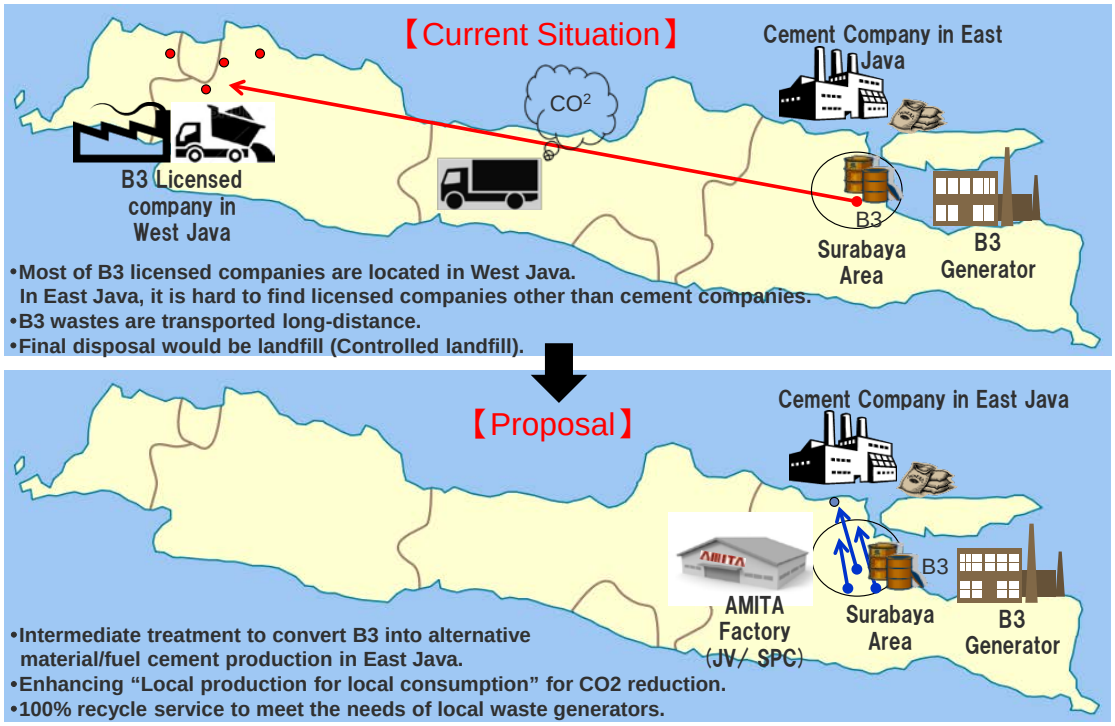


Fig. 3-2 Comparison between the Current Situation and the Project Scheme

Activities for Establishing the JCM Project

The project aims to reduce the waste transportation distance substantially from the current level, by treating the industrial waste generated in and around the Surabaya area at a recycling plant to be constructed in the suburbs of Surabaya in East Java, and supplying it to cement plants in East Java as alternative raw materials and fuels.

In order to implement the scheme as a project, it is desirable to found a new company (e.g. a special purpose company for manufacturing alternative raw materials and fuels) in cooperation with local companies including cement companies and intermediate waste processing companies which are licensed to handle B3 waste. Therefore, we will have discussions with local partner companies on the project plan in order to clarify the details for the collaboration. We will also estimate project profitability, by calculating the initial investment amount needed for the construction of the recycling plant and its running costs, as well as studying the sales prospects for the resulting raw materials and fuels, etc.

Through the past two years of activities, we have been able to obtain a reasonable level of support from the industrial waste producers (B3 waste producers in particular) in the Surabaya area, regarding the idea of recycling waste into cement raw materials and fuels. Therefore, it is expected that a sufficient amount of waste will be supplied to the recycling plant. On the other

hand, we are yet to negotiate various terms and conditions with cement companies, which will receive the recycled raw materials and fuels.

Activities for the Quantification of CO2 Emissions Reductions

Based on the results of studies conducted in the past two years, it is expected that the project would achieve CO2 emissions reductions mainly through a substantial reduction in the transportation distance. In this fiscal year, we will closely examine other possible CO2 emissions reductions, including a reduction through the replacement of the coal used at cement plants with alternative fuels derived from industrial waste, and a reduction through switching from the current industrial waste treatment method to the new treatment method. In addition, if we can increase the percentage of biomass waste in the industrial waste to be recycled into raw materials and fuels, the resulting raw materials and fuels will have less fossil fuel derivative content. This will increase the percentage of power generated from biomass and thereby reduce CO2 emissions, if the cement plants which will use the raw materials and fuels are equipped with waste heat recovery power generation systems. Therefore, we will consider the possibility of increasing the percentage of biomass waste to be inputted into the recycling plant.

We will then create the MRV methodology, by taking into account the results of the above activities.

3.1.2 Applicable Technologies and Relevant Legislation

Applicable Technologies

The Japanese cement industry actively works on the utilization of waste as raw materials and fuels. In the 2013 fiscal year, more than 30 million tons of industrial waste and by-products were utilized as cement raw materials and fuels. The total annual emission of industrial waste and by-products is approx. 400 million tons. 486 kg of industrial waste is used to produce one ton of cement, which is the highest level in the world. Therefore, the cement industry plays an important role in the utilization and appropriate treatment of waste in Japan.

The Amita Corporation has been engaged in resource recycling since its foundation in 1977, by manufacturing the raw materials for cement, alternative fuels, metal materials, etc. from more than 4,000 types of industrial waste (resources available above-ground), using its blending techniques. It produces approx. 140,000 tons of recycled raw materials and fuels annually.

The following explains the alternative liquid fuel “SlurMix®” and the alternative solid fuel/raw material “CRM (Cement Raw Material).”

SlurMix® is an alternative liquid fuel made from industrial liquid waste such as waste oil,

oil-containing sludge and waste solvents for which the only treatment method was incineration. Different types of industrial liquid waste are combined, homogenized and made into emulsion in accordance with the user's specifications, in order to make an easy-to-handle alternative fuel. SlurMix® is mainly used as an alternative fuel to coal for calcination furnaces and rotary kilns in the firing process at cement plants. SlurMix® enables complete recycling with no secondary waste generated, as any cinders left over after the SlurMix® is burnt are used as a raw material for cement. SlurMix® is also used as an alternative fuel to heavy oil by steelmakers, non-ferrous metal smelters, lime manufacturers and paper manufacturers.

"CRM (Cement Raw Material)" is an alternative solid raw material/fuel used in cement manufacturing, which is made by blending different types of industrial solid waste such as sludge, cinders, soot and dust in accordance with the user's specifications. CRM which has a low calorific value is mainly used as an alternative raw material to clay at cement plants. CRM which has a high calorific value is used in calcination furnaces in the firing process. Similarly to SlurMix®, CRM for fuel also enables complete recycling with no secondary waste generated, as any cinders left after the CRM is burnt are added to the cement raw materials.

Relevant Legislation, Regulations, etc.

・The Development of Laws

In Indonesia, waste management measures have been taken mainly for hazardous waste (B3 waste). The basic framework was initially provided for in the Government Regulation of the Republic of Indonesia regarding Hazardous and Toxic Waste Management (No. 19 of 1994), and then other regulations followed, up to regulation No. 85 of 1999. Meanwhile, city waste had become a major problem and this prompted the Indonesian government to develop regulations to manage waste comprehensively, which resulted in the Waste Management Act (No. 18 of 2008).

The scope of the Waste Management Act included household waste, non-household waste and special waste (hazardous household solid waste, waste derived from disasters, waste from the construction sector, waste that cannot be treated with currently available technologies, and waste that does not occur regularly). The promotion of the qualitative improvement of public hygiene and the environment as well as the utilization of waste as an energy source was included in the law. More specifically, new targets and obligations were set forth for waste producers, waste treatment companies and waste transportation companies, with regard to the reduction of waste (setting targets, the introduction of environmental technologies, the promotion of environmental products and 3Rs (reduce, reuse and recycle), the provision of rewards and punishments regarding the implementation of waste reduction, etc.), and the waste treatment methods (sorting waste, the collection of waste, the transportation of waste to disposal plants, and the final

treatment to turn waste into safe environmental media).

・Relevant Government Agencies, Permits and Licenses

B3 waste is controlled by the Ministry of Environment and Forestry of Indonesia (KLHK: Kementrian Lingkungan Hidup dan Kehutanan). Unlike city waste administration which is being transferred to local governments through devolution of power, most of the powers regarding the issuance of permits and licenses for B3 waste are still held by the Ministry of Environment and Forestry. (The central government of Indonesia was restructured by President Joko Widodo who took office in October 2014, and the Ministry of Environment and Forestry was created in January 2015 through the merger of the Ministry of Environment and the Ministry of Forestry.) The organization responsible for industrial waste at the Ministry of Environment and Forestry is divided into four sections in accordance with the following issues.

- 3Rs and collection
- Treatment and transportation
- Disposal and dumping in landfill sites
- Transboundary movement of waste

According to the interview with the Ministry of Environment and Forestry in May 2015, we will need to obtain permits and licenses in the following order, if we are to launch a B3 waste handling business in Indonesia.

1) Apply for approval of the EIA (environmental impact assessment) report to the local government which governs the planned construction site, and obtain approval.

2) Obtain a location permit from the local government which governs the planned construction site.

3) Obtain a business permit from the local government which governs the planned construction site.

4) Obtain an operation permit from the Ministry of Environment and Forestry.

The operation permit concerns the following matters.

- Storage (Controlled by the local government)
- Collection and transportation (Controlled by the Ministry of Environment and Forestry if the business area extends to multiple administrative areas. Controlled by the local government if the business area is limited to one administrative area)
- Intermediate processing (such as incineration. Controlled by the Ministry of Environment and Forestry)

-Recycling (Controlled by the Ministry of Environment and Forestry. Amita Corporation's business activities come under this category.)

The amount of B3 waste treated and disposed of based on the B3 handling permits may be limited to only about 30% of the actual amount of B3 waste generated (the 2011 Fiscal Year Report on the Survey Conducted on Behalf of the Ministry of the Environment, Japan). When looking at data for 2006, the amount of hazardous waste discharged in the year was 7.02 million tons.[2] On the other hand, about 2.5 million tons of hazardous waste was identified to have been utilized, incinerated or dumped in landfill sites, according to relevant statistics. The amount utilized was 1.68 million tons.[3]

Industrial waste which does not come under B3 waste is outside the scope of industrial waste management, and it is currently treated as general waste.

・Preferential Treatment Policies

The Indonesian Ministry of Finance provides corporations with economic incentives regarding the importation of machinery and equipment for the management and treatment of waste. Companies in the manufacturing industry that wish to manage the waste they have generated, or to manage the duties which involve waste management activities that require the importation of machinery, equipment, biological materials or chemical materials for the purpose of the treatment of waste, are subject to the policy. Based on the "Import Duty Exemption on Equipment and Raw Material Used to Prevent Environmental Pollution (No. 101/PMK 04/2007)," relevant corporations can apply for the exemption of import duties to the Ministry of Finance, via the Directorate General of Customs and Excise.[4]

・Waste Acceptance Standards for Cement Companies

The standards for waste that can be used by cement companies in Indonesia are stipulated in the Regulation of the State Minister for the Environment No. 140 of 2010 regarding the Effective Utilization of Hazardous Waste.

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[2] 2006. Indonesian Environment Status.

[3] The Ministry of Environment, Indonesia. 2006. Tahun 2006: 1.7 juta ton Limbah B3 dimangaatkan; The Institute of Developing Economies, the Japan External Trade Organization. 2007. "The Report on the Project for the Provision of Information on Industrial Waste and Recycling Policies in Asian Countries," a report created on behalf of the Ministry of Economy, Trade and Industry, Japan; The 2011 Fiscal Year Report on the Survey Conducted on Behalf of the Ministry of the Environment, Japan (the 2014 Fiscal Year Revision).

[4] The International Economic Research Division, the Japan External Trade Organization. 2011. "Citizen Awareness of the Environment and Environment-related Policies in Indonesia."

The Waste Acceptance Criteria (hereinafter referred to as WAC), which are the waste acceptance standards for the cement industry in Indonesia, are stricter than the standards in Malaysia and Vietnam, for all items. In order to meet the WAC, intermediate waste processing (blending), for which we are examining project feasibility, plays an extremely important role. In fact, cement companies and B3 treatment companies conduct intermediate waste processing (blending) in order to manufacture and use raw materials and fuels which meet the WAC. However, our study only found four companies in Indonesia which have intermediate processing plants equipped with the appropriate blending technologies (in Indonesia, this kind of intermediate processing company are referred to as “platforms”). It is surmised that intermediate processing companies with appropriate technologies will become more important in the future, for the creation of a waste recycling system using the cement industry.

3.1.3 The Organizational Structure for the Implementation of the Study

Fig. 3-6 shows the organizational structure for the implementation of the study through cooperation between the Kitakyushu City Government and the Surabaya City Government. The study was conducted through cooperation between the two city governments which have signed the Green Sister City agreement. Similarly to the previous fiscal year, general coordination, etc. for inter-city cooperation was conducted by the Kitakyushu Urban Centre (KUC) of the Institute for Global Environmental Strategies (IGES). Activities for the establishment of the project were mainly conducted by the Amita Corporation, and the activities for the quantification of the CO2 emissions reductions were mainly conducted by the NTT DATA Institute of Management Consulting, Inc.

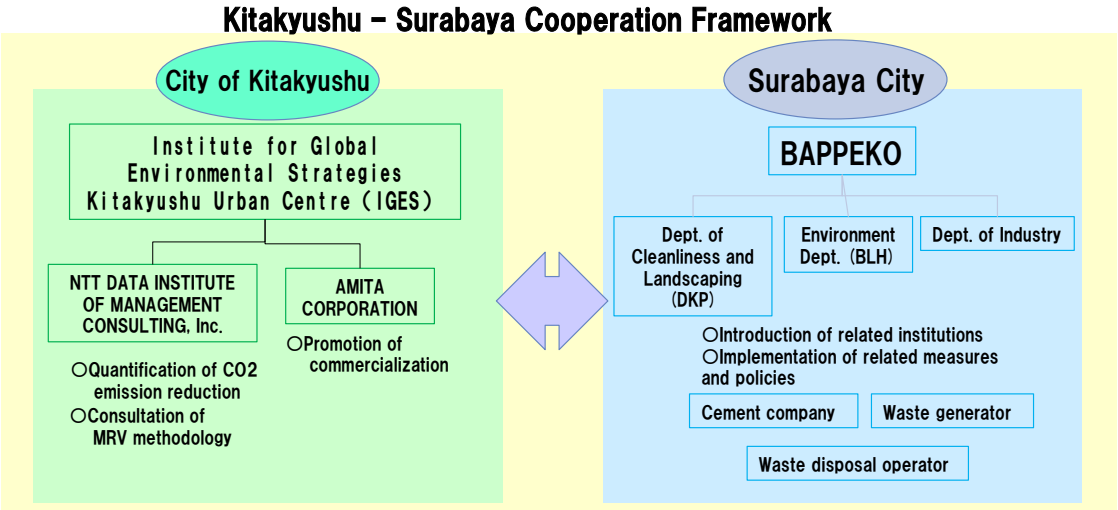


Fig. 3-3 The Organizational Structure for the Implementation of the Study

3.1.4 The Study Methods and the Schedule

We conducted the "Activities for Establishing the JCM Project" and studies for the "Quantification of CO2 Emissions Reductions and the Creation of the MRV Methodology" using the methods described below. Fig. 3-7 shows the study schedule.

Activities for Establishing the JCM Project

- Through the past two years of activities, we have already identified candidate industrial waste producers that would provide waste and candidate cement plants that would accept raw materials and fuels derived from waste.
- In order to implement the planned scheme as a project, it is desirable to found a special purpose company or the like with local companies including cement companies and intermediate waste processing companies which are licensed to handle B3 waste. Therefore, we will have discussions with local partner companies on the project plan in order to clarify the details of the collaboration.
- We have already identified the amounts and the properties of the industrial waste discharged by waste producers. In this fiscal year, we will examine the waste transportation distances in particular, through direct interviews, etc.
- We will negotiate terms and conditions with cement companies, including the prices for the recycled raw materials and fuels.
- We will identify the amounts, types, etc. of biomass waste generated in the Surabaya area through interviews with the Surabaya City Government and other methods, and consider the possibility of using the biomass waste in the project.

The Quantification of CO2 Emissions Reductions and the Creation of the MRV Methodology

- Regarding the development of a methodology for the JCM which will later be proposed, we will consider reference scenarios and project scenarios, as well as considering the items to be monitored and the CO2 emissions per unit of productive activity in order to calculate the CO2 emissions.
- On the premise that a recycling plant will be constructed at the current candidate site in East Java, we will consider the CO2 emissions reduction effect of transporting hazardous waste to the new recycling plant in East Java instead of continuing to transport it to Bogor in West Java, through interviews, etc. with the relevant business operators.
- We will summarize the information on the types, amounts, etc. of biomass that can be contained in the materials to be recycled into cement raw materials and fuels. We will then consider the CO2 emissions reduction effect of the project with an increased percentage of biomass.

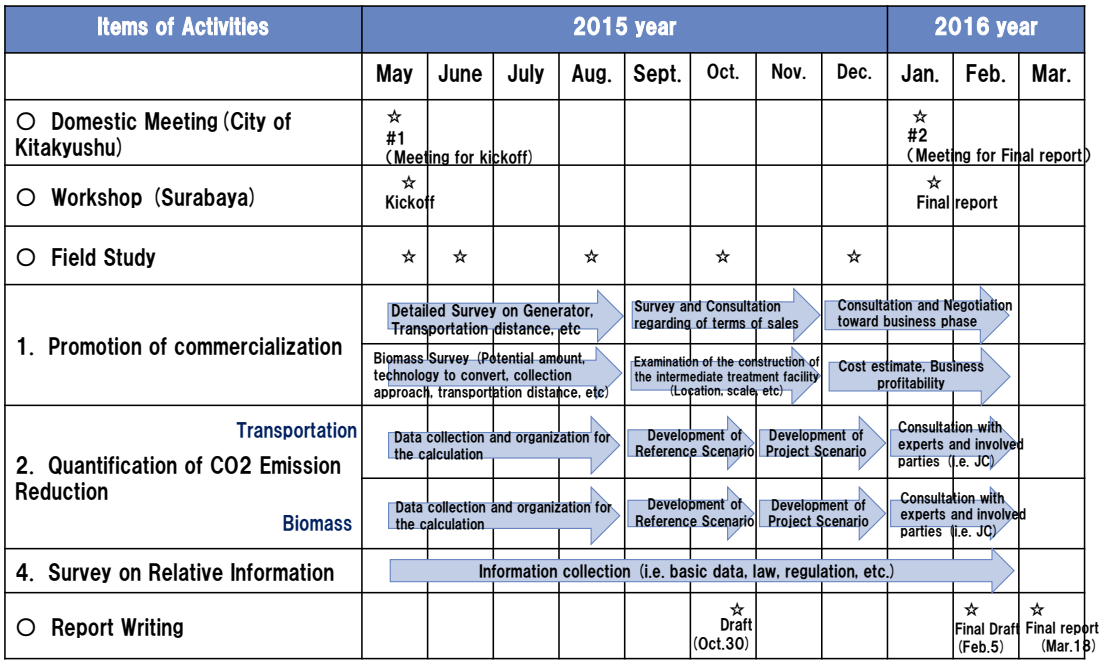


Fig. 3-4 The Study Schedule

3.2 The Results of the Feasibility Study

3.2.1 A Summary of the Field Surveys

We conducted field surveys in May, August and November 2015. We also had a follow-up consultation in January 2016 in order to discuss future activities.

The construction costs and the facility capacity for the recycling plant are estimated to be 340 million yen, when the production capacity for SlurMix® is 5,000 tons per year and the production capacity for CRM is 24,000 tons per year. Regarding the operational expenditure, the business will be feasible based on the current level of B3 treatment fee in Indonesia.

When considering the possibility of collaborations with local companies, we prioritized cement manufacturers as candidate partner companies, in order to ensure that alternative raw materials and fuels derived from industrial waste will be used. The following table lists all the cement manufacturers in Indonesia and summarizes the possibility of collaborations with them. It also includes the results of surveys conducted in the past two years.

Table 3-1 A Summary of the Possibility of Collaborations with Cement Manufacturers

Company name (Shareholders)	Operation started	Cement production capacity (1,000 tons/year)	Waste heat recovery	Collaboration possibility	
Cement company group (51.1% by the government, 48.99% by others)					
- Cement Company C	1910	6,300	Yes	–	We did not visit them as they are not located on Java.
- Cement Company B	1957	11,300	Yes	Maybe	They have a plant in East Java. We are exchanging information periodically, but they are not so interested.
- Cement Company D	1968	6,700	No	–	We did not visit them as they are not located on Java.
Cement Company A	1975	8,700	No	Likely	They have a plant in Tuban in the suburbs of Surabaya in East Java. They are interested in the Financing Programme for JCM Model Projects and they are actively cooperating with us. They have a subsidiary intermediate waste processing company called Geocycle.
Cement Company E	1975	18,600	No	Maybe	They do not have a plant in East Java. We are exchanging information periodically, but they are not so interested.
Cement Company F	1980	2,000	No	–	We did not visit them as they are not located on Java.
Cement Company G	1982	1,600	No	No	They are not located on Java

					and they accept only a small amount of B3 waste.
Cement Company H	1984	396	No	–	We did not visit them as they are not located on Java.
Cement Company I	1999	5,400	No	–	We did not visit them as they are not located on Java.
Cement Company J			No	–	They are owned by a Vietnamese company and their plant has just begun operating.
Cement Company K			No	–	They are owned by a Taiwanese company and the plant is under construction.
Cement Company L			No	–	They are owned by a Thai company Siam Sement and the plant is under construction.

Through the past surveys, Cement company A was found to have the highest possibility for collaboration among all cement manufacturers. However, we also took into account the possibilities of collaborations with Cement company B which has a plant in East Java as well as with intermediate waste processing companies in West Java, and conducted field surveys with the following itinerary, including visits to relevant companies as well as the Ministry of Environment and Forestry which controls B3 waste.

Table 3-2 Field Survey Itinerary

Date	**Organizations visited**	
<The 1st field survey: May>		
May 26 Jakarta	Morning Afternoon 1 Afternoon 2	B3 Licensed company A The Cement Association The Ministry of Environment and Forestry
May 27 Jakarta	Afternoon Transfer	Cement company A (Jakarta → Surabaya)
May 28 Surabaya	Morning 1 Morning 2 Afternoon	JETRO BAPPEKO (the local kickoff meeting) Cement company B

May 29 Surabaya	Wood pellet manufacturer
<The 2nd field survey: August>	
August 3 Narogon, West Java	Cement company A
August 4 Surabaya	The Department of Cleanliness and Landscaping, the Surabaya City Government
August 5 Cilegon	B3 Licensed company A
August 6 Jakarta	B3 Licensed company B
<The 3rd field survey: November>	
November 24 Jakarta	Morning B3 Licensed company B Afternoon B3 Licensed company A
November 25 Jakarta Narogon	Morning The Cement Association Afternoon Cement company A
November 26 Jakarta	The Ministry of Environment and Forestry

The following table summarizes the content and results of the discussions with each candidate partner company.

Table 3-3 Discussions with Candidate Partner Companies for the Establishment of the JCM Project

Discussion counterpart	Main content and the results of the discussions
Cement company A (We had discussions with its subsidiary conducting intermediate waste processing.)	- Cement company A is considering the introduction of a treatment system at its cement plant in Tuban (located in the suburbs of Surabaya) in order to accept raw materials and fuels derived from B3 waste. Therefore, they gave positive consideration to cooperation with Amita. - As of August-October 2015, Cement company A was planning to

	invest approx. 830 million yen for the introduction of a treatment system at its cement plant in Tuban (located in the suburbs of Surabaya), in order to accept raw materials and fuels derived from B3 waste. The construction was to start in 2016. They were giving positive consideration to cooperation with Amita regarding this plan. However, as a result of deliberation, the company found that it would take longer to recover the investment than they are prepared to accept. In addition, the current amount of B3 waste generated in East Java is limited and the company needed to continue its market research in order to secure inputs. Therefore, the company withdrew the plan and this made it impossible to realize collaboration between the company and Amita at an early date. - Collaboration is not possible at the company's cement plant in West Java either, as they are already conducting intermediate processing which is similar to Amita. - However, Holcim is very interested in the Financing Programme for JCM Model Projects as a way of reducing carbon emissions from the cement manufacturing process, and they have provided multiple ideas. They are currently having discussions with Japanese counterparts with the aim of creating a JCM project in the energy sector.
B3 Licensed company A	- The company is interested in expanding their business into East Java. - Their current processing method is incineration with no other treatment. Therefore, the introduction of an intermediate treatment system for the production of raw materials and fuels from waste would reduce carbon emissions. - They are having detailed discussions with a view to introducing Amita's treatment system at an early date. - However, they have concluded that they will proceed with detailed discussions on the introduction of the system without using the JCM scheme, due to CO2 monitoring burdens and subsidy rate restrictions based on the level of cost-effectiveness for CO2 reductions.
B3 Licensed company B	- The company is currently working on the construction of its second

	plant. - Amita is proposing the introduction of Amita's treatment system by B3 Licensed company B, but it wants to establish a joint venture (JV) with Amita and make it into a JCM project. However, JV establishment procedures take a very long time, and the long-term prospects for the JCM project environment are unknown. Therefore, the possibility of it becoming a candidate JCM project is low. We will continue discussions with the company outside the feasibility study, while closely monitoring the project environment in Indonesia.

In conclusion, none of the discussions led to the creation of a project using the JCM.

We interviewed the Department of Cleanliness and Landscaping of the Surabaya City Government and a wood pellet manufacturing company regarding the possibility of using biomass waste, from a CO2 emissions reduction standpoint. They told us that most industrial biomass waste is being sold to specific buyers as a valuable resource to be utilized effectively. Therefore, it is surmised that the amount of biomass waste being directly dumped in landfill sites and contributing to methane fermentation is insignificant.

The Department of Cleanliness and Landscaping of the Surabaya City Government is manufacturing compost at 21 compost centers in the city, mainly using pruning waste generated through city cleaning activities. Table 3-4 shows data on waste which is used to manufacture compost. Pruning waste generated through city cleaning activities is the main ingredient for compost, and about 30% of the inputted biomass waste remains as a residue that cannot be treated. Therefore, using the compost manufacturing residue in the project may be one option to explore.

Table 3-4 Data on Waste Used as the Raw Material for Compost (the Surabaya City Department of Cleanliness and Landscaping, June 2015)

No.	Location of the compost center	Compost material (M^3)					Amount of compost material (M^3)		
		Wood	Market waste	Road cleaning waste	Garden waste	Domestic waste	Total	Impossible to process	Treated
1	MENUR	162	0	0	1	0	163	54	109
2	KEPUTRAN	0	238	0	0	0	238	0	238
3	BRATANG	168	0	0	1	30	199	56	143
4	SRIKANA	0	0	0	26	0	26	6	20
5	LIPONSOS KEPUTIH	12	0	0	27	0	39	9	30
6	WONOREJO	414	0	0	17	0	431	139	292
7	RUNGKUT ASRI	126	0	2	21	0	149	48	101
8	TENGGILIS UTARA	36	0	0	28	0	64	18	46
9	TENGGILIS RAYON TAMAN	96	0	0	12	0	108	34	74
10	GAYUNGSARI	12	0	0	42	0	54	14	40
11	BIBIS KARAH	24	0	0	10	0	34	8	26
12	JAMBANGAN	122	10	0	7	0	139	42	97
13	BALAS KLUMPRIK	18	0	0	6	0	24	7	17
14	GUNUNGSARI	36	0	0	6	0	42	14	28
15	PUTAT JAYA	30	0	0	34	0	65	17	48
16	SONOKWIJENAN	282	0	0	14	0	296	95	201
17	KIAI TAMBAK DERES*	0	0	0	0	0	0	0	0
18	TUBANAN	6	0	0	16	0	22	5	17
19	RUNGKUT ASRI TIMUR (MERR)	162	0	0	7	0	169	56	113
20	IPLT KEPUTIH	60	20	0	8	0	88	22	66
21	BABAT JERAWAT	36	0	0	0	0	36	12	24
TOTAL		1,802	268	2	283	30	2,386	656	1,730

3.2.2 The Possibility of Reducing GHG Emissions (CO2 Emissions from Energy Consumption in Particular)

We considered the possibility of CO2 emissions reductions by the project, using the following four scenarios.

1) Replacement of coal at cement plants with alternative raw materials and fuels derived from industrial waste

2) Switching from the incineration of industrial waste with no other treatment to the treatment of industrial waste which produces raw materials and fuels

3) Increasing the percentage of biomass waste in industrial waste which is to be recycled into raw materials and fuels
4) The reduction of the waste transportation distance

1) The Replacement of Coal at Cement Plants with Alternative Raw Materials and Fuels Derived from Industrial Waste

The breakdown of CO2 emissions in cement manufacturing is: about 40% from the combustion of fuels, and about 60% from the firing process. We examined the possibility of CO2 emissions reductions through the replacement of raw materials, by looking at the chemical reactions of the raw material components in the firing process. More specifically, we examined whether CO2 emissions would be reduced when alternative raw materials were used in the firing process instead of the standard materials, while referring to the CDM (clean development mechanism) methodology "ACM005: Consolidated Baseline Methodology for Increasing the Blend in Cement Production" and other documents.

In principle, the above-mentioned examination requires carbon density data, etc. obtained through component analysis of alternative raw materials and fuels as well as monitoring. However, as it was difficult to obtain the necessary data in Surabaya's case, we concluded that it would not be possible to carry out such calculations.

If we were to replace the coal fuel used at the current cement plant facilities with alternative raw materials and fuels which have the same calorific value as the coal fuel, we would have to use alternative raw materials and fuels with a high calorific value, or increase the amount of alternative raw materials and fuels to be inputted. Therefore, burning alternative materials and fuels would not reduce CO2 emissions.

2) Switching from the Incineration of Industrial Waste with No Other Treatment to the Treatment of Industrial Waste Which Produces Raw Materials and Fuels

As a reference scenario, we assumed that currently a certain percentage of B3 waste is incinerated with no other treatment. We decided to use the percentage of waste incinerated with no other treatment out of the total amount of industrial waste generated as a parameter, and to assume that CO2 emissions from incineration with no other treatment would be reduced by the project.

Therefore, the important task for the study was to determine a conservative estimation for the percentage of waste incinerated with no other treatment, but we could not obtain quantitative

data regarding the percentage through interview surveys. Through literature research,[5] we learned that the percentage was about 5% in 2007, which is a low level.

3) The Avoidance of Methane Fermentation at Disposal Sites (and the Reduction of CO2 Emissions through an Increase in the Percentage of Power Generated from Biomass in Power Generation from Recovered Waste Heat) by Increasing the Percentage of Biomass Waste in the Industrial Waste to Be Recycled into Raw Materials and Fuels

As explained in 3.2.1, in Surabaya, it is surmised that the amount of biomass waste being directly dumped in landfill sites and contributing to methane fermentation is insignificant, as most industrial biomass waste is being sold to specific buyers as a valuable resource to be utilized effectively. Therefore, it is unlikely that CO2 emissions reductions will be achieved in this scenario.

4) The Reduction of the Waste Transportation Distance

Based on the reference scenario that B3 waste is transported over a distance of more than 800 km from the Surabaya area to Bogor in West Java, we considered the CO2 emissions reduction effect of switching to transporting the B3 waste to a recycling plant in East Java.

The previous fiscal year's study calculated the CO2 emissions reduction effect under the same scenario, and therefore we used the results from the previous study.

3.2.3 The MRV Methodology

The project plans to produce the following three types of alternative raw materials and fuels from B3 waste.

(1) Alternative solid fuel: CRM for fuel
(2) Alternative liquid fuel: SlurMix®
(3) Alternative raw material: CRM for raw material

"(2) Alternative liquid fuel: SlurMix®" was excluded from the CO2 emissions reduction calculations, because it has a high carbon density and the CO2 emissions from its use as fuel are as high as the CO2 emissions from fossil fuels, and also because industrial waste that can be used to manufacture SlurMix® is not incinerated in the reference scenario.

"(3) Alternative raw material: CRM for raw material" was treated in the same way as "(1) Alternative solid fuel: CRM for fuel" when developing the MRV methodology, because "(3)

[5] The 2011 Fiscal Year Report on the Survey Conducted on Behalf of the Ministry of the Environment, Japan (the 2014 Fiscal Year Revision).

Alternative raw material: CRM for raw material" has a reasonable calorific value, although it does not reduce CO2 emissions when replacing standard cement raw materials. Therefore, we developed the MRV methodology for (1) and (3), based on the four scenarios explained earlier.

The Proposed Methodology for the JCM

A. Title of the methodology

The Recycling of Industrial Waste and the Replacement of Solid Fuels Used for Cement Manufacturing with Recycled Industrial Waste (Version ●.●)

B. Terms and definitions

Terms	Definitions
Industrial waste	The residue left by an undertaking and/or activity (the Government Regulation of the Republic of Indonesia (No. 18 of 1999) on Waste Management of Hazardous and Toxic Materials)
Hazardous waste	Waste of hazardous and toxic materials (Limbah Bahan Berbahaya dan Beracun: B3 waste) B3 waste is the residue of an undertaking and/or activity which contains a hazardous material and/or which, owing to its nature and/or concentration and/or quantity, either directly or indirectly, may contaminate and/or damage the environment and/or imperil the environment and the health as well as the survival of human beings and other living creatures. B3 waste is explosive, inflammable, reactive, toxic, infectious or corrosive.
Organic waste	Waste mainly derived from animals and plants. It includes paper, kitchen waste, wood, bamboo, fibers, sludge, animal and plant residues, and animal excreta.
Blending techniques	Resource recycling techniques which include: the precise analysis of materials regarding their components, the calorific values, the repellent content, etc.; consideration of the blending rates and combination which meet the alternative raw material/fuel product specifications; blending; and the analysis of the end products to confirm compliance with the specifications.
Alternative solid fuel	CRM (Cement Raw Material) for fuel. It is an alternative fuel

	for cement manufacturing, which is created to meet the user's specifications by blending industrial solid waste such as sludge, cinders, soot and dust.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	This methodology is designed for a series of technologies which reduce fossil fuel consumption, by recycling industrial solid waste including hazardous waste and organic waste through blending and adjusting techniques, and by using the recycled material as an alternative fuel for cement manufacturing. The technologies are also designed to avoid GHG emissions from the incineration of industrial waste with no other treatment and the dumping of industrial waste in landfill sites, by contributing to resource recycling. More specifically, they are designed to avoid CO2 emissions from the incineration of industrial waste, as well as stopping the dumping of organic waste contained in industrial waste at landfill sites and releasing methane gas into the atmosphere through anaerobic decomposition at the waste disposal sites. The technologies are also designed to reduce the amount of fossil fuels used for transportation, by reducing the total transportation distance required for the collection of industrial waste and its transportation to cement plants via a recycling plant, when compared to the transportation distance to an incineration plant or a landfill site.
Calculation of reference emissions	1. CO2 will be emitted through the consumption of coal fuel for cement manufacturing, if alternative fuels derived from industrial waste are not used. [1 Replacement of coal] 2. CO2 will be emitted through the incineration (with no other treatment)

	of waste which contains carbon derived from fossil resources, if industrial waste is not recycled. [2 Replacement of incineration without other treatment] 3. Methane gas will be emitted when organic waste is dumped in landfill sites and biodegradable organic carbon is biodegraded under anaerobic conditions at the waste disposal sites, if industrial waste is not recycled. [3 Avoidance of methane emissions] 4. CO2 will be emitted through the use of fossil fuels for the transportation required for the collection, treatment and disposal of industrial waste, if industrial waste is not recycled. [4 The reduction of the transportation distance] 5. Although the project activities are expected to reduce the amount of industrial waste received at waste disposal sites and therefore reduce energy consumption, etc. at the waste disposal sites, this methodology does not take it into account.
Calculation of project emissions	1. Fossil fuels will be consumed and CO2 will be emitted, through the collection of industrial waste and its transportation to the recycling plant, as well as through the transportation of alternative fuel products from the recycling plant to cement plants. 2. CO2 will be emitted through the consumption of electricity and fossil fuels at the recycling plant where the blending process for the industrial waste takes place. 3. CO2 will be emitted through the combustion of components derived from fossil resources in the alternative fuel derived from industrial waste, in the cement manufacturing process.
Monitoring parameters	1. The amount and distance for the industrial waste transported from the collection points to the recycling plant 2. The amount and distance for the alternative fuel transported from the recycling plant to cement plants

	3. Consumption of electricity and fuels at the recycling plant 4. The amount, composition and calorific value of the alternative fuel derived from industrial waste to be inputted for cement manufacturing

D. Eligibility criteria

This methodology is applicable to projects that satisfy all the following criteria.

Criterion 1	The project must conduct the intermediate processing of industrial waste which is currently not treated for disposal after it is collected. The project must then utilize alternative fuel which will be obtained by recycling industrial waste through intermediate processing.
Criterion 2	The industrial waste to be recycled by the project through intermediate processing must meet one of the following conditions: if the project is not conducted, the industrial waste will be incinerated and emit CO2 through the combustion of waste which contains carbon derived from fossil resources; the industrial waste will be dumped in landfills at waste disposal sites and emit methane gas through biodegradable organic carbon biodegrading under anaerobic conditions at the waste disposal sites; or, the industrial waste will cause CO2 emissions through the use of fossil fuels for long-distance transportation.
Criterion 3	The intermediate processing used in the project must be the recycling of industrial waste into fuel for cement manufacturing which is of a specific quality, through the use of the industrial waste blending techniques.
Criterion 4	The blending techniques used in the project must include the following processes: component analysis of the collected industrial waste; consideration of the blending rates and combinations which meet the fuel product specifications; blending; and the analysis of product samples.
Criterion 5	The facilities and equipment to be introduced and used through the project activities must be new. They must not be converted or improved facilities and equipment which were or are being used for other activities.
Criterion 6	The project activities must not reduce the amount of industrial waste which would have been recycled if the project activities did not take place.

E. Emission sources and GHG types

Reference emissions	
Emission sources	GHG types
Coal fuel consumption at cement plants	CO_2
Combustion of carbon components derived from fossil resources through the industrial waste incineration process	CO_2
Methane emissions from the anaerobic decomposition of organic waste at waste disposal sites	CH_4
Fossil fuel consumption through the collection of industrial waste and its transportation to incineration plants and landfill sites	CO_2
Project emissions	
Emission sources	GHG types
Grid electricity consumption in the recycling process	CO_2
Fossil fuel consumption in the recycling process	CO_2
Consumption of components derived from fossil resources in the alternative fuel at cement plants	CO_2
Fossil fuel consumption through the collection of industrial waste and its transportation to the recycling plant, as well as through the transportation of alternative fuel products from the recycling plant to the cement plants.	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated based on: the amount, composition and calorific value of the alternative fuel to be inputted for cement manufacturing; the percentage of industrial waste incinerated with no other treatment and the percentage of industrial waste dumped in landfill sites; the amount and distance for industrial waste transported to the recycling plant; etc.

F.2. Calculation of reference emissions

$$RE_y = RE_{C,y} + RE_{INC,y} + RE_{CH4,y} + RE_{TR,y}$$

RE_y Reference emissions in year y [tCO2/y]

(1) $RE_{C,y}$ Emissions from the consumption of coal fuel at cement plants in year *y* [tCO2/y]

(2) $RE_{INC,y}$ Emissions from the incineration process in year *y* [tCO2/y]

(3) $RE_{CH4,y}$ Methane emissions released from waste disposal sites in year *y* [tCO2/y]

(4) $RE_{TR,y}$ Emissions from the collection of industrial waste and its transportation to incineration plants or landfill sites in year *y* [tCO2/y]

(1) $RE_{C,y} = \Sigma_i Q_{ALFi,y} \times (CV_{ALFi} / CV_C) \times EF_{C,y}$

$Q_{ALFi,y}$ Consumption of alternative fuel type *i* by the project activities in year *y* [kl, ton/y]

CV_C The lower heating value of coal in year *y* [kcal/kl, t, 1000Nm^3]

CV_{ALFi} The lower heating value of alternative fuel type *i* in year *y* [kcal/kl, t, 1000Nm^3]

$EF_{C,y}$ CO2 emission factor for coal fuel in year *y* [tCO2/tCoal]

(2) $RE_{INC,y} = EFF_{INC,y} \times 44/12 \times \Sigma_j (R_{INC,y} \times W_{j,y} \times FCC_{j,y} \times FFC_{j,y})$

$EFF_{INC,y}$ The incineration efficiency of incineration equipment in year *y*

$R_{INC,y}$ The percentage of industrial waste to be incinerated with no other treatment in year *y*

$W_{j,y}$ The amount of industrial waste j to be inputted in the recycling plant in year *y* [ton/y]

$FCC_{j,y}$ The percentage of all carbon contained in industrial waste j in year *y* [tC/t]

$FFC_{j,y}$ The percentage of carbon derived from fossil resources out of all carbon contained in industrial waste j in year *y*

(3) $RE_{CH4,y} = \varphi_y \times (1 - f_y) \times GWP_{CH4} \times (1 - OX) \times \frac{16}{12} \times F_{CH4} \times DOC_{f,y} \times MCF_y \times \sum_{x=1}^{y} \sum_{j,\ell} R_{LF,x} \times W_{j,x} \times F_{\ell,x} \times DOC_\ell \times e^{-k\ell(y-x)} \times (1 - e^{-k\ell})$

φ_y Adjustment factor for uncertainty in year *y*

f_y The percentage of methane to be flared/combusted/used out of the recovered methane in year *y*

OX Percentage oxidized

F_{CH4} The percentage of methane in gases emitted at waste disposal sties

$DOC_{f,y}$ The percentage of degradable organic carbon which will decompose in year *y*

MCF_y	Methane correction factor in year *y*
$W_{j,x}$	The amount of industrial waste j to be inputted in the recycling plant in year *x* [ton/y]
$R_{LF,x}$	The percentage of industrial waste to be dumped in landfill sites in year *x*
$F_{\ell,x}$	The percentage of organic waste type ℓ contained in industrial waste *j* in year *x*
DOC_ℓ	The percentage of degradable organic carbon in organic waste ℓ
k_ℓ	Decomposition speed for organic waste ℓ
ℓ	Organic waste
x	The year in which the waste was dumped in landfill sites (the value *x* could vary from the year when the dumping in the landfills started (x=1) to the year when the methane emissions are calculated (x=y).)
y	The year when the methane emissions are calculated

(4) $RE_{TR,y} = \Sigma_j \{R_{INC,y} \times W_{j,y} \times D_{INC} \times Eft\} + \Sigma_{j,n} \{R_{LF,y} \times W_{j,y} \times D_{LF} \times Eft\}$

$W_{j,y}$	The amount of industrial waste j to be inputted in the recycling plant in year *y* [ton/y]
D_{INC}	The distance from the industrial waste emission point to the incineration plant [km]
D_{LF}	The distance from the industrial waste emission point to the landfill site [km]
EFt	CO2 emissions per unit of productive activity for each type of vehicle in year *y* [tCO2/ton-kilometer]

G. Calculation of project emissions

$PE_y = PE_{ALT,y} + PE_{EC,y} + PE_{FC,y} + PE_{TR,y}$

PE_y	Project emissions in year *y* [tCO2/y]
(1) $PE_{ALT,y}$	Emissions from the consumption of alternative fuel at cement plants in year *y* [tCO2/y]
(2) $PE_{EC,y}$	Emissions from the consumption of grid electricity by the project activities in year *y* [tCO2/y]
(3) $PE_{FC,y}$	Emissions from the consumption of fossil fuels by the project activities in year *y* [tCO2/y]

(4) $PE_{TR,y}$ Emissions from the collection of industrial waste and its transportation to the recycling plant, as well as the transportation of alternative fuel products from the recycling plant to the cement plants in year *y* [tCO2/y]

(1)-1 When measuring the emission factor for alternative fuel:

$$PE_{ALT,y(1)} = \Sigma_i Q_{ALFi,y} \times EF_{ALTi}$$

$Q_{ALFi,y}$ Consumption of alternative fuel *i* by the project activities in year *y* [kl, ton/y]

EF_{ALTi} The CO2 emission factor for the alternative fuel *i* [tCO2/tALT]

(1)-2 When calculating emissions from the composition of the alternative fuel and an assumed combustion efficiency:

$$PE_{ALT,y(2)} = EFF_{COM,y} \times 44/12 \times \Sigma_i (Q_{ALFi,y} \times FCC_{i,y} \times FFC_{i,y)}$$

$EFF_{COM,y}$ The combustion efficiency of cement firing equipment in year *y*

$Q_{ALFi,y}$ Consumption of alternative fuel *i* by the project activities in year *y* [kl, ton/y]

$FCC_{i,y}$ The percentage of all carbon contained in alternative fuel *i* in year *y* [tC/t]

FFCi,y The percentage of carbon derived from fossil resources out of all carbon contained in alternative fuel *i* in year *y*

(2) $PE_{EC,y} = EC_{PJ,y} \times EF_{EL,y} \times (1 + TDL_y)$

$EC_{PJ,y}$ Grid electricity consumption by the project in year *y* [MWh]

$EF_{EL,y}$ The CO2 emission factor for grid electricity in year *y* [tCO2/MWh] (Calculate EFgrid,CM,y defined by the applicable version of the CDM methodological tool the "Tool to calculate the emission factor for an electricity system," and use it as the parameter.)

TDLy Average transmission and distribution losses of grid electricity received by the project in year *y* (For this parameter, use the default value of $TDL_{j,y}$ provided by the applicable version of the CDM methodological tool the "Tool to calculate baseline, project and/or leakage emissions from electricity consumption.")

(3) $PE_{FC,y} = \sum EC_{n,y} \times NCV_{n,y} \times EF_{n,y}$

$EC_{n,y}$	Consumption of fossil fuel type *n* by the project activities in year *y* [kl, t, 1000Nm^3/y]
$NCV_{n,y}$	The net calorific value of fossil fuel type *n* in year *y* [GJ/kl, t, 1000Nm^3]
$EF_{n,y}$	The CO2 emission factor for fossil fuel type *n* in year *y* [tCO_2/GJ]

(4) $PE_{TR,y} = \Sigma_{j,p} \{W_{j,y} \times D_{AMT} \times Eft\}$
$+\Sigma_{j,p} \{Q_y \times D_{CEM} \times Eft\}$

$W_{j,y}$	The amount of industrial waste j to be inputted in the recycling plant in year *y* [ton/y]
Q_y	The amount of alternative fuel shipped by the project activities in year *y* [ton/y]
D_{AMT}	The distance from the industrial waste emission point to the recycling plant [km]
D_{CEM}	The distance from the recycling plant to the cement plant [km]
$EF_{p,y}$	CO2 emissions per unit of productive activity for each type of vehicle in year y [tCO2/ton-kilometer]

H. Calculation of emissions reductions

$ER_y = RE_y - PE_y$

ER_y	GHG emission reductions in year *y* [tCO_2]
RE_y	Reference emissions in year *y* [tCO_2]
PE_y	Project emissions in year *y* [tCO_2]

It is theoretically possible to calculate CO2 emissions reductions using the above described calculation methodology, but in reality it is difficult to obtain data for many of the parameters used in the methodology. Therefore, in this report, CO2 emissions reductions were estimated using the following method.

$ER_y = RE_y - PE_y$
= (1. CO2 emissions reductions through the replacement of coal at cement plants) + (2. CO2 emissions reductions through the replacement of incineration without other treatment) + (3. Methane emissions from disposal sites) – (4. CO2 emissions from electricity and fuel

consumption at the recycling plant) + (5. CO2 emissions reductions through the reduction of the transportation distance)

The values for "1. CO2 emissions reductions through the replacement of coal at cement plants" and "3. Methane emissions from disposal sites" are zero, based on the results of the scenario analysis explained above.

Regarding "2. CO2 emissions reductions through the replacement of industrial waste incineration without other treatment," it is not possible to calculate the CO2 emissions from incineration because the composition of the B3 waste currently being incinerated is unclear. If it is assumed that 60% of the B3 waste is plastic based on the data for general waste (from the calculation example in Surabaya[6]), the annual CO2 emissions reductions are estimated to be approx. 1,100 tons.

"4. CO2 emissions from electricity and fuel consumption at the recycling plant" can be calculated as follows if the CO2 emissions per unit of productive activity at the Amita Corporation's plants in Japan are used: 0.009 (tCO2/ton shipped) × 24,000 tons (shipped) = 216 tons per year.

"5. CO2 emissions reductions through the reduction of the transportation distance" are 7,580 tons per year, based on the report from the previous fiscal year's study.

Therefore, through the following calculation, CO2 emissions reductions by the project are estimated to be 8,464 tons per year.

ER_y = RE_y -PE_y

= (1. CO2 emissions reductions through the replacement of coal at cement plants) + (2. CO2 emissions reductions through the replacement of incineration without other treatment) + (3. Methane emissions from disposal sites) – (4. CO2 emissions from electricity and fuel consumption at the recycling plant) + (5. CO2 emissions reductions through the reduction of the transportation distance)

= 0 + 1100 + 0 – 216 + 7580

= 8,464 tons/year

3.2.4 Estimated Project Costs and Cost-effectiveness

The construction costs for the recycling plant are estimated to be 340 million yen, when the production capacity for SlurMix® is 5,000 tons per year and the production capacity for CRM is

[6] The 2014 Fiscal Year Promotion of Projects for the Development of the Japanese Recycling Industry Overseas "Power Generation from Municipal Solid Waste in Surabaya, Indonesia"

24,000 tons per year.

If the Financing Programme for JCM Model Projects subsidy rate is 30%, the amount of subsidy will be 102 million yen.

The JCM subsidy's cost-effectiveness for CO2 emissions reductions is approx. 12,000 yen/year, based on the calculation below:
102 million yen ÷ 8,464 tons = 14,178 yen/ton

The JCM subsidy's cost-effectiveness for CO2 emissions reductions becomes lower than 1,000 yen for the period of legally durable years of 17 :
102 million yen ÷ (8,464 tons * 17 years) = 834 yen

3.2.5 Co-benefits

The promotion of waste recycling by the project is expected to create various co-benefits.

Firstly, the use of SlurMix® will contribute to a reduction in fossil fuel consumption. CRM for fuel can be used as an alternative fuel, due to its high calorific value. CRM can also be used as a cement raw material, substituting for clay. Therefore, it contributes to the reduction of natural resource consumption.

The Amita Corporation's blending techniques enable the total utilization of recycled products, i.e. the recycled alternative cement raw materials and fuels will be used completely in the cement manufacturing process with no secondary residue generated. Its treatment process is clear, and appropriate and transparent waste treatment can be ensured. Therefore, the project is expected to reduce environmental impacts and promote more appropriate environmental management, when compared to the current situation where the main disposal methods are incineration with no other treatment and dumping in landfill sites, and also where the conditions under which final disposal takes place are unclear. In addition, appropriate and transparent waste treatment and the improvement of the recycling rate are challenges faced by Japanese-affiliated companies and other foreign-affiliated companies in particular, which have businesses in Indonesia. The project gives solutions to these challenges and this is expected to facilitate more foreign investment in the country.

The project is also expected to increase the lifespan of final disposal sites, by avoiding the dumping of waste in landfills without treatment or the dumping of ash in landfills which is derived from waste incineration with no other treatment. In fact, in Japan, it is estimated that the lifespan of final disposal sites was extended for eight years, as a result of the cement industry accepting approx. 28.5 million tons of waste and by-products per year. This report indicates the

significant contribution of the cement industry to the reduction of environmental impacts through increasing the amount of waste it accepts (based on results from the 2012 fiscal year). It is also surmised that an increase in the lifespan of final disposal sites will lead to a reduction in methane gas emissions from disposal sites, as well as contributing to a reduction in the impacts on the environment surrounding final disposal sites. The project will also contribute to achieving the government policy of banning open dumping as a means of final disposal in principle, which is stipulated in the Act of the Republic of Indonesia No. 18 of 2008 regarding Waste Management.
The project provides a model where a cement company can earn money to cover recycling costs, by accepting and treating B3 waste, i.e. a cement company can obtain a new source of revenue. This could become an incentive for a cement company to accept B3 waste. The popularization of the project model will lead to appropriate price setting based on the market mechanism and the development of a healthy recycling market. The development of a healthy recycling market will lead to the establishment of a clear treatment flow and in turn the elimination of inappropriate treatment.

3.3 A Summary of the Study and the Challenges for the Establishment of the Project

In this study and the studies conducted in the past two years, we have been considering the introduction of the Amita Corporation's equipment through an EPC (engineering, procurement and construction) contract, including the exploration of the possibility of establishing a JV with a local cement manufacturer and the possibility of working with an intermediate processing company which is licensed to treat B3 waste. However, we concluded that it would not be possible to establish a project which uses the JCM scheme in the immediate future (this fiscal year or the next fiscal year) for various reasons, which include: the problems of the time it takes to establish a JV and its project risk; the complex MRV methodology and difficulties in calculating the CO2 emissions reductions accurately; and the unclear prospects for the future of the Financing Programme for JCM Model Projects.

On the other hand, detailed planning is underway towards the introduction of Amita's equipment on Java, as a purely private business investment.

It is clear that the Surabaya project, if it is implemented, will contribute to CO2 reductions through a substantial reduction in the transportation distance, and its co-benefit effects are expected to be particularly high. In addition, the cement industry in Indonesia should have room to accept much larger quantities of waste, as the percentage of waste in the raw materials and

fuels used at cement plants is still low (about one third in Indonesia versus about half in Japan). There is enough potential for future project creation and therefore we will create opportunities for continuous discussions with local candidate partner companies while closely monitoring the project environment.

Chapter 4

Supporting Institutional Arrangements for Low Carbon Project Enhancement

(Kitakyushu – Surabaya Cooperation Project)

Institute for Global Environmental Strategies

4.1 Assistance for Institutional Improvement on Green Building Awareness Award (GBAA)

4.1.1 Summary of the Section

The City of Surabaya initiated the Green Building Awareness Award (GBAA) in response to the Green City Development Program (P2KH) which was launched in 2011 by the Ministry of Public Work and People Housing (MOPW). GBAA undertook the first call for applications and issued the award for the first time in 2014. As GBAA is considered to have high potential as an incentive mechanism to enhance energy saving and environment quality improvement in Surabaya City, the current study was conducted in order to identify potential linkage between GBAA and the Joint Crediting Mechanism (JCM).

In the course of the study, it was revealed that Surabaya City has shifted its focus to develop the Green Building Regulation (tentative name) which incorporates the concept of GBAA. In order to assist Surabaya City in the development of this regulation, the study therefore conducted a literature review and analysis of similar policies in Indonesia and in other countries, compiled a report and corresponding materials, and submitted them to Surabaya City.

Once the regulation is enacted, buildings of a certain size and function will be subject to comply with the technical requirements that are stipulated in the regulation. It is expected that this situation will increase opportunities for JCM Model Projects in the building sector in Surabaya City because the target buildings is likely to be driven to install advanced energy efficient systems such as air conditioning and lighting.

Prospective future development and application for JCM include: (i) Dissemination of information and awareness raising on JCM by linking it with the regulation; and (ii) implementation of a model project targeting government buildings.

4.1.2 Background and Objectives

The City of Surabaya initiated the GBAA in response to the P2KH which was launched by the MOPW in 2011. GBAA undertook the first call for applications and issued the award for the first time in 2014. As GBAA is considered to have high potential as an incentive mechanism to enhance energy saving and environment quality improvement in Surabaya, the current study was conducted in order to identify potential linkage between GBAA and the JCM.

4.1.3 Methods and Schedule

Initially, the study conducted a literature review on green building related policies in Japan and other countries, considered how the GBAA could be improved, and came up with a concept note which was to add a CO_2 monitoring scheme in the GBAA and submitted to Surabaya City. Subsequent discussions with Surabaya City revealed that the City will be developing a Green Building Regulation incorporating the concept of GBAA. So the study has shifted its focus to provide similar case studies in other countries as a reference for Surabaya City to use when they develop the regulation.

The overall schedule of the study is provided in Figure 1. Further details on each action item are referred to in "4.1.4. Results and Achievements".

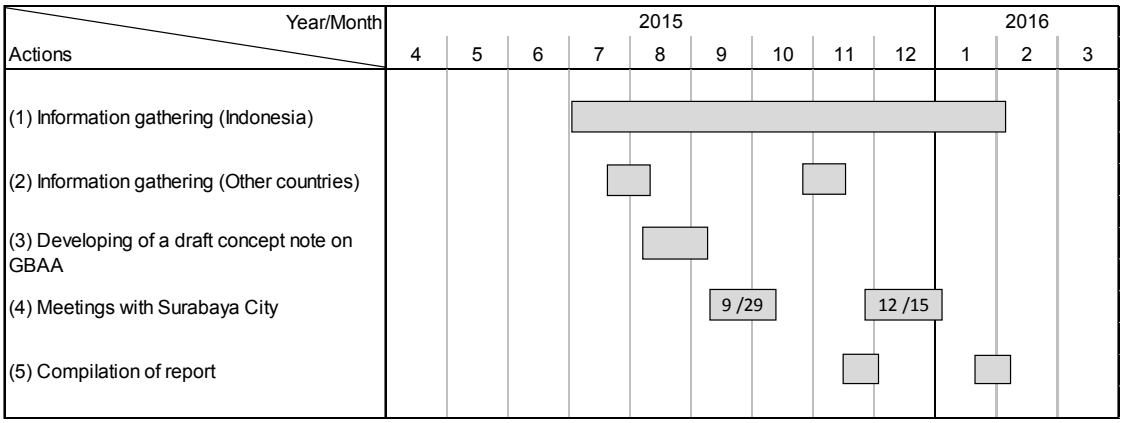


Figure 1. Action items and schedule on assistance for institutional improvement on Green Building Awareness Award (GBAA).

4.1.4 Results and Achievements

(1) Gathering and organising information (in Indonesia)

Information-gathering in Indonesia on energy saving and green building related policies was consigned to a local consultant. A summary of green building related policies is described below. The deliverable report from the consultant (A4, WORD file, 47p., English) is attached in Annex 4-1.

I. Green building related laws and regulations at the national level

The government of Indonesia issued Law No. 28/2002 as a basic law that defines the building standards, functions, management requirements, etc., and stipulates the actual implementation procedure of Law No. 28/2002 in the Government Regulation No. 36/2005.

In terms of green building, the Ministerial Regulation No.02/PRT/M/2015 was enacted by the MOPW in 2015 based on the Law No. 28/2002 and the Government Regulation No. 36/2005.

II. Ministerial Regulation No.02/PRT/M/2015

This regulation stipulates the definition, categories, required standards, procedure and certification on green buildings. The regulation classifies green buildings into three categories on the required level of pursuance to the technical requirements (namely: Mandatory, Recommended and Voluntary) depending on the type, usage, height, etc. of the buildings.

III. Indonesia National Standard (SNI)

The government of Indonesia also issued the Indonesia National Standard (SNI) which includes part of the energy efficiency standard for buildings (Table 1). These standards are recommended but not mandatory. In addition to referring to ISO standards, the Ministerial Regulation No.02/PRT/M/2015 also refers to the SNI standards including those on energy efficiency and water efficiency.

Table 1. Examples of standards on energy efficiency of buildings in the Indonesia National Standard (SNI). Modified from Misna. Andriah Feby (2014)[1]

Energy efficiency standard in building	SNI
Energy conservation for building envelope (OTTV & RTTV < 35 W/m^2)	SNI 03-6389-2011
Energy conservation for air conditioning system in building (temperature: 24^{o}C - 27^{o}C and humidity 60% ± 5%)	SNI 03-6390-2011
Energy conservation for lighting system in building (standard of lighting intensity for the office, residential, industry, hospital, mall, etc.)	SNI 03-6197-2011

IV. Green City Development Program (P2KH)

MOPW launched a Green City Development Program (P2KH) in 2011. P2KH is comprised of eight attributes of a green city which should be taken forward by local governments. One of these attributes is green building. The programme has been implemented in two phases, in 2011-2014 and in 2015-2019.

In the first phase (2011-2014), the programme supported local governments with the preparation and stipulation of local regulations (PERDA). In the second phase (2015-2019), MOPW focuses

[1] Misna. Andriah Feby (2014) Energy efficiency of buildings in Indonesia. Presentation at IEA's Webinar 2 Capacity Building & Construction Transformation in Emerging Economies. Paris, IEA: 22 May 2014.

on strengthening institutional capacities of the local governments particularly in metropolitan cities and districts within the National Strategic Region (KSN). In 2015, MOPW assigned three cities as pilot cities for the implementation of green building, namely Bandung, Surabaya and Makassar.

As a first step to initiate the green building efforts, P2KH encourages local governments to develop a pilot project of green building in government buildings as a role model for public application and capacity building in the implementation of the regulation. For example, MOPW has applied a green building concept in constructing their main building as part of disseminating the green building and they were awarded PLATINUM rating, a highest rating category, in the GREENSHIP rating category.

V. Green building regulations in local governments in Indonesia

The Capital Special Region of Jakarta (DKI Jakarta) was the first local government to regulate the implementation of a green building concept as stipulated in the Governor Regulation No. 38/2012. DKI Jakarta has initially issued a Local Regulation (PERDA) No. 7/2010 which refers to the Governor Regulation No. 36/2005. This PERDA mandated the Governor to issue a Governor Regulation to define criteria and technical requirements of green building. The Governor Regulation No. 38/2012 was thus developed by following that mandate. The Governor Regulation is mandatory and legally binding for buildings of a certain size and function for both new and existing buildings.

Aside from DKI Jakarta and Surabaya City, the two other cities that were assigned as pilot cities for green building (e.g., Bandung and Makassar) are also initiating the development of their own green building regulations. The International Finance Corporation (IFC) has supported the development of the Governor Regulation No. 36/2005 of DKI Jakarta and currently is also supporting Bandung City and Makassar City, respectively, for the same purpose. IFC has also approached Surabaya City but the conditions were not met by both parties. Therefore Surabaya has to develop a Green Building Regulation by its own efforts (or supported by other donors).

VI. Green Building Awareness Award (GBAA) of Surabaya City

GBAA was initiated by Surabaya City in 2013 in response to the P2KH program, and was developed in collaboration with Surabaya Institute of Technology (ITS) based on the GREENSHIP which is a building rating system developed by the Green Building Council

Indonesia[2].

Surabaya made efforts to raise awareness of building owners on GBAA through organizing seminars and conducted application and awarding in 2014.

For the initial application, the target was restricted to existing buildings in two categories: Category 1 (Commercial building with area larger than 2.500 m^2 or height of more than 4 floors) and Category 2 (Government office buildings). Application is voluntary and the first call for applicants in 2014 attracted 175 participating buildings.

The applicant buildings were subject to the following evaluation and selection procedure and a total of 12 buildings (top 3 candidates in each of 4 building categories, namely, hotel, apartment, shopping mall, office) were given the award[3].

- First Stage: Visual observation by the surveyors
- Second Stage: Self-assessment to answer a series of questionnaires which comprise six criteria (1. Appropriate Site Development; 2. Energy Efficiency and Conservation; 3. Water Conservation; 4. Material Resources and Cycles; 5. Indoor Health and Comfort; 6. Building Environment Management and User Behavior) on a scale of 1-5.
- Third Stage: Presentation and building visitation by the surveyors

(2) Gathering and organising information (in other countries)

I. Green building regulations in major South East Asian countries

Most countries have national building regulations and standards that building developers must follow in order to get a permit for construction. There is a global trend of incorporating green building aspects into these building regulations to ensure the design, construction, operation, maintenance, etc. are environmentally responsible and resource-efficient. Regulations can be classified into two types: (a) a code which regulates to satisfy certain environment standards by the means of regulation or ordinance (e.g., CALGreen[4]); and (b) a rating system which provides certain credit or authorisation by conducting a third-party evaluation of the building environment performances (e.g., LEED[5], BREEM[6], Green Star[7], CASBEE[8]).

[2] Green Building Council Indonesia: http://www.gbcindonesia.org/
[3] Surabaya City (2014) Laporan Pelaksanaan Surabaya Green Building Awareness Award (GBAA) 2014
[4] California Green Building Standards Code (CALGreen): http://www.bsc.ca.gov/Home/CALGreen.aspx
[5] Leadership in Energy and Environmental Design (LEED): http://leed.usgbc.org/
[6] Building Research Establishment Environmental Assessment Method (BREEM): http://www.breeam.com/
[7] Green Star: https://www.gbca.org.au/green-star/
[8] Comprehensive Assessment System for Building Environment Efficiency (CASBEE): http://www.ibec.or.jp/CASBEE/

In major South East Asian countries (top five in GDP, as of February 2016), all countries had a building regulation that contained green building aspects on one level or another. Among these, only Singapore is applying a rating system (BCA Green Mark[9]) while others are enacting a code. Four countries (i.e., Philippines, Singapore, Thailand and Viet Nam) have a mandatory regulation at the national level (Table 2). Aside from Singapore having a mandatory rating system developed by a government agency (Building and Construction Authority), there are several voluntary green building rating systems developed by the private sector in each country. These include: GREENSHIP[10] in Indonesia, BERDE[11] in the Philippines, GREEN BUILDING INDEX[12] and GreenRE[13] in Malaysia, TREES[14] in Thailand, and LOTUS[15] in Viet Nam.

Table 2. Status of green building regulations in major South East Asian Countries.

Country	Regulation type		Mandatory (Y/N)	Regulations
	Code	Rating System		
Indonesia	√		N	Ministerial Regulation No. 2/PRT/M/2015 on Green Building (2015)
Malaysia	√		N	Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Building (MS 1525:2007)
Philippines	√		Y	The Philippine Green Building Code. A Referral Code of the National Building Code of the Philippines (P.D. 1096) (2015)
Singapore		√	Y	BCA Green Mark[16]; Building Control Act
Thailand	√		Y	Ministerial Regulation Prescribing Type or Size of Building and Standard, Rule and Procedure for Designing of Energy Conservation Building, B.E. 2552 (2009)
Vietnam	√		Y	Building Code of Vietnam, Building Control Decree

[9] BCA Green Mark: A green building rating system developed by the Building and Construction Authority (BCA): http://www.bca.gov.sg/greenmark/green_mark_buildings.html
[10] GREENSHIP: A green building rating system developed by the Green Building Council Indonesia (GBCI): http://www.gbcindonesia.org/greenship
[11] Building for Ecologically Responsive Design Excellence (BERDE): A green building rating system developed by the Philippine Green Building Council (PHILGBC): http://berdeonline.org/
[12] GREEN BUILDING INDEX: http://new.greenbuildingindex.org/
[13] GreenRE: A green building rating system developed by the Real Estate & Housing Developers' Association Malaysia (REHDA): http://www.greenre.org/
[14] Thai's Rating of Energy and Environmental Sustainability (TREES): A green building rating system developed by the Thai Green Building Institute (TGBI): http://www.tgbi.or.th/trees.php
[15] LOTUS: A green building rating system developed by the Vietnam Green Building Council (VGBC): http://www.vgbc.org.vn/index.php/pages/green-building
[16] Building and Construction Authority Green Mark Scheme: http://www.bca.gov.sg/greenmark/green_mark_buildings.html

II. Green building ordinances by local governments

Other major South East Asian countries such as Malaysia, Thailand, Singapore and Viet Nam seem to be adopting a centralised approach where responsible government agencies issue and enforce the building regulations. Meanwhile, the Philippines have both government regulations and municipal regulations similar to Indonesia.

In the Philippines, Quezon City was the first to implement a Green Building Ordinance to enforce sustainable building designs in the city. Quezon City government approved and enacted Ordinance No. SP-1917, the Green Building Ordinance in 2009. The Implementing Rules and Regulations (Part I) of the Green Building Ordinance of 2009 were then issued in 2010 to prescribe necessary rules and regulations for the ordinance. More recently, Mandaluyong City has enacted Ordinance NO. 535, S–2014, the 2014 Green Building Regulation of Mandaluyong City with support from the International Finance Corporation (IFC) [17].

Both ordinances are mandatory for both new and existing buildings of a certain type and/or size. The Green Building Ordinance of Quezon City applies a rating system which requires to meet minimum Green Points (i.e., 50 points) for issuance of standard certification[18]. The Green Building Regulation of Mandaluyong city is a code which requires the developers of projects to obtain the Green Building Pre–Compliance Certificate (GBPCC) and Green Building Compliance Certificate (GBCC) [19].

(3) Results of comparison and analysis

Based on the above literature review, following countries and municipalities were selected for further detailed comparison and analysis on the technical requirements. It was also intended that a detailed comparative table could serve as a reference for Surabaya City when it develops its Green Building Regulation. Singapore and Cebu City were not included because the regulations are in a rating system which is difficult to compare with the code system.

- National level: Indonesia, Philippines, Malaysia and Thailand
- Municipal level: DKI Jakarta (Indonesia) and Mandaluyong City (Philippines)

[17] Philippines: IFC helps Mandaluyong set green building ordinance: http://www.asiagreenbuildings.com/8447/philippines-ifc-helps-mandaluyong-set-green-building-ordinance/
[18] Implementing Rules and Regulations (Part I) – Green Building Infrastructure: http://quezoncity.gov.ph/index.php/component/content/article/94/342-implementing-rules-and-regulation-for-green-infrastructure
[19] ORDINANCE NO. 535, S–2014 Green Building Regulation of Mandaluyong City and its Implementing Rules and Regulations: http://www.mandaluyong.gov.ph/updates/downloads/files/merged.pdf

A comparative summary between different green building regulations on the availability of technical requirements is provided in Table 3. Further detailed technical requirements were extracted and compiled in a separate EXCEL file but this was not attached to this report as it contained too much data.

Results of the comparison revealed the following points:

- Ministerial Regulation No. 2/PRT/M/2015 covers the full spectrum of green building requirements including programming, technical design, construction, utilisation, and demolition phases.
- Ministerial Regulation No. 2/PRT/M/2015 and Governor Regulation No. 38/2012 have similar requirements particularly on “energy efficiency”. They both refer to corresponding SNI but the Ministerial Regulation sets a higher standard, e.g., by referring to corresponding ISO standards and setting a higher efficiency on OTTV & RTTV. This indicates that the Ministerial Regulation was developed based on the Governor Regulation No. 38/2012 by referring to the latest SNI.
- The requirements in Governor Regulation No. 38/2012 are primarily focused on “Technical design” (in particular on “Energy efficiency” and “Water efficiency”). Provision of requirements on “Construction” are limited compared to Ministerial Regulation No. 2/PRT/M/2015, while provision of “Programming” and “Demolition” are lacking.
- The requirements in Governor Regulation No. 38/2012 have detailed provisions on technical requirements of existing building which correspond to “Utilization” in the Ministerial Regulation No. 2/PRT/M/2015. This includes development and submission of a conservation programme and implementation of monitoring on energy and water consumption including periodic (every 12 months) reporting to the authorities.
- Green building codes in other countries and municipalities mostly focus on “energy efficiency” and are much simpler (with fewer requirements) compared to Governor Regulation No. 38/2012, which becomes much more obvious when compared to Ministerial Regulation No.02/PRT/M/2015.
- Different countries apply different technical standards making it difficult to compare each requirements directly. Meanwhile, the cross-country/municipality comparison is still useful in: (i) understanding the overall framework and scope of each country/city, (ii) getting an idea of requirements that the Indonesian regulations and standards are not covering (but could be worth consideration for inclusion), and (iii) considering the appropriate structure and format of the regulation.

- Requirements that were included in other regulations but were not included in the Ministerial Regulation No.02/PRT/M/2015 and could be worth consideration include:
  - Bicycle parking and shower facilities (DKI Jakarta)
  - Renewable energy and sustainable design (Thailand and Malaysia)
  - Provision of certificate (Mandaluyong City)
  - Incentives such as building height limit and tax discount (Mandaluyong City)

Table 3. Comparison between different green building regulations and standards on the availability of requirements at different phases based on the Ministerial Regulation No.02/PRT/M/2015 (further detailed table is provided separately in EXCEL file: Green Building Code Summary).

Phase	Requirements	Indonesia			Philippines		Thailand	Malaysia
		Ministerial Regulation No.02/PRT/M/2015	Indonesia National Standard (SNI)	Governor Regulation No. 38/2012	The Philippine Green Building Code	2014 Green Building Regulation of Mandaluyong City (ORDINANCE NO. 535, S–2014)	Ministerial Regulation Prescribing Type or Size of Building and Standard, Criteria and Procedure in Designing Building for Energy Conservation (B.E. 2552, 2009)	Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Building (MS 1525:2007)
Programming	1) Site suitability	●						
	2) Determination of building object	●						
	3) Performance of green buildings in accordance with the requirements	●						
	4) Project delivery system	●						
	5) Building feasibility for a green building implementation	●						
Technical design	1) Site management							
	a. Buildings orientation	●						●
	b. Site management including accessibility/circulation	●			●			
	c. Contaminated land management of hazardous and toxic waste (B3)	●						
	d. Private green open space (RTH)	●		●	●	●		
	e. Pedestrian paths provision	●		●				
	f. Basement site management	●						
	g. Parking lots provision	●						
	h. Outdoor lighting systems	●						
	i. Buildings construction above and/or below the ground, water and/or public infrastructure/facilities	●						
	2) Energy efficiency							
	a. Building envelope	●	●	●	●	●	●	●
	b. Ventilation system	●	●	●	●	●		●
	c. Air conditioning system	●	●	●	●	●	●	●
	d. Lighting system	●	●	●	●	●	●	●
	e. Indoor transport system	●	●	●	●	●		
	f. Electrical system	●	●	●	●	●	●	●
	3) Water efficiency							
	a. Water sources	●	●	●	●	●		
	b. Water consumption	●	●	●	●	●		
	c. Use of water fixture sanitary equipment	●	●	●	●	●		

	4) Indoor air quality							
	a. Smoking ban	●			●	●		
	b. Carbon dioxide (CO2) and carbon monoxide (CO) control	●		●				
	c. Refrigerant use control	●		●				
	5) Environmental-friendly materials use							
	a. Use control of hazardous materials	●		●	●			
	b. Use of certified environmental-friendly materials (eco-labelling)	●						
	6) Waste management							
	a. Application of 3R principles	●						
	b. Application of waste management system	●		●	●	●		
	c. Application of waste generation recording system	●						
	7) Management of waste water							
	a. Provision of facilities for solid waste and waste water management before discharged into municipal sewer	●		●				
	b. Grey water recycle	●						
Construction	1) Green construction process							
	a. Application of the green construction delivery system	●						
	b. Optimise use of equipment	●						
	c. Implementation of construction waste management	●						
	d. Implementation of water conservation during construction process	●						
	e. The implementation of energy conservation during construction process	●						
	2) Green behaviour practice							
	a. Implementation of Health and Safety Management System (SMK3)	●						
	b. Application of environmental-friendly behaviour	●						
	3) Green supply chain							
	a. Construction materials use	●						
	b. Suppliers and/or sub-contractors selection	●						
	c. Energy conservation	●						
Utilisation	1) Organisation and governance of the green building utilisation	●						

	2) Operational Standards and Procedures (OSP) implementation for green building utilization	•						
	3) Preparation of guidelines for the building occupants/users	•						
Demolition	1) Procedure of demolition	•						
	2) Recovery efforts for environment footprint	•						

(4) Developing and proposing a concept note on GBAA

Initially, the study sought to understand the institutional arrangement and challenges of GBAA and consider potential area of collaboration with the JCM. As a result, adding a simple CO_2 monitoring scheme in the existing GBAA programme was considered to raise CO_2 reduction incentives and hence improves the overall functionality of the programme. A concept note (A4, WORD file, 8p., English: Annex 4-2) was compiled and submitted to Surabaya City for review in August 2015.

(5) Consultation with Surabaya City

I. First meeting

DATE/TIME 10:30-12:00, 29 September 2015

LOCATION Public Works Department (Cipta Karya), Surabaya City Office

PARTICIPANTS Total 9

- Cipta Karya (5): Ema Agustina, Reinhard, others
- Development Planning Department (Bappeko) (3): Ken Wahyuni, Erisa Nandatami, others
- Institute for Global Environmental Strategies (IGES) (1): Kohei Hibino

OBJECTIVE Initial discussion with Bappeko revealed that the responsibility of GBAA was transferred to Cipta Karya; therefore a meeting was held with Cipta Karya to hear about the current status and to discuss the possible way forward.

SUMMARY OF DISCUSSION

- GBAA is part of the Green City Master Plan of Surabaya City and is an important policy. Bappeko was responsible for planning and development of GBAA. Given that the GBAA was implemented in 2014, the responsibility has now moved to Cipta Karya where it is responsible for spatial planning and building permit. (Bappeko)
- The current regulation on building permit (No. 7/2009) stipulates necessary requirements and procedure to construct new buildings. This regulation partly contains a concept of green building but it is not specific and operational. (Cipta Karya)
- The Department intends to incorporate the concept of green building in the existing regulation and to develop a new Green Building Regulation. By using the FY2016 budget, it is anticipated to initiate the drafting of a new Regulation from January 2016 and to be completed by December 2016. (Cipta Karya)

- A team of experts in Cipta Karya will be responsible and lead the drafting of the new Regulation. (Cipta Karya)
- Once the new Regulation is enacted, all new buildings will be subject to comply with the green building concept. Application of the green building concept in existing buildings is a future challenge. (Cipta Karya)
- It was agreed that IGES will provide assistance for developing the Regulation by gathering similar regulations in other countries. There was a comment to prioritise practical methods (i.e., simple, easy, low cost) for references.
- It was clarified that there are no plans for further implementing the GBAA and/or upgrading the program. It was therefore decided that the proposal on CO_2 monitoring in the concept note will be abandoned and prioritize the Regulation development.

II. Second meeting

DATE/TIME 09:30-12:00, 15 December 2015

LOCATION Cipta Karya, Surabaya City Office

PARTICIPANTS Total 6

- Cipta Karya (3): Ema Agustina, Reinhard, others
- Development Planning Department (Bappeko) (2): Arum Safitri Rahayu, Erisa Nandatami, others
- IGES (1): Kohei Hibino

OBJECTIVE An interview with Cipta Karya was conducted to better understand the status of the Green Building Regulation. A preliminary draft sample of the output which compiled the green building regulations in other countries was used to discuss and clarify the image of an output.

Initial discussion with Bappeko revealed that the responsibility of GBAA was transferred to Cipta Karya; therefore a meeting was organised to consult with Cipta Karya to hear about the current status and to determine the possible way forward.

SUMMARY OF DISCUSSION

- There are two types in local regulations: i) Local Regulations (PERDA) and ii) Mayoral Regulations (PERWALI), and the current regulation on building permit (No. 7/2009) corresponds to the former (i). PERDA is upper level regulation which requires the highest decision-making procedure of the City; while PERWALI is more of a supplementary regulation and requires a simpler procedure (with a shorter period) for development. The new Green Building

Regulation is intended to be the PERWALI. (Cipta Karya)

- There was an offer of financial support from IFC to Surabaya City for development of the Regulation but an agreement could not be reached due to mismatch of the conditions. Thus, the City has initiated the development of a draft on its own. It was noted that the budget of the City will not be able to cover some expenses such as inviting experts and organising workshops. (Cipta Karya)
- The Department intends to start with a simple and basic regulation (by referring to existing guidelines and standards issued by the central government) and gradually upgrade the contents depending on the situation. (Cipta Karya)
- It was clarified that the format of the draft sample output (EXCEL file) was considered to be useful for development of the regulation and the direction of development is appropriate as suggested.

(6) Compilation and submission of output

Based on the discussion with Surabaya City, a report (A4, WORD file, 10p., English: Annex 4-3) which compiled and analysed the status and challenges of the green building regulations in and outside of Indonesia and potential collaboration with JCM was submitted to Cipta Karya on February 2016. A corresponding EXCEL file which was also submitted to Surabaya City was not attached to this report as it contained too much data.

4.1.5 Potential of Institutionalisation and Linkage with JCM

(1) Potential and challenges toward institutionalization

Since the application and awarding of GBAA were undertaken in 2014, there has been no future prospect of continuation of the programme. However, it turned out that the concept of green building will be incorporated into the Green Building Regulation which has binding power. These actions are undertaken following relevant government regulations and the P2KH programme. Surabaya City has already initiated the drafting of the Regulation aiming to be completed within FY2016. This suggests it is highly likely that the Regulation will be institutionalised in due course.

Through reviewing other green building regulations in and outside of Indonesia, the following challenges were identified upon development of the Green Building Regulation by Surabaya City:

I. <u>Competition and comparison with DKI Jakarta, Bandung, and Makassar</u>

The Green Building Regulation that Surabaya City is aiming to develop is likely to become the first green building regulation to be enacted by the Indonesian municipality after the Governor Regulation No. 38/2012 of DKI Indonesia which was issued in 2012. It is also likely to become the first of its kind after the issuance of Ministerial Regulation No. 2/PRT/M/2015 in 2015. So there is an implicit expectation that the Regulation will follow these guidelines and precedent cases, and will cover more advanced contents than Governor Regulation No. 38/2012.

On the other hand, Bandung City and Makassar City are standing on the same track aiming to achieve the same objectives to develop and enforce their own green building regulations. Even though it is not a competition, these three cities are likely to be subject for comparison as pilot cities. Bandung and Makassar may have an advantage as they are getting technical and financial assistance from IFC. On the other hand, Surabaya City is free from guidance and requirements of IFC which could be advantageous in terms of focusing on developing a truly original regulation that suits its own circumstances.

II. Capacity for implementation

Developing and enforcing a new regulation will require not just the issuance of the regulation itself as a legal document but also developing a system and arrangement of staffing to ensure appropriate and efficient implementation of the regulation. These developments need to be in place in parallel with the development of the regulation. Thus, whatever process and requirements to be prescribed in the regulation should carefully consider the feasibility in terms of both capacity and adequacy.

III. Inclusion of existing building

The current ongoing building application, auditing and permit process in Surabaya City, including Advice Planning (SKRK), Building Permit (IMB), and Certificate of Building Proper Function (SLF), will not likely to change if the target of the ordinance is restricted only to new buildings. However, if the target includes existing buildings, an additional division (i.e., operational management/maintenance division) will be needed to handle the additional processes, including monitoring, evaluation, assessment and supervision of existing buildings. It is indeed meaningful to include existing buildings in the target from an environment conservation and GHG reduction point of view, but it also means that the number of target buildings will drastically increase. Thus, if the capacity of Surabaya City is limited, it may be worthwhile considering to apply a step-by-step approach to initiate with targeting only new buildings and gradually expand the scope to include existing buildings in the future.

IV. Identification of right balance between cost & benefit

Too many and/or high requirements of green building will raise initial investment costs and will be a burden on developers and building owners. However, if the requirements are too basic, building owners as well as citizens will not be able to enjoy the advantages of green building such as reduced running costs and achieving a cleaner environment and healthier lifestyle. Thus, identifying the right technological requirements that can balance out the cost and benefit is a critical point of development and will require extensive hearing and consultation with experts.

V. Financing

As Surabaya City does not receive financial support from IFC in the development of its green building regulation, it needs to develop it on its own, or if available, with support from other donors. Developing the draft ordinance itself may not need external support as there is already clear guidance and references to follow (i.e., Ministerial Regulation No. 2/PRT/M/2015, SNI, and Governor Regulation No. 38/2012). However, a certain amount of funding may be necessary for actions such as: consultation/reviewing of the draft, hearings and workshops with key experts and private sector players, training and capacity building of officials, testing and system development, etc.

(2) Relevance and potential application to JCM

Once the Regulation is enacted in Surabaya City, buildings of a certain size and function will be subject to comply with the technical requirements that are stipulated in the Regulation and it is expected that the target buildings will dramatically increase compared to GBAA which was based on voluntary participation. It is expected that this situation will increase the opportunities of JCM Model Projects in building sectors in Surabaya because the target buildings are likely to be driven to install advanced energy efficient systems such as air conditioning and lighting.

In order to enhance application of JCM in conjunction with the Regulation, it will be necessary to raise awareness of JCM to not just in Cipta Karya but also in relevant sectors such as building industries, real estate industries, hotel chains, etc. For example, developing and disseminating a JCM brochure focusing on building applications which covers case studies for technologies, investment costs, CO_2 reduction amount, repayment period, etc. of applied JCM Model Projects on buildings will allow potential users to obtain a better image.

As for potential future application and replication in Surabaya City, the first priority could be to

develop a role model of green buildings for government buildings for application of the Regulation and JCM, and capacity building of officers as suggested by P2KH programme.

4.2 Modelling of Low Carbon Projects

4.2.1 Summary of the Section

A consultation meeting was held with Surabaya City to discuss about the potential JCM focus in the next fiscal year and possible development of a mechanism to enhance and replicate JCM projects in the city. The meeting identified that the main obstacle for Surabaya to get involved in the JCM process is a lack of an official letter from the federal government to assure the role and position of Surabaya City toward JCM activities. Necessary coordination was thus undertaken to address this issue.

As a result of coordination, an official letter was issued from the Coordinating Ministry for Economic Affairs (CME) to the City Mayor of Surabaya and thus the original purpose was accomplished. The situation is the same with other municipalities that are conducting JCM Feasibility Studies (FS) based on the city-to-city collaboration in Indonesia, so a similar provision is expected for other cities as well.

For future development, (i) Green Building Regulation and (ii) Green City Master Plan, were identified as the potential mechanisms that could enhance replication of JCM projects in Surabaya City.

4.2.2 Background and Objectives

Given that the current JCM FS is in the third year, the initial objective was to consider developing a new mechanism or a way of publication that can enhance replication of JCM projects in Surabaya City based on the achievements and experiences over the past two years. However, a consultation meeting with Surabaya revealed that the city may not be in a position to fully support the implementation of JCM projects because there has been no issuance of an official letter that certifies the role and position of Surabaya City toward JCM activities. Thus, the strategy was changed to address this matter and necessary coordination was conducted.

4.2.3 Methods and Schedule

(1) Schedule

The current activity intended to realise the issuance of an official letter from the federal government to Surabaya City that certifies the role and position of the City toward JCM projects.

Thus, necessary consultation was undertaken with the JCM Indonesian Secretariat and CME. A follow-up consultation meeting was also held with Surabaya to discuss about the potential next step of JCM in the city. The overall schedule of the activity is provided in Figure 2.

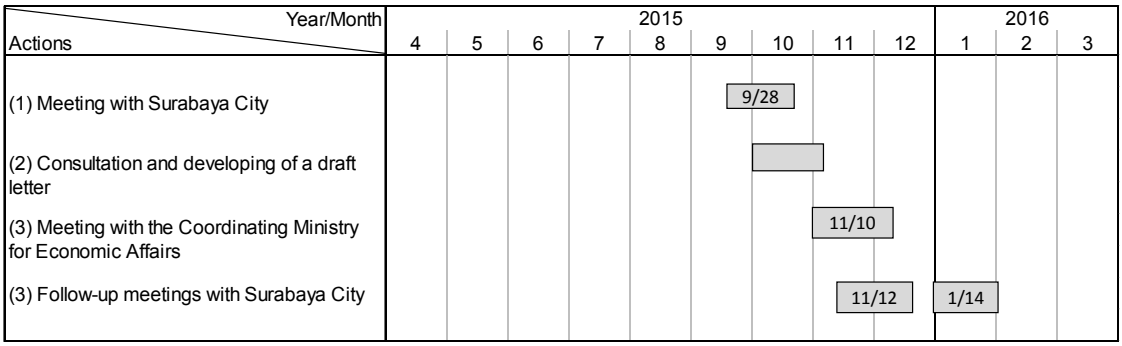


Figure 2. Action items and schedule on the issuance of an official letter that certifies the position of Surabaya City.

(2) Consultation meeting with Surabaya City

DATE/TIME 10:30-12:30, 28 September 2015

LOCATION Bappeko, Surabaya City Office

PARTICIPANTS Total 8

- Bappeko, Surabaya City (5): Dwija Gede, Ken Wahyuni, Arum Safitri Rahayu, Korviantika, Erisa Nandatami
- Cooperation Division, Surabaya City (1): Rahmasari
- Kitakyushu City (1): Seiichiro Ayabe
- IGES (1): Kohei Hibino

OBJECTIVE The meeting aimed to discuss the potential JCM focus in next fiscal year and possible development of a mechanism to enhance and replicate JCM projects in the city

SUMMARY OF DISCUSSION

- A hearing was conducted to clarify the requests and needs of Surabaya City for a potential focus on JCM in next fiscal year and the possible development of a mechanism to enhance and replicate JCM projects in the city based on the achievements and experiences over the past two years.
- Surabaya City is interested in JCM, willing to learn more and handle the subject appropriately especially during and after the actual project phase. However, the

City will not be able to take proactive actions without clarifying the role and authority of the City in the process of JCM. (Surabaya City)

- In Indonesia, an international relations project such as JCM is handled by the federal government and an official letter is required when the local government will be involved in the process with clarification on the role and position of the local government. (Surabaya City)
- Issuance of such a letter will facilitate all administrative process regarding JCM and it will also ease the city Mayor to issue instructions. (Surabaya City)
- Until now, there was no problem because it was FS stage; however this type of letter would be indispensable when moving forward to the actual project implementation phase and replication of projects in the city. Thus, the city would like to entrust Kitakyushu City and IGES to consult with the JCM Indonesian Secretariat on the issuance of the letter. (Surabaya City)
- The letter should be sent from the federal government agency that is responsible for JCM and overseeing the JCM Indonesian Secretariat, to the Mayor of Surabaya City. (Surabaya City)
- The contents of the letter was discussed and it was agreed that IGES will draft the letter and consult with the JCM Indonesian Secretariat upon getting consent from the Surabaya City.

(3) Consultation with relevant agencies and drafting of the letter

Based on consultation with Surabaya City, the necessity of such a letter was explained to the JCM Indonesian Secretariat. A draft letter was then prepared upon consultation with Surabaya City, and the contents and procedure of issuance was discussed with the JCM Indonesian Secretariat.

(4) Consultation with the Coordinating Ministry for Economic Affairs

DATE/TIME 11:30-11:40, 10 November 2015

LOCATION Hotel Santika Premiere Bintaro

PARTICIPANTS Total 7

- Indonesian Government (2): Rizal Edwin Manansang (CME), Dicky Edwin Hindarto (JCM Indonesian Secretariat)
- Cooperation Division, Surabaya City (1): Yunuar Hermawan
- Kitakyushu City (1): Kengo Ishida
- IGES (2): Yatsuka Kataoka, Kohei Hibino

- Other (1): Jun Ichihara (JICA expert)

OBJECTIVE A side meeting with CME was held during the 5th JCM Joint Committee Meeting between the Governments of Japan and Indonesia on 9 and 10 October 2015 in Jakarta to discuss about the issuance of the letter.

SUMMARY OF DISCUSSION

- The letter will be prepared in Bahasa Indonesia based on the previously sent draft and expected to be signed by the Deputy Minister. It will be issued and sent as soon as possible (CME).
- A JCM workshop is under preparation to be co-organised by the JCM Indonesian Secretariat and ITS on December 16 – 17 2015 in ITS (JCM Indonesian Secretariat).

(5) Follow-up meeting with Surabaya City (Part I)

DATE/TIME 13:00-15:00, 12 November 12 2015

LOCATION Bappeko, Surabaya City Office

PARTICIPANTS Total 7

- Bappekon, Surabaya City (3): Dwija Gede, Arum Safitri Rahayu, Korviantika
- Cooperation Division, Surabaya City (1): Rahmasari
- Kitakyushu City (1): Naoki Motoshima
- IGES (2): Yatsuka Kataoka, Kohei Hibino

OBJECTIVE A follow-up meeting was held to report back the result of the side meeting with CME and the JCM Indonesian Secretariat regarding the issuance of the letter and to discuss about the next steps of JCM in Surabaya City.

SUMMARY OF DISCUSSION

- The letter has clarified the current position of Surabaya City which helps the City to handle JCM appropriately. (Surabaya City)
- The biggest challenge faced by both Surabaya City and Kitakyushu City and the ultimate objective of the Green Sister City Cooperation Agreement is the improvement of the environment and quality of life; while CO_2 reduction is one of the expected results from those efforts with JCM being only one of the means to achieve these objectives. The core principle therefore is to use JCM if it could help achieve the objectives of both cities. (Kitakyushu City & Surabaya City)
- The suggested workshop by the JCM Indonesian Secretariat and ITS in December should be an opportunity to discuss the actual project implementation and not just providing information about JCM. (Surabaya City)

(6) Follow-up meeting with Surabaya City (Part II)

DATE/TIME 14:00-15:00, 13 January 2016

LOCATION Bappeko, Surabaya City Office

PARTICIPANTS Total 4

- Bappeko (1): Dwija Gede
- Cooperation Division (1): Rahmasari
- Kitakyushu City (1): Naoki Motoshima
- IGES (1): Yatsuka Kataoka

OBJECTIVE A follow-up meeting was held to discuss on the next steps of JCM city-to-city collaboration FS and possible project development in Surabaya City before the reporting workshop (15 January 2016).

SUMMARY OF DISCUSSION

- The objective of the Green Sister City Cooperation Agreement between Kitakyushu City and Surabaya City is to improve the environment and to achieve a green city. JCM is one option among several other funding schemes. JCM will be considered if there is a specific project that matches with the JCM scheme (Kitakyushu City & Surabaya City).
- Several potential projects for the next fiscal year were proposed for discussion that could expect replication of JCM in the City, including (i) Application of green building concept to government buildings; (ii) Upgrade or advanced process of human waste; (iii) Municipal transportation system.
- The meeting could not identify a specific candidate project for the next fiscal year onward. However, Surabaya City agreed to consider possible project that matched with the city policy, and both parties agreed to continue the discussion.

4.2.4 Results and Achievements

As a result of the above mentioned coordination and consultation, CME has issued an official letter regarding JCM to the Surabaya City Mayor dated 19 November 2015 (Original letter in Bahasa Indonesia: Annex 4-4). A provisional translation is provided as follows:

(Provisional translation)

Dear Mayor

As we know well that since 2013, Coordinating Ministry for Economy, has been coordinating the implementation of activities on Low carbon Development with Japanese Government through the scheme of the Joint Crediting Mechanism (JCM). One of the activities that have been underway is leapfrog project constitutes as cooperation between the cities (sister city), which involves Regional Government of two countries. At this time, there are 3 (three) cooperation has been underway, namely, between Surabaya and Kitakyushu, Bandung and Kawasaki, and Batam and Yokohama.

We herewith would like to extend our appreciation to Surabaya City which has committed to environment conservation actions and fostering collaboration with the City of Kitakyushu through the Green Sister City Cooperation Agreement and become pilot city of JCM feasibility study.

We hope that cooperation and feasibility Studies will continue to the implementation phase which will be conducted in accordance with arrangement agreed by Government of Indonesia and Japan and persisted based on the prevailing laws and regulation in Indonesia. Furthermore, for easy coordination, we would like to request you to appoint the official/staff of Surabaya City Government who can be in charge for in this Join Crediting Mechanism.

It is so we submit this letter. We thank you for your attention and cooperation.

4.2.5 Linkage with JCM

(1) Relevance of the current results with JCM

The initial objective to facilitate the issuance of the letter was successfully achieved and the position of Surabaya City which is to support JCM city-to-city collaboration FS with the Kitakyushu City was clarified. The same situation also applies to other Indonesian municipalities that are conducting JCM city-to-city collaboration FS, so the same measure is

also expected to be applied to other cities.

Regarding the next steps on JCM in Surabaya City, the consultation could not agree on a specific direction. However, both cities could affirm a common understanding and basic stance that any JCM project in Surabaya City should not be an independent business-to-business project, should contribute to the greening of the City, should be linked to city policies and regulations, and could expect to be replicated. Some candidate projects were discussed and will be followed-up continuously

(2) Future possibility of replication of projects

Following mechanisms were identified as the potential opportunities to enhance replication of JCM projects in Surabaya City:

I. Green Building Regulation

Once the regulation is enacted, buildings of a certain size and function will be subject to comply with the technical requirements that are stipulated in the regulation and it is expected that this situation will increase the needs to install advanced energy efficient systems in the buildings. The installation of such systems has already proved to be successful in the JCM Model Projects under the current FS (see Chapter 2) and more projects could be applied. So it can be said that the regulation is a useful mechanism to enhance JCM replication in Surabaya City from both institutional point of view and project development point of view (see "4.1 Assistance for Institutional Improvement on Green Building Awareness Award (GBAA)").

II. Green City Master Plan

Surabaya City is planning to develop its Green City Master Plan with an aim to develop a green city from 2016 with a support from the JICA Technical Cooperation Projects. This project scheme ensures not only to support the formulation of the plan but also to follow-up the implementation and evaluation of the plan in a consistent manner, so the actual implementation of the plan can be expected.

It is anticipated that areas such as energy, waste, transportation and buildings that are responsible for large amount of CO_2 emissions will be included in the Master Plan there are possibilities that a large scale projects including urban infrastructure will be incorporated. Thus, it would be beneficial if the plan development and preparation for projects could be executed with a prospect of possible use of JCM scheme.

4.3 Organising Workshops

4.3.1 Summary of the Section

In order to share information and understanding on the contents and progress of the study and to ensure smooth operation of the work, the current JCM city-to-city collaboration FS has been expected to organise two workshops, one at the beginning of the study, and the other one at the end of the study, in both the Japanese host municipality (i.e., Kitakyushu City) and local host municipality (i.e., Surabaya City), respectively.

Regarding the workshop in Japan, the first workshop (kick-off workshop) could not be organised in Kitakyushu City for various reasons including a conflict of schedule among participants. Therefore the workshop was held in conjunction with the first progress reporting meeting in Tokyo on 14 May 2015. The second workshop (reporting workshop) was organised in

Kitakyushu City on 16 December 2015.

As for the workshop in Surabaya, the first workshop (kick-off workshop) was organised in Surabaya City on 28 May 2015 and the second workshop (reporting workshop) was held on 15 January 2016.

4.3.2 Workshop in the Japanese Host Municipality

The two workshops were planned to be held both in Kitakyushu City, but the first workshop (kick-off workshop) could not be organised in the City for various reasons including a conflict of schedule among participants. Therefore the first workshop was held in conjunction with the first progress reporting meeting in Tokyo on 14 May 2015 upon getting consent from the Ministry of the Environment. The second workshop (reporting workshop) which was to share the progress of the study was organised in Kitakyushu City on 16 December 2015.

(1) First workshop in Japan (Kick-off workshop)

DATE/TIME 14:00-15:00, 14 May 2015

LOCATION 2nd Laurel Building, Tokyo

PARTICIPANTS Total 7

- Ministry of the Environment (3): Teppei Yamaga, Tomoki Uematsu, Shuichi Ozawa
- Joint-business partners (4): Kitakyushu City (Naoki Motoshima), NTT DATA Institute of Management Consulting (Motoshi Muraoka), Amita Corporation (Teruo Yamazaki), IGES (Shiko Hayashi).

SUMMARY OF DISCUSSION

Energy Sector (Annex 4-5)

- Two proposals are being prepared for submission to the JCM Model Projects Scheme for the 1st call for proposal in May FY2015.
- The project of installing a gas engine and cogeneration in a hotel (Company A) already obtained agreement from the hotel owner, thus it is ready to be proposed for the JCM Model Projects.
- The other project to install a chiller in a shopping mall (Company B) will also be submitted for application to the JCM Model Projects if the letter of intent is ready in time.
- The FS for this fiscal year will concentrate on increasing the candidate targets in hotels and to develop a system to pick-up the GBAA certified projects for

application to the JCM Model Projects.

Waste Management Sector (Annex 4-6)

- The project which aims to establish a cement materialisation plant for B3 wastes in Surabaya City has been conducting a FS for the past two years and the main challenge is the finding of local partner companies. The FS for this fiscal year will therefore focus on identifying partner companies.
- There was a request to identify new projects in Surabaya (MoE)

Support for Institutionalisation of Relevant Policies (Annex 4-7)

- The FS in this fiscal year will focus on institutionalising policies related to the GBAA programme that can enhance replication of JCM projects. One example is to propose the application of quantitative and objective energy efficiency standards based on energy diagnosis standards.

(2) Second workshop in Japan (Reporting workshop)

DATE/TIME 16:00-16:50, 16 December 2015

LOCATION International Village Center, Kitakyushu City

PARTICIPANTS Total 13

- Kitakyushu City (4): Kengo Ishida, Naoki Motoshima, Takayuki Yamashita, Seiichiro Ayabe
- NTT DATA Institute of Management Consulting (3): Motoshi Muraoka, Tomomi Hoshiko, Maria Yamakawa
- Amita Corporation (3): Katsuhiko Sugie, Hiroshi Mekaru, Teruo Yamazaki
- IGES (3): Yatsuka Kataoka, Shiko Hayashi, Kohei Hibino

SUMMARY OF DISCUSSION

Energy Sector (Annex 4-8)

- The project in the shopping mall (Company B) has been applied for and accepted as a FY2015 JCM Model Project. The cogeneration project in the hotel (Company A) has received an unofficial announcement but had to withdraw the application for various reasons.
- Currently in the process of discussing with hotel chains regarding the possible replication of projects. A new approach was initiated to consult with the manufacturers and currently in the process of discussion with a cement company (Company C) on the biomass energy project using JCM scheme.

Waste Management Sector (Annex 4-9)

- Regarding the cement raw materialization project, the FS has been concentrating

on negotiating with a cement company (Company D) to introduce a recycling plant but the conditions were not met. On the other hand, a B3 intermediate processing company (Company E) is keen to introduce a processing facility but this does not match the conditions of JCM.

Support for Institutionalisation of Relevant Policies (Annex 4-10)

- Bappeko in Surabaya City has been conducting programme development and awarding of GBAA so far but responsibility for this has been shifted to Cipta Karya, and the concept of GBAA will be incorporated into the new Green Building Regulation. Thus the FS has changed direction to review the relevant green building programmes and provide such information to Surabaya City.

4.3.3 Workshop in the Local Host Municipality

Two workshops were held in Surabaya City; the first workshop (kick-off workshop) presented and shared the plan and schedule of the FS, while the second workshop (reporting workshop) presented and discussed the achievements of the FS. Both workshops were attended by representatives from the relevant Departments of Surabaya City, Indonesian JCM Secretariat, local universities, local companies, etc.

(1) First workshop in Surabaya (Kick-off workshop)

DATE/TIME 10:50-12:30, 28 May 2015

LOCATION Bappeko, Surabaya City Office

PARTICIPANTS Total approx. 32

- Surabaya City (approx. 18): Bappeko, Corporation Department, others
- Japan side (6): NTT DATA Institute of Management Consulting (Motoshi Muraoka, Tomomi Hoshiko, Aya Watarai), Amita Corporation (Hiroshi Mekaru), IGES (Kohei Hibino)
- JCM Indonesian Secretariat (3): Dicky Edwin Hindarto, Ratu Keni Atika, Jyun Ichihara (JICA expert)
- Others (6): ITS (1), industry estates (1), cement industry (3), Indonesian Architecture Association (Moderator: 1).

AGENDA

1. Opening remarks (Dwija Gede, Bappeko)
2. Current development of JCM scheme in Indonesia (Indonesian JCM Secretariat)
3. Summary of 2013-2015 JCM FS (IGES) (Annex 4-11)
4. FY2015 FS in Energy and waste management sectors

- NTT DATA Institute of Management Consulting (Annex 4-12)
- Amita Corporation (Annex 4-13)

5. Discussion

SUMMARY OF DISCUSSION

- The JCM scheme is the most realistic for projects which target hotels, shopping malls, etc. and are currently ongoing between business-to-business partners
- The study on the SIER industrial estate revealed that the IRR (internal rate of return) will become low when the generated power is sold to Pt. PLN (Indonesia's state electricity company) -- In Indonesia, it is mandated to sell all generated electricity to Pt. PLN except for captive consumption but the IRR will increase by using the JCM subsidy.
- In Indonesia, when the funding is received from other countries, an arrangement for asset transfer from the federal level to municipal level should be taken. For funding schemes by MOEJ, the Indonesian local government needs to prepare additional funding on its own and that should require endorsement by the local assembly. Surabaya City should be developing a team to cope with such international affairs. (Indonesian JCM Secretariat)
- If a private company is going to apply for a project together with Surabaya City, it needs to go through a tender process which will likely limit the flexibility of the project development. In such cases, other funding schemes, such as JICA, might be appropriate.
- A workshop to enhance understanding of JCM can be organised in Surabaya. (Indonesian JCM Secretariat)
- The current status is still at the brainstorming stage so the development of JCM in Surabaya City may still need some time. The city would like to continue to follow up on technical issues. (Surabaya City)
- Surabaya City thinks that JCM is an important scheme for the greening of the City. It is still at a brainstorming stage but we would be keen to follow the technical matters. (Surabaya City)

(2) Second workshop in Surabaya (Reporting workshop)

DATE/TIME 8:30-10:30, 15 January 2016

LOCATION Bappeko, Surabaya City Office

PARTICIPANTS Total approx. 30

- Surabaya City (approx. 16): Bappeko, Department of Cleanliness and Gardens

(DKP), Environment Department (BLH), Corporation Department, others

- Japan side (7): Kitakyushu City (Naoki Motoshima, Seiichiro Ayabe), NTT DATA Institute of Management Consulting (Motoshi Muraoka), Amita Corporation (Hiroshi Mekaru), Nippon Steer & Sumikin Engineering (Osamu Suzuki), IGES (Yatsuka Kataoka,)
- JCM Indonesian Secretariat (3): Dicky Edwin Hindarto, Ratu Keni Atika, Jyun Ichihara (JICA expert)
- Others (5): ITS (2), hotel industry (2), Indonesian Architecture Association (Moderator: 1).

AGENDA

* A short video on JCM was shown to the participants before the workshop.

1. Opening remarks
   - Dwija Gede (Bappeko)
   - Naoki Motoshima (Kitakyushu City)
2. Overview of JCM and its Feasibility Studies in Surabaya (IGES) (Annex 4-14)
3. Report on the energy sector (NTT Data) (Annex 4-15)
4. Report on the waste sector (Amita Corporation) (Annex 4-16)
5. Report on the green building policy (IGES) (Annex 4-17)
6. Discussion

SUMMARY OF DISCUSSION

- As the generation of B3 waste is abundant in Surabaya City, it would be helpful to have an intermediate processing facility in East Java Province. It would also be good to install Japanese highly efficient systems into existing old systems such as those in shopping malls, sewage treatment plants.
- Two optional activities were proposed as next steps: (i) Incorporation of guidelines on the pump performance of sewage treatment in the Green Building Regulation; and (ii) Development of a lease financing system to reduce the burden of companies on an initial investment for installation of facilities.
- It is likely that opportunities to introduce JCM will increase once the currently developing Green Building Regulation is enacted because the requirements on energy efficiency will then be mandatory.
- The Indonesian JCM Secretariat would like to continue supporting the JCM project development in Surabaya City. The Secretariat would like to request that the progress of the projects is reported to the Secretariat and to consult the Secretariat if there are any problems in the implementation of the projects. The

Secretariat is also preparing to organise a seminar on JCM in Surabaya City. (Indonesian JCM Secretariat)

- Many matters on JCM need to be handled at the federal level but Surabaya City would like to support JCM projects as much as possible within the limits of its own authority, and hopes that these will be implemented on a project basis. (Surabaya City)
- Although there are many issues in JCM that needs to be dealt by the authority of the central government, Surabaya City would like to support the implementation of JCM within the extent possible and wishes to see some project based achievements. (Surabaya City)

Kitakyushu – Surabaya JCM city-to-city workshop (May 28th 2015) in the Surabaya City Office.

Kitakyushu – Surabaya JCM city-to-city workshop (Jan 15th 2016) in the Surabaya City Office.

Contents of Reference

reference 1 Information Gathering on Energy Saving and Green Building Related Policies

reference 2 Concept Note on Green Building Awareness Award

reference 3 Report on Green Building Regulation of Surabaya City

reference 4 Official Letter Regarding JCM Implementation in Surabaya City

reference 5 Materials of the First Workshop in Japan (Kick-off Workshop)

reference 6 Materials of the Second Workshop in Japan (Reporting Workshop)

reference 7 Materials of the First Workshop in Surabaya (Kick-off Workshop)

reference 8 Materials of the Second Workshop in Surabaya (Reporting Workshop)

Reference 1 Information Gathering on Energy Saving and Green Building Related Policies

Report

Baseline Survey on Energy Saving Related Policies and Initiatives in Indonesia

Prepared by:
Cecilya Malik
Muchamad Muchtar

PT Wahana Usaha Universal
2015

EXECUTIVE SUMMARY

As part of IGES activities in the development of Green Building Awareness Award (GBAA) in Surabaya City, IGES conducted a baseline survey activity on energy saving policy and initiative in building sector. This baseline survey aims at compiling and analysing information on energy saving policies at national level and energy saving initiatives implemented by the government and international organizations in Indonesia.

Basically, the implementation of energy saving measures in all sectors of the economy has been regulated by the Government Regulation (PP) no 70/2009 on Energy Conservation as stipulated in .Article 25 of the Energy Law (UU no 30/2007. The regulation emphasized that energy consumers consuming 6000 TOE and more are obliged to implement energy management by setting energy conservation program, appointing energy manager and implementing energy audit. Relating to the government and commercial building, the average consumption was still lower than the 6000 TOE (around 70 GWh). Nevertheless, the GoI have implemented energy saving initiates including those with the support of international organization such as UNDP, USAID, and Danish government.

Implementing energy saving measures will not only impact on energy security but also on the reduction of GHG emission. The Presidential Regulation (PerPres) no 61/2011 on RAN-GRK set a target of 26% GHG emission reduction by 2020 by own efforts and 41% if including international support. National and regional government are encouraging green concept for sustainable development including green city, green building, etc. In terms of regulatory framework, implementing green initiatives will relate not only to Energy Law but also other law such as Water Resources Law, Building Law, Local Government Law, etc. In addition series of regulations has been issued to enforce these Laws.

Green building or energy saving building is one of the attributes of a Green City Development Programme (P2KH) led by Ministry of Public Work and People Housing (MOPW). In national level, green building issue is still in early stage for the central government focuses on the implementation of a general sustainable building, as mandated by Law No. 28/2002 on Building. Since last year, MOPW has provided a ministerial regulation, as a guidance for district/city level, and invite public participation in order to promote the implementation of green building. As pilot cities, MOPW assigned three cities in Bandung, Surabaya, and Makassar.

Prior to the promotion by the central government, green building concept have been introduced by the DKI Jakarta Province and the Green Building Council Indonesia (GBCI), which provide lesson learned for the central government. DKI Jakarta has issued Governor Regulation since 2012, and implemented it by utilising IMB and SLF permit as instruments for monitoring. By mid of 2015, 63 newly developed buildings have acquired IMBs, and hundreds of new buildings are applying. In parallel, the promising development can be seen from the lesson learned provided by the GBCI. It has been involving at least 125 corporate members which own or manage commercial or residential buildings which fall into green building category. The Council has been promoting public awareness and formulate GREENSHIP, a rating tool to be used as a communication tools with the public. As of January 2016, sixteen buildings consisting nine newly built buildings, one for interior space, and six existing buildings had been awarded GREENSHIP certificates by the GBCI.

Table of Contents

EXECUTIVE SUMMARY ii
Table of Contents iii
List of Figures iv
List of Table iv
1. Introduction 1
   1.1 Background 1
   1.2 Objective 1
   1.3 Approach 1
2. Energy Efficiency Policies and Measures 2
   2.1 Energy Efficiency and Conservation Regulation and Policy 2
   2.2 On-going programmes related to energy efficiency 5
   2.3 Energy Saving in Commercial Sector 7
   2.4 Energy efficiency facilitation fund 10
   2.5 Energy efficiency initiatives under cooperation with international organisations 12
      2.5.1 ICED/USAID 13
      2.5.2 BRESL/UNDP 16
      2.5.3 DANIDA 18
3. Energy Efficiency Implementation in Green building programme 22
   3.1 Policy related to Green Building concept 22
   3.2 Green City Development Programme 23
   3.3 Promotion of Green Building programme 24
      3.3.1 Ministerial Regulation on Green Building 25
      3.3.2 Implementation of a role model by Ministry of Public Work and People Housing 30
      3.3.3 Green building initiative in DKI Jakarta Province 31
      3.3.4 Green Building Council Indonesia 34
4. Conclusion and Recommendation 37
   4.1 Conclusion 37
   4.2 Recommendation 37
Reference 39
Appendix 1. Classification of buildings required to implement green building based on complexity and height 42

List of Figures

Figure 2-1 History of Indonesian Energy Policy on Energy Conservation 2
Figure 2-2. Energy Conservation Government Regulation no 70/2009 5
Figure 2-3 Energy Conservation Programme 6
Figure 2-4. Categories of the National Energy Efficiency Awards 7
Figure 2-5. Trend of Participants and Winners of the National Energy Efficiency Awards 7
Figure 2-6. Energy Intensity in Commercial Building (MEMR) 8
Figure 2-7. Hotel General Overview 14
Figure 2-8. Energy and water consumption profile of Yogyakarta Hotel (% total cost)...15
Figure 2-9. Average Hotel Energy and water consumption profile.....15
Figure 2-10. Identified Areas for ICED II Support.....16
Figure 2-11. Barrier of Energy Efficiency Standards and Labelling (EESL).....17
Figure 2-12. Overview of EINCOPS Activities 19
Figure 2-13. Low energy demonstration office – Before and after 19
Figure 2-14. Low Energy Demonstration Office Results 20
Figure 2-15. DANIDA ESP3 Programme structure 20
Figure 2-16. DANIDA ESP3 Energy Activities Overview 20
Figure 3-1. Building of the Ministry of Public Work and People's Housing 30
Figure 3-2. Expected electricity energy consumption intensity for typical building.....33

List of Table

Table 2-1 Details of the Energy Conservation Regulatory Framework 3
Table 2-2. Potential energy saving by sector 5
Table 2-3. PLN Business Customer Electricity Sales.....8
Table 2-4 Average Energy Intensity of Building 2010.....8
Table 2-5. Energy Audit in Building 2013 (MEMR) 9
Table 2-6. Recommendation for energy saving in building 9
Table 2-7. Energy Utilization of Building 2010 10
Table 2-8 Sample of Hotel Electricity Consumption (Audit Result).....10
Table 2-9. Energy Conservation Partnership Programme 12
Table 2-10. List of Hotel Audited.....14
Table 3-1 National standards related to energy efficiency in building 23
Table 3-2. Technical requirements of green building implementation based on its development phases. 26
Table 3-3. Indicator and reference for energy efficiency implementation 28
Table 3-4. Technical requirements of green building for new and existing building.....31
Table 3-5. Benchmark of electricity energy consumption intensity for typical building according to the Governor Regulation No. 38/2012 33
Table 3-6. Category of electricity energy consumption index.....34
Table 3-7. Criteria, number, and assessment points of GREENSHIP by building category 35
Table 3-8. GREENSHIP criteria according to the GBCI 36
Table 3-9. Some of the GREENSHIP recipients from the GBCI 36

1. Introduction

1.1 Background

Government of Indonesia has issued regulatory framework on energy resource management. The Energy Policy Law No. 30 of 2007 emphasizes that the energy management principle is aimed to achieve the environmentally-sound national self-sufficiency and energy security to support the national sustainable development. It is achieved by prioritising the utilisation of new and renewable energy and energy conservation. In a more practical way, the GoI has issued regulations to promote energy and water saving programme. These regulations will control and monitor the utilisation of energy and water efficiently, in particular the building sector.

The cities of Surabaya and Kitakyushu have maintained a cooperative relationship for over 10 years and have signed the environmental sister cities cooperation agreement in November 2012. Based on the mutual interest of both cities, feasibility studies (F/S) on identifying potential Joint Crediting Mechanism (JCM) to facilitate diffusion of advanced low carbon technologies and complement the Clean Development Mechanism have been conducted in Surabaya City in 2013 and 2014, and currently being conducted in 2015, as the commissioned projects by the Japanese Ministry of the Environment.

IGES is one of the co-proponents of these projects and is responsible in assisting the institutional development of low-carbon policies in Surabaya City. One of the major focuses has been to assist the development of Green Building Awareness Award (GBAA) in Surabaya City.

This baseline survey aimed to collate relevant information on energy efficiency at the national level mainly the building sector including the green building policies and other related initiatives in Indonesia. It will further describe in more detail the programme and instance of green building by relevant ministries, DKI Jakarta Province, and NGO.

1.2 Objective

1) To collate information on energy efficiency policies at the national level;
2) To collate example of energy efficiency initiatives implemented by government and international organisation in Indonesia;

1.3 Approach

The baseline study was conducted by employing desk study compiling data and information from regulations, reports, and online news reports. Interviews were conducted from September 2015 and January 2016 to confirm current development with representatives from Ministry of Energy and Mineral Resources, and City Planning Department of DKI Jakarta Province, while of the Ministry of Public Work and People Housing is still awaited.

2. Energy Efficiency Policies and Measures

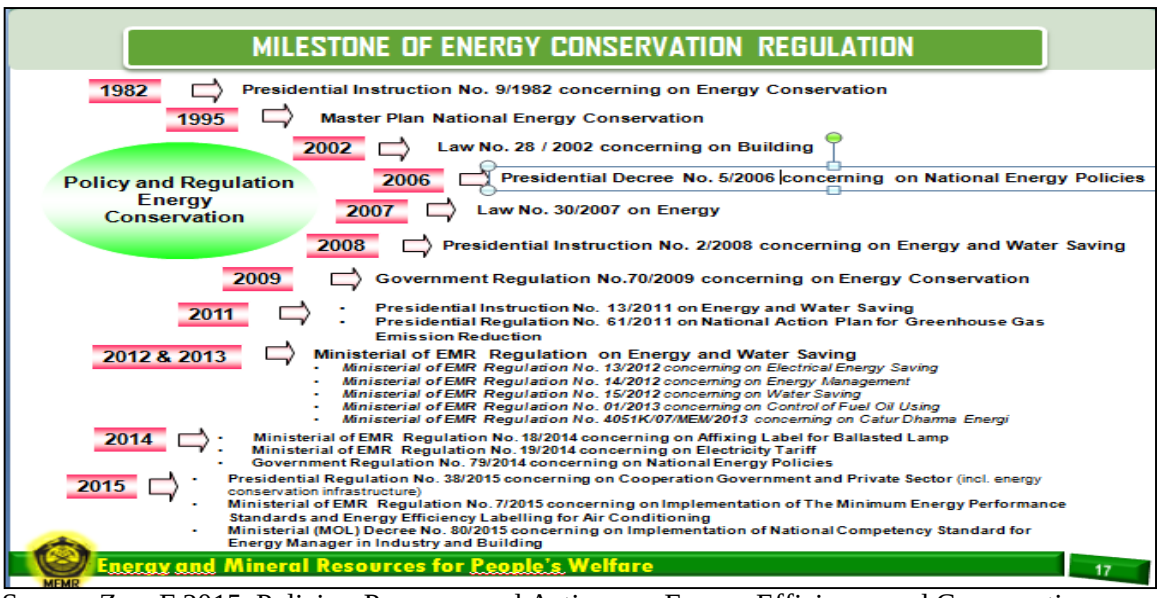
Efficient use of energy in all sector of the economy will reduce cost and help reduce the GHG emission of the country. Promoting efficient use of energy is still difficult because of the subsidy that makes the price of energy below its economic price. In addition, investment needs for EE is enormous and commercial bank still hesitated in providing loans for an EE project. In these regards, GOI has embarked on a variety of programs to conserve energy use so as to be more efficient and continuously identify financing options that can promote EE in Indonesia. Below are the regulatory framework and programs on Energy Conservation and Energy Efficiency. It also provide information on the financial options reviewed by the government for promoting EE projects and some EE related activities support as part of bilateral cooperation.

2.1 Energy Efficiency and Conservation Regulation and Policy

The 1973 and 1979 oil crisis has risen concerned on energy security of the country. The 1980 energy policy (*Kebijakan Umum Bidang Energi*/KUBE) and thereafter, has always emphasized on these three basic principles:

- Energy diversification to move away from oil through the development of other alternative energy sources such as coal, natural gas and renewable.
- Energy conservation to reduce the use of oil in all economic sectors, and
- Energy intensification to increase the country's energy reserve base both fossil and non-fossil energy resources.

Relating to energy conservation, the Government first issued the Presidential Instruction no 9 on Energy Conservation (INPRES no 9/1982), which mandated governmental institutions (all state-owned entities and all government buildings) to report their monthly consumption of all forms of energy. The evolvement of the Energy Efficiency and Conservation (EE&C) regulatory framework is shown in Figure 2-1 below.



Source: Zen, F 2015. Policies, Program, and Actions on Energy Efficiency and Conservation.

Figure 2-1 History of Indonesian Energy Policy on Energy Conservation

Details of the regulatory framework related to energy conservation are shown in Table 2-1 below.

Table 2-1 Details of the Energy Conservation Regulatory Framework

Law (UU)	No. 30/2007 on Energy	Article 25: Energy Conservation - Central and regional government as well as people should be responsible for the implementation of energy conservation program - Energy conservation is conducted from upstream to down stream - Government will provide incentive and disincentive for the energy efficiency and conservation implementation of energy consumer and producer of energy efficient equipment
	N0. 28/2002 on Building	Regulatory Instruments>Codes and standards
Government Regulation (PP)	No. 70/2009 on Energy Conservation	• Mandatory on EC(Energy Management) • EE Standard and Label • Incentive/Disincentive
	No. 79/2014 on National Energy Policy (KEN)	• National RE and EE Target • Energy Elasticity < 1 in 2025
Presidential Regulation (PERPRES)	N0.61/2011 on National Action Plan on Green House Gas (RAN-GRK)	• National Commitment to reduce the GHG Emission in 2020: - 26% (767 mil. tons) by own efforts - 41% by own efforts and international support • Energy and transportation sector will contribute 38 mil tons. For energy, it will be through the development of new renewable energy and implementing energy conservation in all sectors.
Presidential Instruction (INPRES)	No. 13/2011on Energy and Water Saving (replacing INPRES no 2/2008)	• Energy and Water Saving for Government institutions at all levels including State-Owned Enterprises • Target: - Electricity 20% - Fuel 10% - Water10% • Periodic reporting.
Ministerial Regulation (PERMEN)	No. 321 & 323/MEN/XII/2011on Standard of Energy Manager Competence	Competency of Energy Manager in Industrial and Commercial Building
	No. 13 /2012 on Electricity Saving	•Electricity saving 20%(Improvement of air system, lighting, & supporting equipment) •Government/Reg. Gov. Office •State-owned enterprises •Street lighting, etc. •Monitoring
	No. 14/2012 on Energy Management	•Mandatory of Energy Management for large energy users (>6,000 TOE) •The distribution of Authority (Gov. Reg.Gov.) •Monitoring of Energy Management Implementation •Incentive/Disincentive

	No. 01/2013 concerning Control of Subsidized Fuel Utilization (replacing MEMR Regulation no 12/2012)	The use non-subsidized fuel •Fuel saving 10% •Gov. Official and State-owned enterprises Vehicle -1 June 2012 (Jabodetabek/ Greater Jakarta) -1August 2012 (Jawa –Bali) •Vehicles used by plantation and mining companies(1 Sept 2012) •Fuel saving for electric generation •Monitoring
	No 18/2014 on EE Label for Compact Fluorescent Light (CFL) (replacing MEMR Reg.no 6/2011)	• Implementation of Label for CFL • Mandatory for CFL manufacturer • Self-Declaration of Conformity (SDOC) More star -more efficient
	4/2015 on Electricity Tariff provided by the National Power Company (PT PLN)	Tariffs are adjusted differently for each tariff class. Some classes, including the smallest household consumers, receive no increase, whereas others are increased substantially
	No. 7/2015 7/2015 on Applying the Minimum Energy Performance Standards (MEPS/SKEM) and Energy Efficiency Labelling for Air Conditioning	• Minimum EER allowed as SKEM (MEPS) for AC is 8.53 • Have to place label and MEPS in the product • Domestic and importer of AC products must have permits prior to apply the MEPS and Label on their products

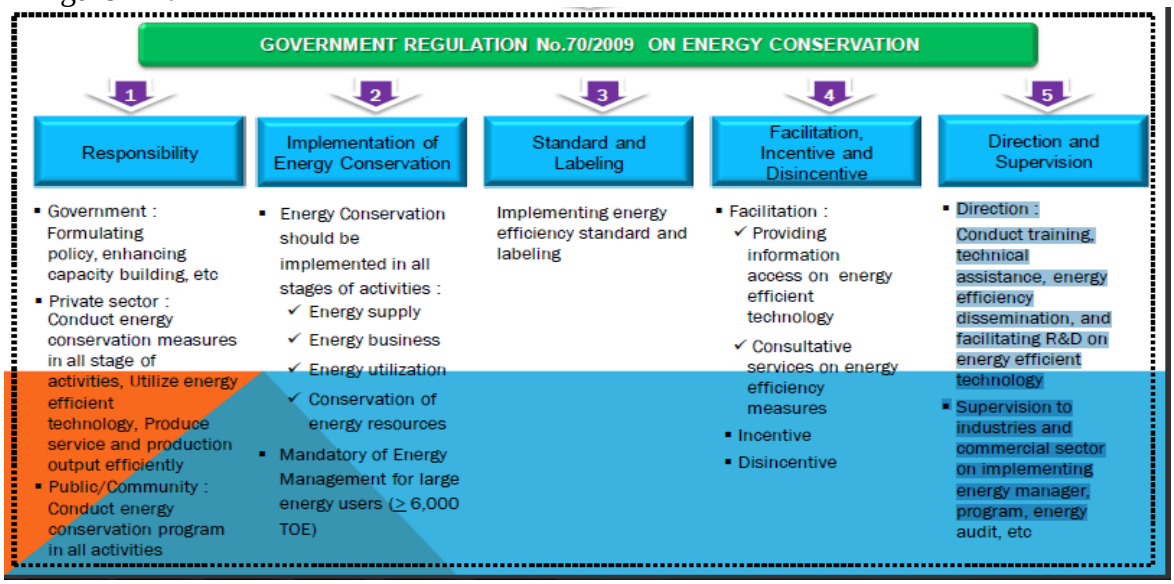
Source: Compilation 2015

The Government Regulation no 70/2009, basically is the implementing regulation on energy conservation with regard to the Energy Law. The regulation makes provisions for the proper utilisation of energy resources. It stipulates:

- Responsibilities of Government, regional governments, private sectors and society in energy conservation
- Implementation of energy conservation and energy efficiency from downstream to upstream
    - The energy consumers which consume 6000TOE and more are obliged to implement energy management by setting energy conservation program, appointing energy manager and implementing energy audit
- Standard and labelling
- Facilitation, incentive and disincentive for energy consumer and producer of energy saving technology
- Direction and supervision

This regulation also mandates the development of General Plan of Energy Conservation (*Rencana Induk Konservasi Energi Nasional*, RIKEN) as the guideline for the stakeholders to implement energy efficiency and conservation in Indonesia. The las RIKEN was 2005. This was to be revised every 5 year. By 2011, the revised RIKEN was finalized but was not published due to the article in the Law no 30/2007 that requires the revised RIKEN in line with the updated 2006 National Energy Policy (KEN). Since the KEN has been issued in 2014 (PP no 79/2014), then the 2011 RIKEN will be adjusted with KEN. The Energy Conservation regulation (PP 70/2009) is still enforce, and energy efficiency target and plans

still being implemented. The main points of the PP no 70/2009 can be summarised as shown in Figure 2-2.



Source: Hutapea, M. 2012. Energy Conservation Policy and Program in Indonesia

Figure 2-2. Energy Conservation Government Regulation no 70/2009

2.2 On-going programmes related to energy efficiency

The National Energy Policy (KEN) 2014, set the target of energy elasticity and energy intensities reduction is shown in Table 2.1. The energy saving potential by the different sector of the economy is as shown in Table 2-2 below.

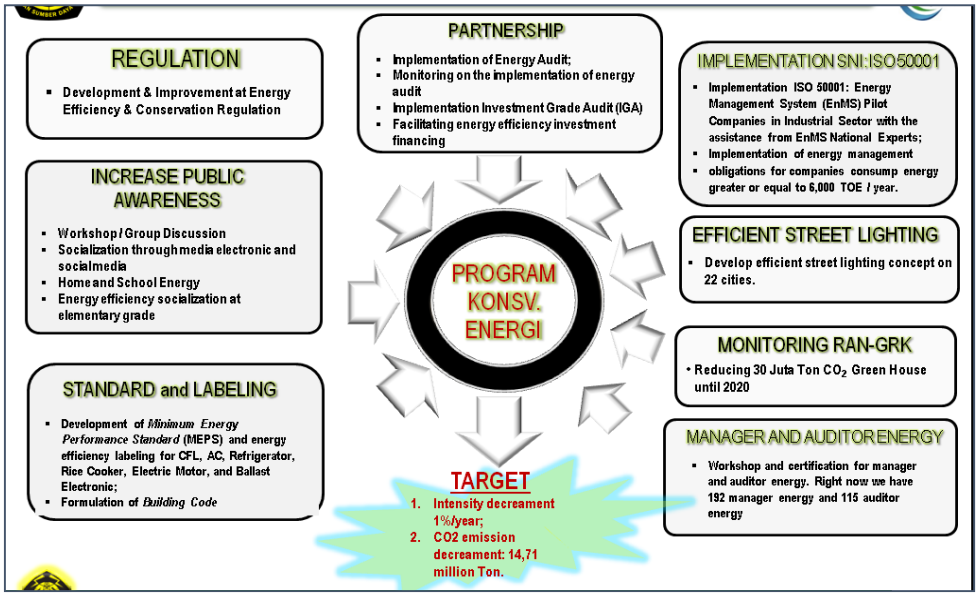
Table 2-2. Potential energy saving by sector

Sector	Energy consumption/sector in 2013 (million BOE)	Potential of EC	Target of energy conservation sectoral (2025)
Industry	355 (42%)	10-30%	17%
Transportation	324 (39%)	15-35%	20%
Household	100 (12%)	15-30%	15%
Commercial (incl. hotel)	36 (4%)	10-30%	15%
Others (Agriculture, construction, and mining)	23 (3%	25%	-

Source: Zen, F. 2015. Policies, Program, and Actions on Energy Efficiency and Conservation

Note: exclude biomass and non-energy used; based on Handbook of Energy & Economic Statistics of Indonesia 2014

The Directorate Energy Conservation under the Directorate General of New and Renewable Energy and Energy Conservation (DGNREEC), MEMR, conducted the programs to achieve the above energy saving target for all sector of the economy. These programs can be summarized as shown in Figure 2-3.



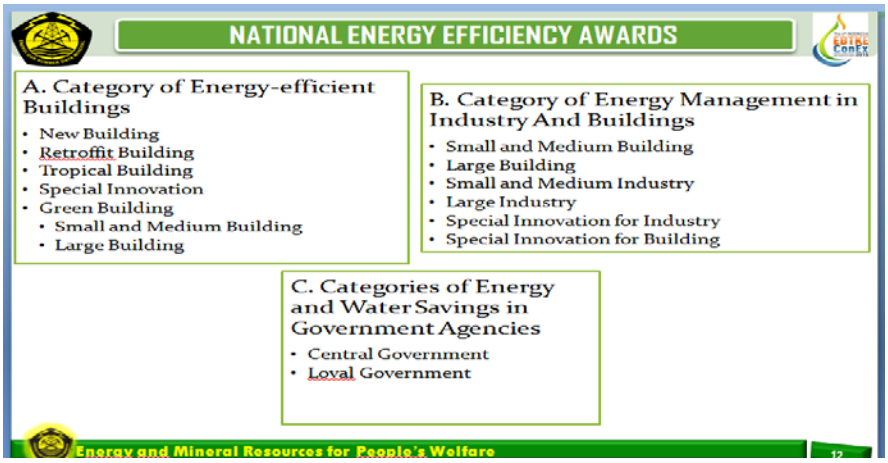
Source: Zen, F. 2015. Policies, Program, and Actions on Energy Efficiency and Conservation

Figure 2-3 Energy Conservation Programme

Based on the Strategic Plan of the MEMR for the 2015-2019 (RENSTRA ESDM 2015-2019) the energy conservation activities will include

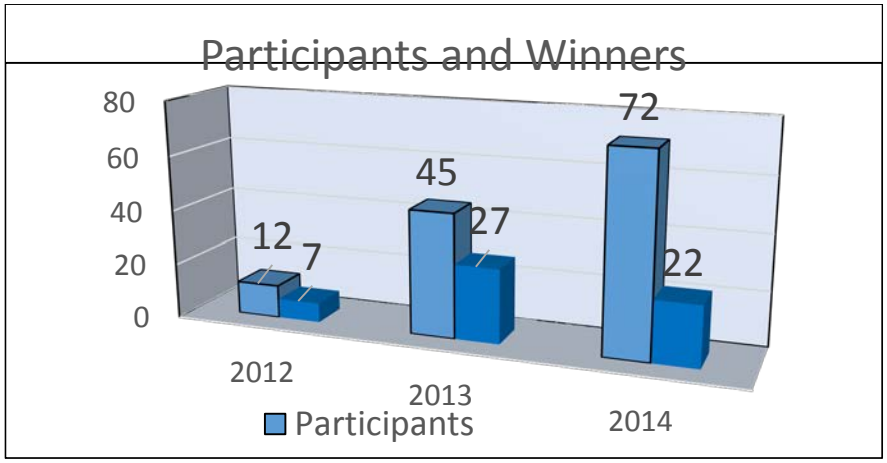
- Energy audit of government building (10 building per year)
- Monitoring implementation of audit result (30 object in 2015 and 10 object per year afterwards)
- Pilot project for installing monitoring system of electricity use (4 object per year)
- Implementation of energy efficiency and conservation investment
- Installation of energy efficient street lighting (2 cities in 2016, 3 in 2017, 4 in 2018 and 5 in 2019)
- Energy labelling for electricity appliances
- Implementation of the SNI:ISO 50001 Energy Management System
- Implementing at most 2 cogeneration pilot project over the 2015-2019 period.
- Development & Improvement at Energy Efficiency & Conservation Regulations (drafting of 6 proposed regulations such as guideline for energy efficient street lighting, implementation of Energy Saving Company (ESCO), applying MEPS and Label for rice cooker and electronic ballast and also for refrigerator and electric fan)
- Socialization of energy saving to increase awareness in using energy.

The MEMR also conducted annually the National Energy Efficiency Award to National Energy Efficiency Award. This award is intended to give the government institutions and stakeholders in industry and building on their success in applying the principles of energy efficiency and conservation. There are three main category of the Award are as shown below (Figure 2-4). Figure 2-5 showed the trend of participants in the National Energy Efficiency Award. Regarding energy efficiency in industries, the Ministry of Industries have programmes to revitalize machinery in industries.



Source: Zen, F. 2015. Policies, Program, and Actions on Energy Efficiency and Conservation

Figure 2-4. Categories of the National Energy Efficiency Awards



Source: Zen, F. 2015. Policies, Program, and Actions on Energy Efficiency and Conservation

Figure 2-5. Trend of Participants and Winners of the National Energy Efficiency Awards

2.3 Energy Saving in Commercial Sector

The commercial sector contributed only around 3% of the total final energy demand with electricity amounting 75% of the total consumption of the sector. Based on PLN Statistic 2014, the sales of electricity to commercial customers (Business) amounted to 36282.43 GWh. Assuming sales is equal to consumption, then with a total number of customers around 2626160, the per customer consumption would be around 14 MWh. Since this is lower than the 6000 TOE (around 70 GWh) stipulated in the Energy Conservation regulation (PP 70/2009), then implementation of energy management (setting energy conservation program, appointing energy manager and implementing energy audit) by the commercial sector is not mandatory but voluntary. The PLN statistic breakdown of the business customer by their tariff group is shown in Table 2-3.

Table 2-3. PLN Business Customer Electricity Sales

Tariff Group	Total Customer	MWh consumed	MWh/Customer
B-1	2,095,775	5,426,953	2.59
B-2	461,115	13,176,467	28.58
B-3	6,221	15,080,305	2424.1
Sub total	2,563,111	33,683,725	13.14
T	43	154,851	3601.18
C	30	59,295	1976.50
M	62,976	2,384,550	37.86
Total	2,626,160	36,282,421	13.82

Source: PLN Statistik 2014 [15]

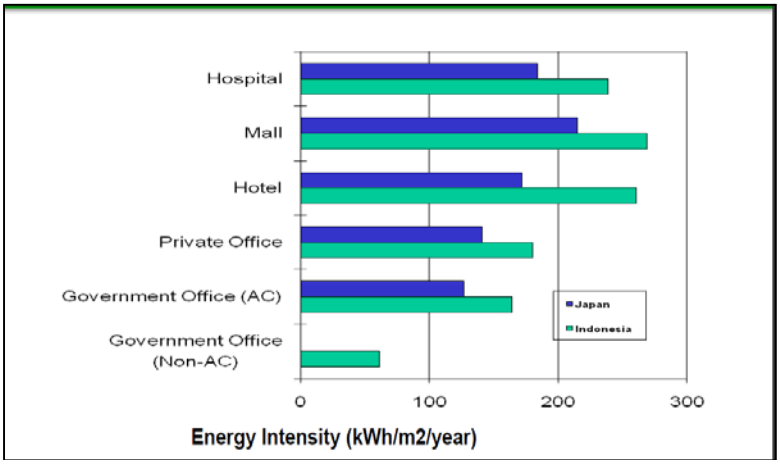
The statistic does not detailed the business customer type whether it is mall, hotel, restaurants, etc. Based on a study conducted by Nur Hidayanto [16], on building energy saving potential, the average energy intensity/index of building is as shown in below.

Table 2-4 Average Energy Intensity of Building 2010

No	Building Type	Average EI (kWh/m2/year)
1	Office building (incl. government.)	97
2	Hospital	129
3	Hotel	197
4	Mall/shopping centre	278
	Average	175

Source: Hidayanto, N. [15]

The MEMR also provided a comparison between the EI of commercial buildings between Indonesia and Japan. This was part of the result of the study conducted by MEMR and JICA Study 2010 (Figure 2-6).



Source: Misna. Andriah Feby 2014. Energy efficiency of buildings in Indonesia.

Figure 2-6. Energy Intensity in Commercial Building (MEMR)

In 2013, the MEMR conducted a free energy audit in building sector totalling 60 building samples of various types. The result is shown below.

Table 2-5. Energy Audit in Building 2013 (MEMR)

Buildings	Number of building	Energy consumption (kWh/year)	Energy potential saving (kWh/year)	Percentage of energy saving (%)
Hotel	17 unit	40,670,016	4,990,852	12.3
Hospital	5 unit	3,349,255	921,618	27.5
Mall	3 unit	45,837,572	3,596,596	7.8
Government office & university	35 unit	13,683,301	3,603,151	26.3
Number of building audited	60 unit			

Source: Misna. Andriah Feby 2014. Energy efficiency of buildings in Indonesia.

After the audit, MEMR provided recommendation for the stakeholder to save energy consumption. These recommendations are separated into a) No Cost and Low Cost Measures, and b) Middle Cost and High Cost Measures. Details of the measures in both category is shown in Table 2-6 below.

Table 2-6. Recommendation for energy saving in building

Active Design	Passive Design
No-cost and Low-cost measures: - Housekeeping - Application of automatic switch - Re-adjusting operating hour **Middle-cost and High-cost measures:** - Replacing chiller plant - Retrofitting Hydrocarbon refrigerant - Replacing lamp with an efficieant lamp such as CFL and LED - Replacing conventional ballast with electronic ballast - Installing variable Speed Driver/VSD in pum and fan - Improving power quality - Implementing cogeneration (waste heat for absorption chiller)	- Improve natural daylighting - Improve natural ventilation - Decreasing thermal load (Installing low-e window glass/Film, shading, vegetation

Source: Misna. Andriah Feby 2014. Energy efficiency of buildings in Indonesia.

Distribution of the energy consumed by building showed that AC amounted to around 57%, while lighting only around 17%. The remaining of 26% would be for the building/office utilities (Table 2-7).

Table 2-7. Energy Utilization of Building 2010

No	Building Type	Utilisation for Main Purpose (%)		
		AC	Lighting	Utility/equipment
1	Office building (incl. government.)	66	15	19
2	Hospital	56.5	13.5	30
3	Hotel	54	18	28
4	Mall/shopping centre	51.9	20	28.1
	Average	57.1	16.6	26.3

Source: Hidayanto,N [15]

In regard to hotel, the electricity consumption data for hotel as shown in Table 2-8. The highest consumption is shown by Sheraton Hotel of Jogyakarta and Nikko Hotel in Jakarta, above 10 GWh.

Table 2-8 Sample of Hotel Electricity Consumption (Audit Result)

No	Hotel Audited	City	Province	Audit Year	Connected Capacity (kVA)	Consumption (kWh)	Area (m2)	EI (kWh/m2
1	Tryas Hotel	Cirebon	West Jawa	2010	105	285170	1568	181.87
2	Hotel Lombok Raya	Mataram	NTB	2007	279	1144320	6500	176.05
3	Bentani Hotel	Cirebon	West Jawa	2010	414	1155324	10204	113.22
4	Hotel Garuda Plaza	Medan	N. Sumatra	2007	415	2251200	7650	294.27
5	Hotel Sedona	Menado	N. Sulawesi	2010	555	2930960	24000	122.12
6	Hotel Bumi Senyiur	Samarinda	E. Kalimantan	2010	555	2566424	22325	114.96
7	Swiss Bell Maleosan Hotel	Menado	N. Sulawesi	2010	630	1945371	19000	102.39
8	Aquarius Boutique Hotel	Palangkaraya	C.Kalimantan	2010	700	3660865	10595	345.53
9	Hotel Melia Purosani	Yogyakarta	DI Yogyaarta	2009	1110	6456000	28320	227.97
10	Novotel Benoa	Denpasar	Bali	2010	1110	3024000	8640	350.00
11	Hotel Sahid Jaya	Makassar	S. Sulawesi	2010	1110	3708960	32689	113.46
12	Sheraton Hotel	Yogyakarta	DIY Yogya	2010	1385	10123381	60000	168.72
13	Clarion Hotel & Convention	Makassar	S. Sulawesi	2010	1700	6638400	23715	279.92
14	Hotel Novotel Nusa Dua	Denpasar	Bali	2007	2180	5055200	37000	136.63
15	Hotel Grand Angkasa Intl	Medan	N. Sumatera	2009	2355	9043997	57240	158.00
16	Hotel Nikko	Jakarta	DKI Jaya	2007	5540	10528304	38707	272.00

Source: Hidayanto N [15]

2.4 Energy efficiency facilitation fund

The Ministry of Finance (MOF) provided various forms of incentives to influence economic actors in order to implement energy savings programs on an ongoing basis e.g. tax facilities and facilities duty for components/parts and raw materials used to produce energy efficient appliances. These incentives, however, have not been able to fully affect the efficient use of energy investment. The Government needed to initiate other forms of investment such as low-interest financing in order to catalyse the market which in the long run can generate energy efficiency enhancement projects (Setyawan, 2013).

One of the financing mechanism considered is the energy efficiency revolving fund (*Dana Bergulir Efisiensi Energi*- DBEE). In this regard, the government planned to provide Rp 500 billion from the 2014 National Budget (APBN) as revolving fund for energy efficiency project. The Fund, however, is still in preparation stage. The study was started in 2012 by the Fiscal Policy Office's Centre of Climate Change Finance and Multilateral (PPKIM). The MOF and MEMR was to formulate the energy efficiency investment profile and mechanism for the implementation of the revolving fund scheme. The investment profile is expected to create energy efficiency project pipeline which provide comprehensive information for future participating banks, once the scheme being launched. According to

PPKIM, the feasible scheme is using Micro Credit Program (*Kredit Usaha Rakyat*) with credit ceiling at Rp 500 billion. The Program is usually intended to provide the poor and micro enterprises (who are mostly not bankable due to lack of collateral) with access to affordable credit. This Micro Credit Program is expected to be a stepping stone toward the implementation of the DBEE.

The Fiscal office (BKF) of the MOF also considered the option of providing financial support to the local government to implement climate change mitigation option including energy efficiency. In this regard, the government proposed to implement the Regional Incentive Mechanism. This fiscal transfer mechanism will enable the central government to provide funding to the regional governments for implementing energy efficiency policy. In addition, this mechanism could link to the outcome of the policy in the regional level. The regional government will also have an adequate autonomy to decide the most cost-effective proposals to implement, keeping in mind their development priorities (Syaifudin, Noor, et.al. 2014).

In the mechanism of fiscal transfers to the regions, the BKF considered to apply the Specific Allocation Fund (DAK) for energy efficiency. Actually, there are four types of intergovernmental transfer introduced in the law 32/2004 and 33/2004. These are natural resources revenue sharing, tax sharing, general allocation fund, and specific allocation fund. The DAK has advantages compared to these other transfer mechanism, particularly if associated with budget allocation for some specific purposes. There are already several DAK funds being distributed. For the energy sector, the government provided DAK fund for rural electrification which is now known as Rural Energy DAK (Haryanto, 2014)

There is no energy efficiency special allocation fund (DAK-EE) in the current fiscal year (2015). Based on the latest information, the government will reduce the proposed budget of the MEMR for 2016. However, the government will allocate special fund for energy through the DAK and state enterprise. There was no clarification yet if this will be additional to the current DAK or new DAK that would be specifically for energy efficiency and/or renewable energy.

Besides preparing special allocation fund, the government is also encouraging Indonesia's banking industry to implement green banking concept. Through the concept of green banking, banks must be more selective in distributing loans and investments to their customers. Apart from that, they must also actively educate each of their customers in environmentally friendly business practices. Thus, the green concept will enable bank to put more emphasis on the preservation of the environment by lending more to environmentally friendly customers and to limit lending to non-environmentally friendly ones.

During President SBY term, the central bank (Bank Indonesia/ (BI) and the Environment Ministry have signed a memorandum of understanding to cooperate on establishing ground rules for environmentally friendly banking practices. The BI, has also issued a regulation, namely Bank of Indonesia Regulation (*Peraturan Bank Indonesia*) No. 14/15/PBI/2012 on commercial bank asset quality assessment, particularly with regard to environmental aspects. Currently several Indonesian banks have initiated green banking practices. For example, the nation's biggest bank by assets, state-owned *Bank Mandiri* has cooperated with *Agence Française de Développement* (AFD) to actively finance some renewable energy and energy efficiency projects in Indonesia.

State-owned Bank Negara Indonesia (BNI) has also started implementing a green banking policy. Aside from having introduced green mortgages in Indonesia, BNI has been assigned

by the Environment Ministry to become a bank to channel soft loans for environmental projects, such as the Pollution Abatement Equipment scheme, which was funded by the Japan Bank for International Cooperation (JBIC) and German financing firm *Kreditanstalt für Wiederaufbau* (KfW). Under the scheme, BNI grants soft loans for investments in pollution control equipment and industrial efficiency to Indonesia's SMEs. (Subinarto, 2015)

Recently, the Financial Services Authority (OJK), the government agency that regulates and supervises the financial services sector of Indonesia, released a roadmap for the development of the sustainable finance sector, both for the middle-long period (2015-2019) and the long-term period (2015-2024). These roadmaps, made in cooperation with the Ministry of Forestry and Environment, contain guidelines and directions for the development of sustainable finance in Indonesia. The main theme of sustainable finance is to generate profit while taking into account sustainability of the environment. Through these roadmaps, sectors that potentially damage the environment will receive less bank financing in the future. However, in cases where bank financing cannot be reduced in certain sectors, then there has to be the good intention of conducting business in such a way that the environment experiences the least possible negative impact (Anonymous, 2015a).

The OJK realised that it is not possible to ban banks from lending to any non-sustainable projects as the economy would grind to a halt. However, it is something that banks must be moving towards to prevent environmental damage such as the terrible haze happening a few months ago. In this regard, the OJK will introduce rules to restrict banks' lending to environmentally damaging projects by 2018. Thus, OJK will request banks to invest in companies and projects deemed sustainable, to offset any funds given to non-environmentally friendly activities.

In the first phase, eight banks will be involved in the program. These are Bank Artha Graha Internasional, Bank Central Asia (BCA), Bank Negara Indonesia (BNI), Bank Rakyat Indonesia (BRI), Bank BRI Syariah, Bank Mandiri, and Bank Jawa Barat dan Banten. These banks will implement the new guidelines in January 2016. This imply that the eight banks will start to take into account sustainable environmental practices when making lending decisions (for example in the controversial palm oil sector) to safeguard the environment and sets a good example for other banks that are yet to join. (Anonymous 2015b).

2.5 Energy efficiency initiatives under cooperation with international organisations

Promotion of energy efficiency and conservation will not only from state budget but also through partnership programs. These include with ADB, JICA, IEA, UNIDO, etc. as shown below.

Table 2-9. Energy Conservation Partnership Programme

No	Organisation	Project	Remark
1	ADB	Smart Street Lighting Project	PJU Semarang and PJU Batang
2	GGGI	Green Industry Mapping Strategy Project (GIMS)	Help to decide the most potential green technology in Indonesia based on simulation
3	IEA	Data energy efficiency measurement	Workshop

4	DANIDA	Environmental Support Programme Phase 3 Component 2	IGA Pilot Project, Training IGA
5	JICA	Energy efficiency promotion project in Indonesia, Preliminary study before providing Technical Assistance: JICA Study for Development of Evaluation Method on Energy Efficiency and Conservation Measures	
6	NEDO	Smart Community for Industrial Park in Java	Technical Assistance
7	GIZ	Green chiller	
8	ECN	The development of a Common Accounting Framework for Energy Nationally Appropriate Mitigation Actions (NAMA-CAFÉ) and a NAMA for energy efficient Electric Motors (EEE NAMA)	Help to design Nationally Appropriate Mitigation Actions - NAMAs
9	UNEP	En.Lighten Global Efficient Lighting	Workshop
10	KEMCO	Joint Development Program for Climate Change Response Projects	
11	ICA	MEPS Policy for Air Conditioning and Electric Motors	
12	UNIDO	Promoting energy efficiency in industrial through energy management standard (ISO 50001) and system optimization	

Source: Zen, F. 2015. Policies, Program, and Actions on Energy Efficiency and Conservation

The above activities are still on going and some is a continuation of the previous program. For example the DANIDA partnership initiatives is already in the Phase 3. The Phase 2 program on efficiency is known as EINCOPS (Efficiency in the Industrial, Commercial and Public Sector). Details of this project will be described below. In addition, the details of the project BRESL (UNDP) and conducted by ICED (USAID) on energy saving potential is also described in detail below.

2.5.1 ICED/USAID

Indonesia Clean Energy Development (ICED) Project is a technical assistance program funded by the United States Agency for International Development (USAID) in the energy sector. The project is now in its second phase.

- ICED I: the project's first phase, implemented from March 2011 through February 2015
- ICED II: the project's second phase, launched in May 2015, and will run through 2020

The ICED program has the purpose to assist the GOI in establishing an effective policy, regulatory and incentive environment for low-emission growth in the energy sector, while simultaneously attracting public and private sector investment in clean energy development. It has two main goals:

- Strengthening the foundation for a low-carbon energy system in Indonesia.
- Contributing to the Government of Indonesia's (GOI) targets for increasing access to energy, while concurrently supporting national efforts to curb GHG emissions.

ICED supports a wide variety to stakeholders in the commercial development of renewable energy and energy efficiency projects. It provides energy planning and policy reform support to selected national and local governments to help them overcome barriers to greater clean energy development and use. ICED advises renewable energy project developers and energy efficiency hosts in assessing the feasibility of clean energy technology applications. ICED also offers local banks and financial institutions assistance

in evaluating project financing proposals. ICED also supports PLN, the national electric utility, in improving the framework for electricity generated from renewable energy.

During the first phase, the USAID ICED designed a pilot program to introduce energy management for hotel in order to better understand hotel‘s energy consumption and help the industry improve its energy performance. The purpose of the program was to support reduction of energy consumption and GHG emission of the hotels in Indonesia by developing hotel energy benchmarking tool and strategic energy management system. The program consisted of audits, monitoring tools, a best practice guide, and a variety of comparative measures to assist hotel managers and engineers. The program targeted hotels in Jakarta, Bali and Jogjakarta, three of Indonesia’s largest tourist destination, over the period 2013-1014. The target was to reduce their annual energy consumption by 5%-10%.

The following approaches were used: 1) benchmark each hotel’s energy performance, 2) facilitate building energy management, and 3) improved hotel industry knowledge on energy management.

The energy audit was basically a walkthrough edit, conducted in 30 hotels (13 in Jakarta, 7 in Yogyakarta, and 10 in Bali) in two Phase: October 2013 (6 hotels) and April-May 2014 (24 hotels). The list of the hotels is as shown in Table 2-10 below.

Table 2-10. List of Hotel Audited

DKI Jakarta	DI Yogyakarta	Bali
1. Kartika Chandra	1. Royal Ambarrukmo	1. Grand Nikko
2. Gran Mahakam	2. Gowongan Inn	2. Bali Intercontinental Resort
3. Park Lane	3. Hyatt Regency Yogyakarta	3. Courtyard by Marriot Bali
4. Gran Melia	4. Merapi Merbabu	4. Four Seasons Resort Bali at Sayan
5. Atlet Century Park	5. Jayakarta Yogyakarta	5. Four Seasons Resort at Jimbaran Bay
6. Pullman Jakarta	6. Sahid Rich Yogyakarta	6. The Royal Beach Seminyak Bali
7. Menara Peninsula	7. Yogyakarta Plaza	7. Nusa Dua Beach
8. Mandarin Oriental		8. The Oberoi Bali
9. JS Luwansa		9. Grand Hyatt Bali
10. Jayakarta Jakarta		10. Jayakarta Bali
11. Le Meridien		
12. Santika Bogor		
13. Santika Premier Slipi		

The general description of the hotel is shown in Figure 2-7 below.

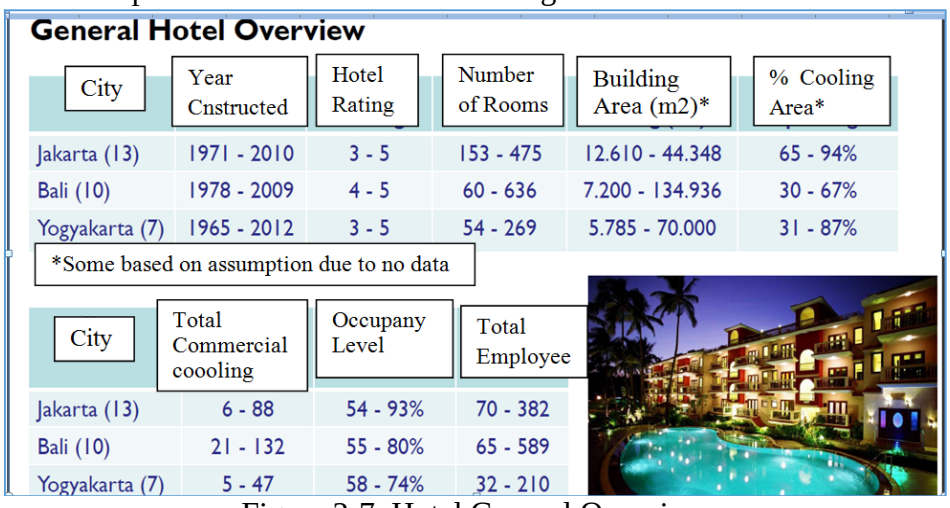


Figure 2-7. Hotel General Overview

Some of the result of the surveys is shown below. The profile in Figure 2-8 and Figure 2-9 showed that of the total energy and water cost, the highest share would be for PLN electricity in all of the hotels surveyed in Yogyakarta. In Hotel 2 (Gowongan Inn) and 5 (Jayakarta) the share of LPG and diesel is also significant although not more than 50% (see Table 2-10 for hotel name).

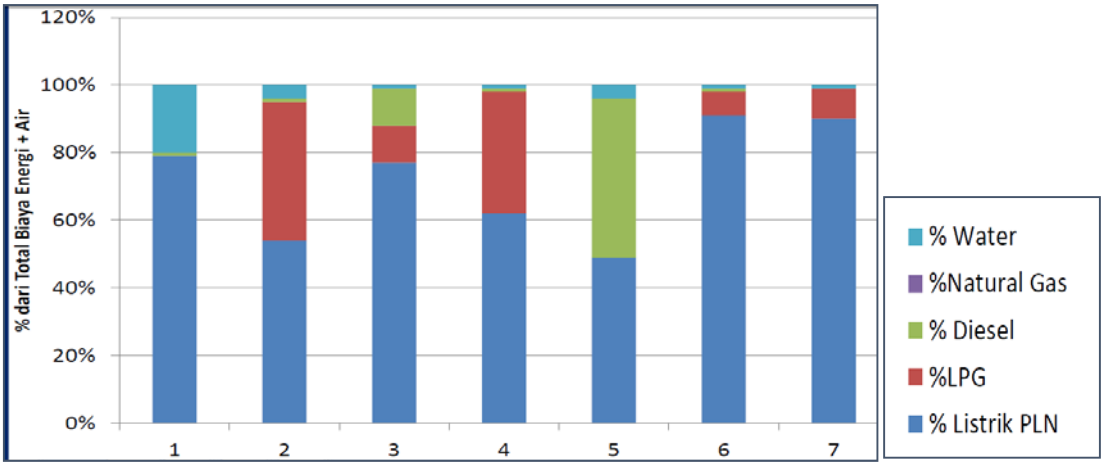


Figure 2-8. Energy and water consumption profile of Yogyakarta Hotel (% total cost)

On average, the electricity portion of the hotel's cost will be 63% in Bali and 73% and 76% in Jakarta and Yogyakarta respectively. Water constitute the 2nd largest share in Bali and Jakarta while in Yogyakarta, diesel accounted more than water.

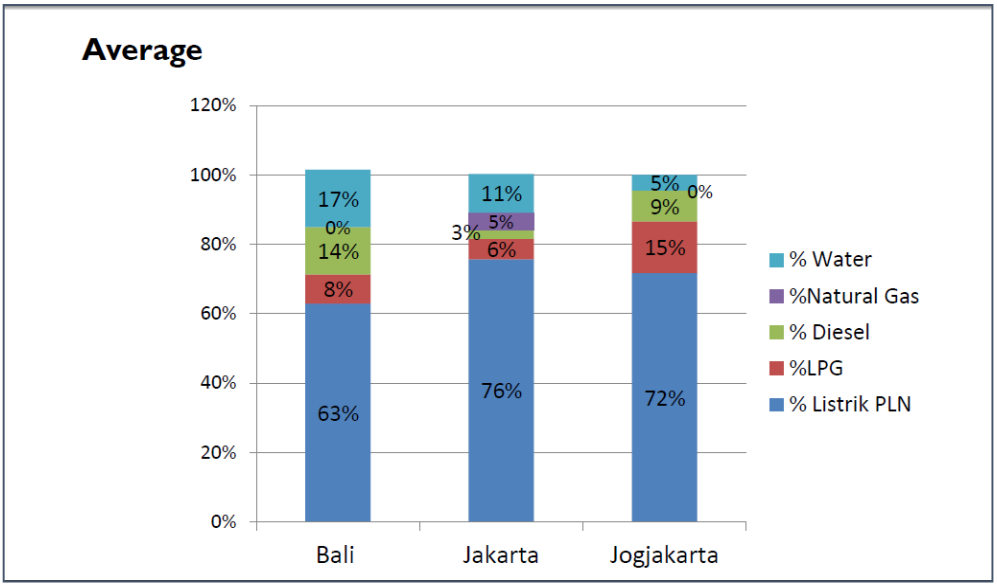


Figure 2-9. Average Hotel Energy and water consumption profile

The ICED compiled the chief engineer hotel training materials during the Hotel Energy Benchmarking and Strategic Energy Management in the Energy Efficiency Guideline in Hotel (in Bahasa). The publication also includes the contributions from hotels on their best practice in the implementation of energy saving. In addition, the report will include the energy consumption profile of the hotels included in the audit and their benchmarking value. The ICED also published the document on Energy Efficiency Guideline in Government Facility (in Bahasa),

For the ICED Phase 2, it was launched in May 2015 and will run through 2020 with the goal to assist the government of Indonesia (GOI) in establishing an effective policy, regulatory and incentive environment for low-emission growth in the energy sector, while simultaneously attracting public- and private-sector investment in clean energy development and increasing human resource capacity in technology and innovation. Through technical assistance activities to government and private sector counterparts, the project is expected to achieve: (1) 4.5 million tons of greenhouse gas emission reduced or avoided; (2) $800 million of private and public investment mobilized; (3) an additional 5 million people with access to clean energy, (4) twenty institutions with improved capacity to address climate change issues, and (5) twenty laws, policies, strategies, plans, or regulations addressing climate change mitigation officially proposed, adopted, or implemented.

The strategy for ICED II has been summarised below and the identified areas of ICED II support is shown in Figure 2-10 (Meade 2015).

- Align program activities with GOI partners' KPIs and priority programs for shared results.
- Scale up EE pilots into government and/or sectoral programs with proven results (e.g., street lighting, government and commercial buildings).
- Work in selected provinces that show the greatest potential for providing a reference for other provinces.
- Engage in cities/regencies where new opportunities emerge that can contribute to ICED-II results.
- Build on the extensive ICED-I Pipeline, the priorities of our national-level partners.

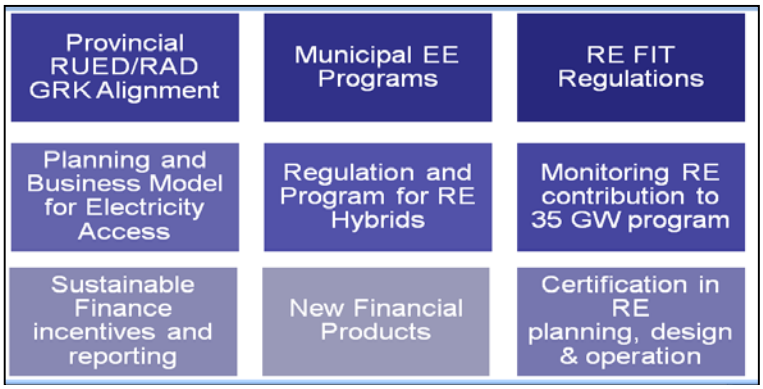


Figure 2-10. Identified Areas for ICED II Support

2.5.2 BRESL/UNDP

The Barrier Removal to the Cost-Effective Development and Implementation of Energy Efficiency Standards and Labelling (BRESL) Project is an international co-operation project, which is sponsored by the United Nations Development Programme (UNDP) and the Global Environment Facility (GEF). The BRESL project is a 5 years project (2010-2014) with GEF US$7.8M funding. The Participating Countries are Bangladesh, China, Indonesia, Pakistan, Thailand and Vietnam. The Target Products include Refrigerators, Room air conditioners, Electric motors, Ballasts for FTLs, Electric fans, Compact fluorescent lamps and Rice cookers.

BRESL is aimed at rapidly accelerating the adoption and implementation of energy standards and labels (ES&L) program in Asia, The project also facilitates harmonization of test procedures, standards and labels among developing countries in Asia, when appropriate.

BRESL will facilitate the transformation of the manufacture and sale of energy-efficient appliances and equipment through:

- A regional initiative in Asia. The project will focus on regional ES&L program cooperation and harmonization with provision for general information, tools and training to all interested developing countries in the region.
- National technical assistance to 6 developing countries in Asia. The project will focus on capacity building and assisting government, manufacturer, distributor, retailor, consumer and relevant stakeholders throughout the Asian region to implement the most cost-effective ES&L program. In each participating country, priority activities will be carried out to help foster each country's preferred process for developing or expanding its ES&L program.

The project activities will be centred on the following components:

1. Policy-making support to Government (development of ES&L Policy Framework
2. Capacity Building : Testing Laboratories, Institutions
3. Manufacturing and market development support
4. Regional cooperation Program: standard harmonization
5. ES&L Pilot Project in individual country

The project identified the barriers of Energy Efficiency Standards and Labelling (EESL), as shown below.

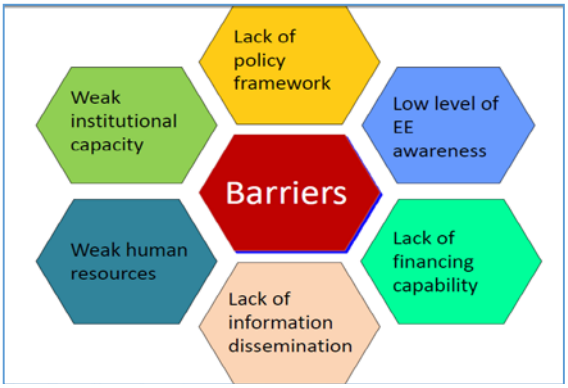


Figure 2-11. Barrier of Energy Efficiency Standards and Labelling (EESL)

The outcome of the project include amongst other:

- The issuance of the MEMR Regulation no 6/2011 on CFLs followed by a Technical Guideline which has been signed and released by the Directorate General of New Renewable Energy and Energy Conservation (DGNREEC);
- The regulation has been revised and the latest was MEMR Regulation no 18/2014.
- Conducted regional feasibility study on CFL based on Australian practices and updated for standard harmonization of CFL energy performance.
- Two drafts of ministry regulation on refrigerator and air conditioner labels were submitted to the DGNREEC and was used as the basis for creation of technical guidelines for labels;
- Finalised the energy performance tests on rice cookers and electric fans and submitted to the DGNREEC to be enacted as the Indonesian Standard for Energy Performance;
- Submission of the testing protocol of electronic ballast to DGNREEC to be evaluated and included as Technical Guideline under ministerial regulation.

- Development of BRESL Indonesia website to provide reliable source of information related to ES&L programmes;
- Training of home appliance and lighting manufacturers on the quality norm ISO 17025 to facilitate laboratory accreditation, in partnership with the National Standardization Agency (BSN).
- Conception of a training programme for laboratory accreditation.
- Training of private manufacturers, state companies and government laboratories for energy efficiency testing of air conditioners. This enabled the Indonesian technicians capable of conducting specialized benchmarks in their respective laboratories at a lower cost; and
- Training of the local manufacturers, testing laboratories and certification bodies by the Indonesian Institute of Sciences (LIPI) and Electronics Industry Association (GABEL). The purpose was to build capacity and to build a common understanding in interpreting testing standards and procedures.
- Provide technical assistance to manufacturers and retailers to enhance their knowledge and skill in order to accelerate the implementation of the ES&L programme;
- Conducted plant visits to local ballast manufacturers, which was followed up by facilitation of preparation for ISO 9001 certification, aiming to identify the barrier of the implementation of ES&L programme.

The project also conducted a sustainability evaluation report for each of the participating countries.

2.5.3 DANIDA

DANIDA is a bilateral cooperation program between the Government of Indonesia and Denmark. The program covers several areas, one of which is the Environmental Support Programme (ESP). The first ESP focused on mainstreaming environmental measuring into Indonesia's national development plans and linking environmental management and poverty alleviation. The second ESP focused on improved environmental management. It supported the energy sector by encouraging energy efficiency in the industrial, commercial and public sectors and promoted more effective natural resource management, including encouragement of small-scale renewable energy in rural locations.

For the efficiency, the projects is known as EINCOPS (Efficiency in the Industrial, Commercial and Public Sector). The EINCOPS was initiated in December 2008 and implemented through the Directorate General for New and Renewable Resources (DGNREEC), MEMR with assistance of DANIDA. EINCOPS continued until the end of 2012 with an overall budget approximately IDR 88 billion. Activities of the project can be summarized below.

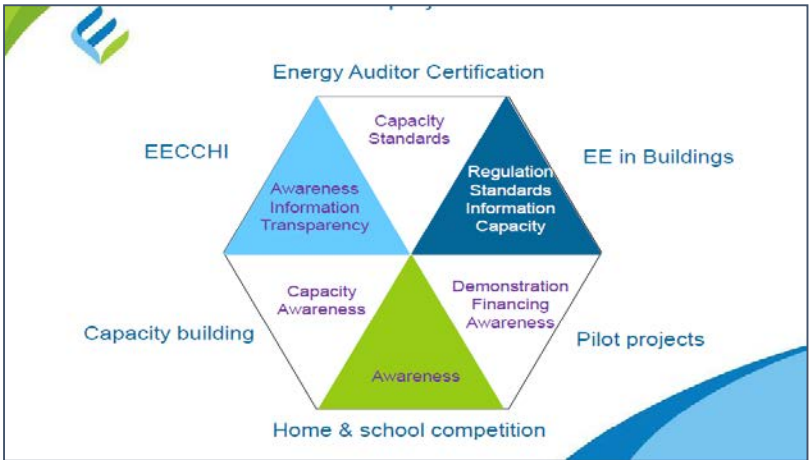


Figure 2-12. Overview of EINCOPS Activities

Regarding the Energy Efficiency in Building, the activities were:

- The Demonstration office in MEMR - EE renovation
- Assistance to the revision of the existing SNI standards, and a peer review of these with a view to future improvements
- Developing guidelines for the Energy Efficient building design
- Work in support of new regulation for Green Buildings in DKI Jakarta (Governor Regulation No. 38/2012, dated 23 April 2012)
- Pilot projects to promote EE solutions in buildings – both new and existing buildings
- Training and Capacity building activities

The picture below showed the situation before and after the office was renovated.

Figure 2-13. Low energy demonstration office – Before and after

Comparison on the Energy Index (kWh/m2/year) showed a significant decrease of around 55%. Other parameters were also measured as shown below.

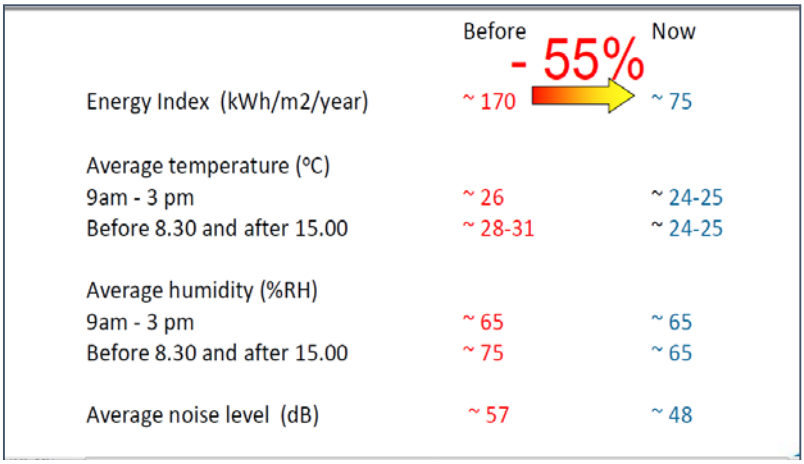


Figure 2-14. Low Energy Demonstration Office Results

The overall goal of the DANIDA's Environmental Support Programme (ESP) phase 3 was to support Climate Change and Green Growth in Indonesia. The project was initiated in 2013 and will be finalized in 2017 with a total budget of approximately 50 million USD. The programme structure is shown below and the activities overview is shown in Figure 2-15 (Oksen 2015).

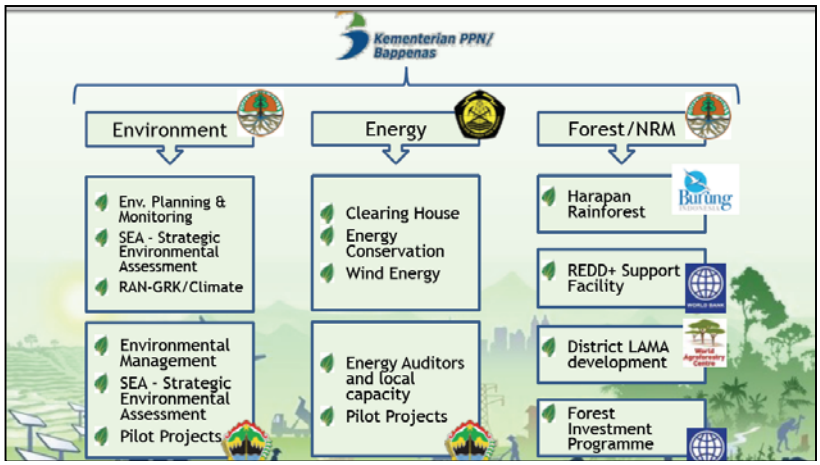


Figure 2-15. DANIDA ESP3 Programme structure

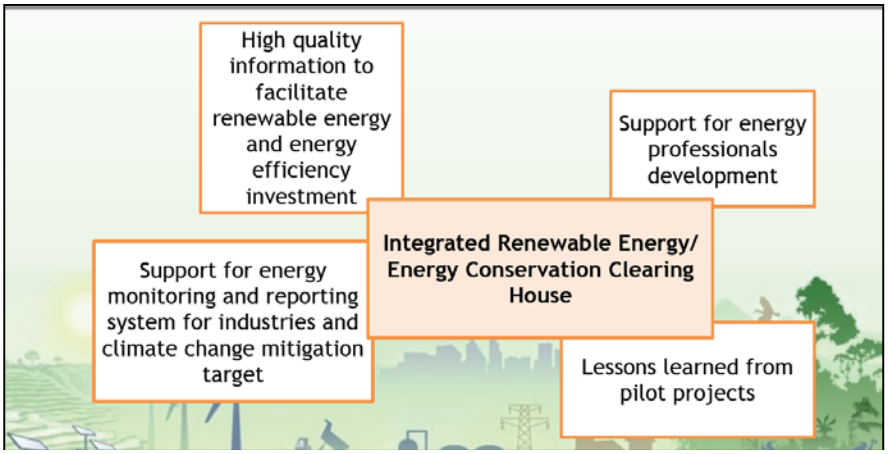


Figure 2-16. DANIDA ESP3 Energy Activities Overview

Based on the Denmark experience, buildings account for 40% of global consumption. Using existing technology consumption can be reduced with 50-80% through e.g. E-

efficient windows; Insulation material; Heat regulators; Ventilation systems; and Lightning systems. For the energy efficiency under ESP3, the activities are including:

- Research on behaviour change strategy for energy conservation in 6 cities (Jakarta, Semarang, Makassar, Ambon, Samarinda, and Palembang);
- Survey on use of energy saving light bulbs in areas with unreliable electricity supply;
- Online monitoring system for high energy consuming industries;
- Development of energy manager training material;
- Clearing house for energy efficiency and renewable energy (planned operational on October 2015)

3. Energy Efficiency Implementation in Green building programme

With the transformation of rural to become more urbanised areas in most of the regions in Indonesia, demands for housing, commercial, social, and other function areas are growing significantly. In accordance with this development, the city development is inseparable from spatial planning context that should consider sustainable development principles including building management and energy efficiency. This section explores national policies and programmes related to green building including Ministerial Regulation of Public Work and People Housing specifically on green building, and strategic plan of the Ministry in promoting green building. Initiatives by DKI Jakarta Province and Green Building Council Indonesia closes the section.

Government of Indonesia has issued several regulatory instruments from Laws and their derivatives from government regulation, presidential regulation to technical ministerial regulations concerning spatial planning and building management, in particular in the city. This regulatory framework supports the implementation of sustainable city and building infrastructure which are resources efficient, environmental-friendly and contributing to GHG emission reduction.

3.1 Policy related to Green Building concept

Law No. 26/2007 on Spatial Planning regulating processes of plan-making, plan implementation, and development control. Provision of green open space is one of the mandates that is regulated by the Law requiring city/district or province to provide minimum 30% of their total area under their jurisdiction. Of the 30%, the proportion is minimum 20% belong to public area and the remaining belong to private-owned area. For building management and control, government issued Law No. 28/2002 on Building. The Law regulates building functions, standard requirements, operation and maintenance reflecting sustainable development principles, as well as public participation and government control, and its (dis)incentive. In addition, there are other Laws and regulations related to green building initiative. These include, among others,

1. Law No. 28/2002 on Building
2. Law No. 30/2007 on Energy,
3. Law No. 24/2007 on Disaster Management,
4. Law No. 7/2007 on Water Resources,
5. Law No. 32/2009 on Environmental Protection and Management,
6. Law No. 32/2014 on Local Government,
7. Government Regulation No. 36/2005 on Implementation of Law No. 28/2002 on Building,
8. Presidential Regulation No. 61/2011 on National Action Plan on GHG emission reduction in particular on energy sector,
9. Ministerial Regulation of Public Work No. 11/2012 on National Action Plan on Climate Change Mitigation and Adaptation under the coordination of Ministry of Public Work 2012-2020.

For building management, a series of ministerial regulations and guidelines providing guidance for city/district government to planning and implementing sustainable building infrastructures which refer to the Law No. 28/2002 on Building and the Government Regulation No. 36/2005 on Implementation of Law No. 28/2002 on Building have been issued, such as:

a) Ministerial Regulation No. 29/PRT/M/2006 on Guidance of Technical Requirements for Building Infrastructure, and
b) Ministerial Regulation No.02/PRT/M/2015 concerning Green Building,
c) Ministry of Environment also issued a Ministerial Regulation No. 8/2010 on Criteria and Certification of Environment-friendly Building,

Compliment to the above regulations, Ministry of Energy and Mineral Resources supported by Danish Energy Management published Guidelines of Energy efficiency for building design in Indonesia on 2012 providing advice and references for building owners/ developers and professionals on how to design buildings to minimize energy use while still meeting comfort, health, and safety needs. The guidelines comprise 3 parts: No. 1 for Building developer and owner, No.2 for Technical guideline for Design, No. 3 for Case study and additional information.

Additionally, Indonesia has already issued Indonesia National Standard (SNI) related to energy efficiency in buildings. The SNI is commonly used as a reference to construct buildings and offices. Currently the national standardization of lighting system, air conditioning system and building envelope has been established.

Table 3-1 National standards related to energy efficiency in building

No.	Energy efficiency standard in building	SNI
1.	Energy conservation for building envelope (OTTV & RTTV < 35 W/m^2)	SNI 03-6389-2011
2.	Energy conservation for air conditioning system in building (temperature: 24ºC - 27ºC and humidity 60% ± 5%)	SNI 03-6390-2011
3.	Energy conservation for lighting system in building (standard of lighting intensity for the office, residential, industry, hospital, mall, etc.)	SNI 03-6197-2011
4.	Energy audit procedure for building	SNI 03-6196-2011

Source: Misna 2013

3.2 Green City Development Programme

Green City concept has a mission to effectively and efficiently utilise water and energy resources, to reduce waste, to apply integrated transportation system, to ensure environmental health, and to create a synergy between natural and artificial environment, by implementing city designing and planning which consider sustainable development principles. At the end, it would create a city that is secure, livable, productive, and sustainable as mandated by the Law No. 26/2007 on Spatial Planning (BKPRN 2012).

To promote such a Green City concept, Ministry of Public Work and People Housing (MOPW) specifically under Directorate General of Spatial Planning launched a Green City Development Programme (*Program Pengembangan Kota Hijau*/P2KH) on 2011involving city/district government and provincial government as well as private sector (BKPRN 2012).

There are eight attributes of a green city, which cover local aspects of economic, social, and ecological development. Energy efficiency and green building are among the attributes of a green city that should be inclusively and comprehensively implemented by city/district government. The eight attributes of a green city are as follows:

1. Environmental-friendly city planning and designing,
2. Green open space provision,
3. Efficient energy consumption,

4. Effective water management,
5. Waste management in 3R principle,
6. Energy-saving building or green building,
7. Sustainable transportation system application, and
8. Public participation enhancement as a green community.

In order to achieve the implementation of P2KH, central government through the MOPW provides strategic and technical steps that should be taken by the city/district and provincial governments, including:

a) Preparation of green map,
b) Preparation of green open space master plan,
c) Public awareness and education,
d) Capacity building through training, workshop etc.
e) Pilot project implementation

The P2KH Programme has been implemented in two phases, in 2011-2014 and continued in 2015-2019 respectively. In order for city to accelerate the implementation of the Programme, the central government provides technical assistance and financing incentives. Up to August 2015, 142 city/district governments have signed Memorandum of Understandings on the implementation of green city with the MOPW.

3.3 Promotion of Green Building programme

As part of the P2KH Programme, the MOPW promotes the application of green building by the local government as a manifestation of sustainable building development as required by the Law No. 28/2002 and Government Regulation No. 36/2005 (Anonymous 2013). As a first step of supports, the Ministry supports the preparation and stipulation of local regulation (*Peraturan Daerah*/PERDA) on building infrastructure by the district/city and, in particular case, DKI Jakarta provincial governments toward the implementation of sustainable buildings.

As of November 2015, 329 cities/districts or 64.89% of the total district/city nationwide have issued the Local Regulations. The achieving number of cities are actually lower than previously expected by the MOPW that all cities/districts would have finalised the PERDA by 2015. The Ministry identified issues hindering the PERDA stipulation, including unsynchronised schedule and prioritise of Regional Legislation Programme (PROLEGDA of the local parliament with the Bill of PERDA proposed by the local government, lack of technical understanding and sense of urgency of local parliament members over the implementation of building infrastructure, as well as their political and business interests (Anonymous 2015a).

For cities/districts that have been promulgated the PERDA, the Ministry provides supports in form of budget allocation and technical capacity building. Capacity building for related government officials is provided to improve their capacities on the assessment of Building Construction Permit (IMB), Certificate of Feasible Function or occupancy permit (SLF), building inventory, establishment of expert team on building infrastructure (TABG), and the accessors.

For the promotion of green building, the MOPW issued relevant regulation, encourages development of pilot project of green building in government buildings as a role model for public application, and capacity building of officials in the implementation and monitoring. The Ministerial Regulation No.02/PRT/M/2015 on Green building has been promulgated

on February 2015. As a role model, the MOPW has established green building concept for their own office compound, both for new and existing buildings.

For 2015-2019 strategic planning, the Ministry focuses on strengthening institutional capacities of the local governments in particular in metropolitan cities and districts within the National Strategic Region (KSN). The Ministry will be a leading sector for the initiative by inviting strategic partners from service providers or assessment institution such as Research Centre of Housing Development under the Ministry, and Green Building Council Indonesia.

For this FY2015, the Ministry assigned 3 cities as pilot cities for the implementation of green building, namely Bandung, Surabaya and Makassar. The Ministry provides technical assistance for the preparation of Mayor Regulation (PERWALI) on green building. In addition, the Ministry monitor and take a lesson learned on the implementation of green building in DKI Jakarta Province, which has been regulated earlier in 2012 (Suara Karya 2015).

In the case of City of Bandung, Department of Spatial Planning & Human Settlement (DISTARCIP) led the preparation of PERWALI. During the policy making processes the Department consulted with relevant city departments, MOPW, and stakeholders. The City received technical support from the International Finance Corporation (IFC) for defining parameters (City of Bandung 2015).

3.3.1 Ministerial Regulation on Green Building

The Ministerial Regulation No. 02/PRT/M/2015 defines green building as: “building which meets the requirements and has a significantly measurable performance in energy, water and other resources saving through the application of the green building principles in accordance with the function and classification in each phase of implementation." The Regulation covers some issues of:

a) green building principles;
b) building types that should comply with the requirements of green building;
c) green building requirements;
d) implementation of green building;
e) certification;
f) providing incentives to the implementation of green buildings;
g) guidance; and
h) Community participation.

As indicated in Article 2, the Regulation is formulated to become a guidance for green building implementers. These include central government, district/city government or provincial government specifically for DKI Jakarta Province, owners, users, and/or building managers, construction service providers, and green building specialist.

The Regulation classifies green building in three categories which depend on the building complexity and height in referring to the provisions of Technical requirements for building structure stipulated on Ministerial Regulation of Public Work No. 29/2006, high potential consumption of energy, water and other resources. Based on the aforementioned requirements, the classification of building that should implement green building concept are mandatory, recommended, and voluntary.

a) Mandatory, for:

- buildings of class 4, 5, 6, 7, 8, and 9 (according to MOPW Regulation No. 29/2006 see Appendix 1), which are not simple nor specific complexity, and have a tall or medium in height;
- buildings of class 6, 7, 8, 9a and 9b, which has up to 2 floors and with total floor area is more than 5000m2;
- buildings which consume a large amount of and has significant potential saving of energy, water, and other resources, and/or
- buildings which are assigned by district/city or provincial government specifically for DKI Jakarta Province in accordance with their urgency, condition, and policy implementation of energy, water, and other resources in the region.

b) Recommended, for:
- Residential buildings of class 1, 2, and 3 which their complexities are not simple, and with height of tall or medium, including those having basement;
- buildings of class 8, 9a and 9b, with simple complexity and height up to 2 floors, but with total floor area is between 500 m2 to 5000 m2;
- green residential buildings with no simple complexity, that their technical requirements are specifically determined;
- buildings which consume quite large amount of and has significant potential saving of energy, water, and other resources, and/or
- buildings which are assigned by head of district/mayor or Governor of DKI Jakarta Province in accordance with urgency, condition, and implementation of energy, water, and other resources policies in in the region.

c) Voluntary, for
- buildings of class 4, 5, 6, 7, 8, and 9 with simple complexity;
- buildings of class 1, 2, and 3 with simple complexity;
- green community residential (H2M) with simple complexity, which is specifically regulated in referring to the Work Plan of Green Community Residential (RKH2M); and/or
- buildings which are assigned by head of district/mayor or Governor of DKI Jakarta Province in accordance with their urgency, condition, and implementation of energy, water, and other resources policies in in the region.

According to the Regulation, the green building concept should be implemented for all building life cycle from programming, technical design, construction, utilisation, to demolition phases. The Regulation provides recommendation for green building project delivery system which consider the expected performance and the available resources, including 1) high performance, high cost, 2) optimum performance, optimum cost, and 3) optimum performance, low cost. Followings are summary of the technical requirements based on its phases.

Table 3-2. Technical requirements of green building implementation based on its development phases.

Phase	Requirements
programming	1) site suitability; 2) determination of building object; 3) performance of green buildings in accordance with the requirements; 4) project delivery system; and 5) building feasibility for a green building implementation.

technical design	1) site management: a. buildings orientation; b. site management including accessibility/circulation; c. contaminated land management of hazardous and toxic waste (B3); d. private green open space (RTH); e. pedestrian paths provision; f. basement site management; g. parking lots provision; h. outdoor lighting systems; and i. buildings construction above and/or below the ground, water and/or public infrastructure/facilities.
	2) energy efficiency; a. building envelope; b. ventilation system; c. air conditioning system; d. lighting system; e. indoor transport system; and f. electrical system.
	3) water efficiency; a. water sources; b. water consumption; and c. use of water fixture sanitary equipment.
	4) indoor air quality; a. smoking ban; b. carbon dioxide (CO2) and carbon monoxide (CO) control; and c. refrigerant use control.
	5) environmental-friendly materials use; a. use control of hazardous materials; and b. use of certified environmental-friendly materials (eco-labeling).
	6) waste management; a. application of 3R principles; b. application of waste management system; and c. application of waste generation recording system.
	7) management of waste water. a. provision of facilities for solid waste and waste water management before discharged into municipal sewer; and b. grey water recycle.
construction	1) green construction process; a. application of the green construction delivery system; b. equipment use optimising; c. implementation of construction waste management; d. implementation of water conservation during construction process; and e. the implementation of energy conservation during construction process.
	2) green behaviour practice: a. implementation of Health and Safety Management System (SMK3); b. application of environmental-friendly behaviour.
	3) green supply chain on: a. construction materials use; b. suppliers and/or sub-contractors selection; and c. energy conservation.
Utilisation	1) organization and governance of the green building utilisation; 2) standards of operational and procedures for green building utilization; 3) preparation of guidelines for the building occupants/users.

Demolition	1) demolition procedures, including documentation of the entire building material construction, of the building structures and/or parts to be demolished, and of material and/or waste to be reused; and 2) environmental site recovery efforts, consisting of the building site recovery effort and, construction waste management effort, as well as improving the overall site quality.

Source: Ministerial Regulation No. 02/PRT/M/2015

Energy efficiency implementation of green building is expected to potentially conserve 20-25% of the energy use. It is by referring to related technical guidelines and Indonesia national standards on specific components (see Table 3-3 below).

Table 3-3. Indicator and reference for energy efficiency implementation

Component	Indicator	Reference
a. Building envelope	Permitted accumulated roof thermal transfer value (RTTV) and/or overall thermal transfer value (OTTV) is maximum 35 W/m2	Indonesia National Standard (SNI) SNI 6389:2000 on energy conservation for building envelop or the latest one.
b. ventilation system;	Should use minimum ventilation size as required by SNI 6572:2001 on procedures for the design of ventilation and air conditioning systems in buildings or the latest	SNI 6572:2001 on procedures for the design of ventilation and air conditioning systems in buildings or the latest
c. air conditioning system;	Designated indoor air temperature is set at 25^{o}C ± 1^{o}C with relative humidity from 60% ± 10%. Rooms necessary for specific temperature should refer to related technical guidelines and standards. The AC system should meet minimum efficiency value of the air conditioning equipment as required by SNI6390:2000 on energy conservation of the building air system	SNI6390:2000 on energy conservation of the building air system or the latest
d. lighting system;	Should refer to SNI6197:2000 on energy conservation on artificial lighting system or the latest	SNI2396:2001 on procedures of design on natural lighting system or the latest; SNI6197:2000 on energy conservation on artificial lighting system or the latest
e. indoor transport system;	Should consider energy consumption required, its management system, passenger capacity, and travelling time	SNI6573:2001 on procedures of implementation of vertical transportation system in building or the latest.
f. electrical system.	Should implement Building Management System (BMT)	SNI0225:2011 on electricity installation general guidance

Source: Appendix to Ministerial Regulation No. 02/PRT/M/2015

The Regulation stipulates reporting and inventory of green building to measure the implementation progresses in local level, and as an input for future policy development in order to improve energy, water and other resources saving contribution in a measurable manner. The reporting and inventory are required as a mandatory of the building owner/manager and service providers for all building life cycle from its programming to demolition containing all components of the technical requirements. The report is submitted to the assigned authority on green building sector in the local level as a part of requirements for IMB permit and performance assessment to acquire green building certificate. The certificate, which is valid for 5 years, has three rating including primary (*utama*), medium (*madya*), and basic (*pratama*).

Upon the transfer of the certificate, the authority conducts inventory on data of:

- General data consisting of ownership of the green building;
- Technical data on structure, architecture, utilities, and service providers involved;
- Data status comprising data of previous ownership;
- Data related to building performance acquired from the reporting of all building life cycle;
- Certificate validity period and its updates record.

To promote the implementation of green building, the central government will provide incentive, guidance, and invite public participation. The incentives are provided for building owner/manager as well as green community residential by the central, city/district government or provincial government in particular for DKI Jakarta (article 28). These include:

a) reduction of licensing fees and relief services;
b) compensation in the form 1) ease of licensing; and/or 2) additional Building Floor Coefficient (KLB);
c) technical and/or expertise support such as technical advice for a green building pilot project;
d) award such as a certificate, plaque, and/or other appreciation;
e) Other incentives in the form of publications and/or promotion.

For the guidance, the government should provide norms, standards, guideline, and criteria for the implementation of green building which apply nationally to involve commercial buildings and green community residential.

3.3.2 Implementation of a role model by Ministry of Public Work and People Housing

Figure 3-1. Building of the Ministry of Public Work and People's Housing

The building compound of the MOPW is currently considered as the first ministerial building compound that has applied green building concept. Recently, Ministry of Marine and Fisheries building compound was also launched on January 2016, which was awarded GOLD GREENSHIP by the Green Building Council Indonesia (GBCI) (Pratiwi 2016). Objective of the initiative is to provide a role model for other government buildings which is appropriate for government cost standard for building a green building.

The MOPW office compound provides three role model types, including:

- Role model for construction and maintenance of new building at the main building;
- Role model of green retrofit at the existing buildings;
- Role model of green site of government offices at the office area.

The main building has been awarded PLATINUM rating of green building according to GREENSHIP rating category for New Building version 1.0 by the GBCI since 2013. The implementation of the green building concept provides initial best practices on energy consumption and its saving. In general, by applying passive and active designs, the energy use intensity (EUI) at the MOPW buildings is at 140 KWh/m2.year, saving 44% more comparing to the average consumption of office buildings in Jakarta which is at 250 KWh/m2.year (MPOW 2015).

From the Operational and Maintenance, the Ministry record indicates that the actual EUI of the buildings is 91 KWh/m2.year, which is 64% saver than the average EUI of office buildings in Jakarta, or 35% saver than the design EUI value. Record shows that the largest energy consumption is from air conditioning (51%), followed by lightings (22%), parking (7%), lift (6%) and others (4%). In addition, the building could reduce 1,650 ton/year CO2-eq, and save 83% water consumption during rainy season, and 61% during dry season.

During the implementation, challenges were identified including (MOPW 2015):

- Ministerial staffs awareness on energy conservation concept in general, as the users of the building is still lacking, requiring a constant education;
- The human resource quality who are responsible for energy conservation management is still lacking that needs special training both on business processes and IT;
- Infrastructure for the Preliminary Energy Audit management within the working unit is still limited;
- Capital expenditure budget for the procurement of energy saving technologies is limited.

3.3.3 Green building initiative in DKI Jakarta Province

Jakarta is the capital and largest city of Indonesia and becoming the one of the most populous urban agglomeration in the world. Although it is a metropolitan city, it is officially known as the Capital Special Region of Jakarta (DKI Jakarta) Province (Wikipedia 2015). With this strategic role and function, Jakarta is specifically mentioned in the Ministerial Regulation of MPOW to implement a green city and green building concepts together with other district/city government.

Jakarta is the first local governments which has regulated the implementation of green building concept as stipulated in Governor Regulation No. 38/2012. Through this green building initiative, DKI Jakarta Province aims at contributing national efforts on greenhouse gases (GHG) emission reduction through the energy efficiency implementation, and serving as a model for implementation in other cities. DKI Jakarta sets out their target to reduce GHG emission by 30% by 2030. During the policy-making processes, the Jakarta Provincial Government was receiving supports from the International Finance Corporation (IFC) (Anonymous 2012a).

Earlier, the DKI Jakarta Province has issued Local Regulation (PERDA) No. 7/2010 on Building which refer to Government Regulation No. 36/2005 on Implementation of Law No. 28/2002 on Building. This PERDA has specifically mentioned 'green building', and mandates the Governor to issue a Governor Regulation to define criteria and technical requirements of green building (article 110).

Regulation contents

The Governor Regulation on Green building is being mandatory for buildings which have functions for:

- Residential (such as apartments);commercial (office buildings and trade); and building which has more than one function in one building mass, with total floor area is more than 50,000 m2.
- Commercial (hotels); social and culture (health service facilities) with total floor area is more than 20,000 m2, and
- Social and culture (education and service facilities) with total floor area is more than 10,000 m2.

The Governor Regulation has several criteria and technical requirements for both existing and new buildings, which have a slight differences as presented in the following table.

Table 3-4. Technical requirements of green building for new and existing building

Criteria for new building	Criteria for existing building
1. Energy efficiency:	**1. Energy conservation and efficiency;**
- building envelope system; - ventilation system; - air conditioning system; - lighting system; - indoor transport system; and - electrical system.	- conduct energy audits - conduct energy conservation and efficiency - analyse the use and potential of energy savings - report the energy usage data for every 12 months to Building Supervision and Control Office with a copy to Energy and Industry Office
2. Water efficiency:	**2. Water conservation and efficiency;**
- water-saving sanitary equipment planning; and - water usage planning.	- Water use should be restricted, optimised and controlled with metering; - Waste water should be processed with Waste Water Processing Installation that should meet quality standard

	- Waste water should be recycled to be used for cooling the chillers, toilet flushing and/or watering plants - Building management report the use of water to Building Supervision and Control Office with a copy to Environmental Management Agency. - Groundwater and recycled water should be laboratory tested
3. Indoor air quality	**3. Indoor air quality and thermal comfort;**
- Planning of indoor air quality must comply with regulations by taking into account the rate of turnover of indoor air and fresh air inlet. - Each room and each parking area which could potentially receive the accumulated concentration of carbon dioxide (CO2) must be monitored with a carbon dioxide monitoring tools (CO2) which is equipped with alarm and an automatic mechanical ventilation system that will operate when the carbon dioxide (CO2) level passed the permitted threshold. - Refrigerant air system must contain secured materials and not harmful to other occupants and the environment. - refrigerant air system must use materials without chlorofluorocarbon (CFC) contained in	- indoor air quality must comply with technical guidance and standard; - Each room and each indoor parking area which could potentially receive the accumulated concentration of carbon dioxide (CO2) must be monitored by a carbon dioxide monitoring tools equipped with alarm, and an automatic mechanical ventilation system that will operate when the CO2 level passed the permitted threshold; - Building management reports data of indoor air quality regularly by 12 months to the Building Supervision and Control Office with a copy to Environmental Management Office - Indoor temperature is set on 25^{o}C at the lowest, and with relative humidity of 60% ± 10%
4. Land and waste management	**4. Operations and maintenance**
- spatial requirements; - supporting facilities; and - management of solid and liquid waste	- each building should have their own operational and maintenance management that has function to do monitoring and evaluation to achieve an efficient performance - resources conservation programme should be reported to the Building Supervision and Control Office, while its summary should be publicly available in a public area of the building for public awareness
5. Construction activity requirements include	
- safety, health and environment; - water conservation management in the course of construction activities; and - Hazardous waste construction management.	

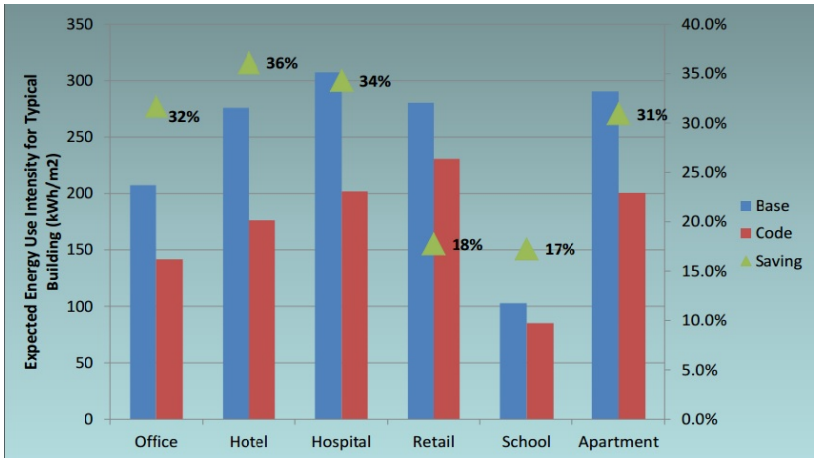
Source: Governor Regulation No. 38/2012

The above aforementioned technical requirements are becoming mandatory for buildings intending to apply Building Construction Permit (IMB) and/or Certificate of Feasible Function (SLF), both for newly built and existing buildings. The Governor Regulation rules sanction for any violation of the above technical requirements that may be subject to administrative sanctions in the form of halting or not issuing IMB and SLF (article 50).

Certificate of Green Building, however, is still a voluntary. The Certification in Indonesia is now available through an independent certified assessor assigned by the Ministry of Environment and Forestry, as regulated by Ministerial Regulation No. 8/2010 on Criteria and Certification of Environment-friendly Building. Currently, the Green Building Council Indonesia is one of the certified assessor for green building certification (see next section).

Energy consumption benchmark

The implementation of the Governor Regulation is potentially achieving 17-36% energy and water savings expected for various building types by 2020 versus 2011 baseline. Hospital and apartment were the largest energy consuming buildings, but the largest potential energy saving coming from hotel and hospital, if those applied green building concept. Results is presented at Figure 3-1 (Alhamid 2014).



Source: Alhamid, 2014.

Figure 3-2. Expected electricity energy consumption intensity for typical building

For measuring energy consumption intensity, the Regulation provides form on electricity consumption that building owner or manager is able to calculate and analyse their potential and achieved energy conservation by themselves. Having calculated their energy consumption intensity, the users could compare it with benchmark existed in the Regulation (Table 3-5). From that point, the users could monitor and evaluate their energy consumption behaviour and consider efforts to anticipate it (Table 3-6).

Table 3-5. Benchmark of electricity energy consumption intensity for typical building according to the Governor Regulation No. 38/2012

Building type	**Energy consumption index interval (kWh/m2/yr)**			**Benchmark operational hours**
	lower ref. limit	**normal**	**upper ref. limit**	
Office	210	250	285	10 hrs/day, 5 days/week, 52 week/yr ~ 2600 hrs/yr
Hotel	290	350	400	24 hrs/day, 7 days/week, 52 week/yr ~ 8736 hrs/yr
Apartment	300	350	400	24 hrs/day, 7 days/week, 52 week/yr ~ 8736 hrs/yr
School	195	235	265	8 hrs/day, 5 days/week, 52 week/yr ~ 2080 hrs/yr
Hospital	320	400	450	24 hrs/day, 7 days/week, 52 week/yr ~ 8736 hrs/yr
Retail	350	450	500	12 hrs/day, 7 days/week, 52 week/yr ~ 4368 hrs/yr

Source: Appendix VII of Governor Regulation No. 38/2012

Table 3-6. Category of electricity energy consumption index

Interval	Category	Value	Suggesting efforts
1	Thrifty	ECI <lower ref. limit	Necessary to maintain with carrying out the SOP, and systematic maintenance
2	Somewhat thrifty	lower ref. limit ≤ ECI ≤ reference	Necessary to improve performance by tuning up
3	Somewhat wasteful	reference ≤ ECI ≤ upper ref. limit	Necessary to do some changes
4	Wasteful	ECI > upper ref. limit	Necessary to do retrofitting or replacement

Source: Appendix VII of the Governor Regulation No. 38/2012

Status of implementation

According to the City Planning Department (pers. comm. 2016), authority for green building monitoring was transferred to the City Planning Department, which merge Building Supervision and Controlling Department, the one mentioned in the Regulation, and Spatial Planning Department. In addition, the issue of construction permit (IMB) and occupancy permit (SLF) has been under the authority of the One-Door Integrated Office (BPTSP) to improve public service since early 2015.

According to the City Planning Department, the green building regulation in Jakarta Province has come into effect since April 2013, for which around 300 large buildings to comply with. The construction permit (IMB) is utilised as a tools for monitoring the implementation of the code for newly built building in particular during the design/planning processes. During this design stage, the BPTSP engages stakeholders of building specialists in the Building Experts Team (TABG) meeting, which review the application of the IMB (City Planning Department comm. 2016). For utilisation stage upon the construction finalised or for existing buildings, the occupancy permit (SLF) is used as a monitoring tools. In 2014, the Department disseminated the technical requirements for building owners/managers and invited them to fill in data forms, such as energy consumption and compared it to the benchmark contained in the Code.

By mid of 2015, 63 newly developed buildings have acquired IMBs, and hundreds of new buildings are applying (WBCSD 2016).

3.3.4 Green Building Council Indonesia

The Green Building Council Indonesia (GBCI) is a non-government and non-for profit organisation which "has a full commitment for public education in applying environmental best practices and facilitating the transformation of sustainable global building industries".[1] GCBI was established on 9 September 2009 involving 50 professional and 21 corporations particularly from building and property industries, as the founding members. As of December 2012, the Council has 125 corporate members (Sulistyanto 2014).

The GBCI is an emerging member of and representing the World Green Building Council (WGBC) in Indonesia. Ministry of Environment of Indonesia has appointed GBCI as the first Indonesia's Environmental-friendly Building Certification Agency in August 2011. The appointment was coincide with the launching of Certification System of Environmental-friendly Building, which was mandated by Ministerial Regulation of

[1] GBCI website (http://www.gbcindonesia.org/) accessed on 20 November 2015

Environment No. 8/2010 on Environmental-friendly Building. The Ministerial Regulation covers criteria of environmental-friendly building, its certification and registration of certification institution (Kompas online 2011).

Programmes of the GBCI include public awareness, rating tools developments of GREENSHIP, and building certification. Public awareness include seminars, trainings involving industries, professional, and academician to disseminate efforts on reducing GHG emission from both existing and new buildings. GBCI also encourage companies which have their environmental concerns to do market transformation by implementing green building principles and promoting utilisation of environmental-friendly materials, and encourage industries to create environmental-friendly products.[2]

For rating tools and certification, GBCI develops GREENSHIP, rating tools utilising assessment criteria which refers to Indonesia's relevant regulations and Indonesia National Standard (SNI), combining with foreign rating tools which consider local aspects. Currently, the GBCI has published GREENSHIP rating tools for existing building, new building, interior space, and a more recently for homes.

In 2015, GBCI collaborated with the International Finance Corporation (IFC) launched the EDGE certification in Indonesia, which complements the GREENSHIP programs and trains auditors certified by the IFC (WBCSD, 2016).

Table 3-7. Criteria, number, and assessment points of GREENSHIP by building category

No	Criteria	New Building vers. 1.1	Existing Building vers.1.1	Interior space vers.1.0
1.	Appropriate site development	8 criteria, 17 points (16.83%)	2 prerequisites +8 criteria, 16 points (13.67%)	12 points (11.65%)
2.	Energy efficiency and conservation	7 criteria + 1 bonus, 26 points + 5 bonus points (25.74%)	2 prerequisites +5 criteria+2 bonus, 36 points+8 bonus point (30.76%)	14 points (13.59%)
3.	Water conservation	7 criteria, 21 points (20.79%)	1 prerequisites +7 criteria +1 bonus, 20 points +2 bonus points (17.09%)	8 points (7.77%)
4.	Material resources and cycle	7 criteria, 14 points (13.86%)	3 prerequisites +5 criteria, 12 points (10.26%)	28 points (27.18%)
5.	Indoor air health and comfort	8 criteria, 10 points (9.9%)	1 prerequisites +8 criteria, 20 points (17.09%)	29 points (28.16%)
6.	Building environmental management	8 criteria, 13 points (12.87%)	1 prerequisites +5 criteria, 13 points (11.11%)	12 points (11.65%)
7.	Total	46 criteria, 101 points	10Prerequisites + 41Criteria + 3Bonus; 117Points + 10Bonus	43 criteria, 103 points

Source: Sulistyanto 2014

[2] Ibid

Based on the above GREENSHIP criteria, the GBCI made criteria award for building certification consisting of four criteria. The certificate is subject to re-certification/re-assessment after 3 years.

Table 3-8. GREENSHIP criteria according to the GBCI

Achievement	Percentage	Minimum point for new building	Minimum point for existing building
Platinum	73%	74	85
Gold	57%	58	67
Silver	46%	47	53
Bronze	35%	35	41
	Total	101	117

Source: Sulistyanto 2014

As of January 2016, sixteen buildings consisting nine newly built buildings, one for interior space, and six existing buildings had been awarded GREENSHIP certificates by the GBCI. In parallel, 70 buildings are being assessed for certification, most of them are buildings in Jakarta. It is estimated that the GREENSHIP existing buildings has contributed to energy efficiency around 14,600 MWh/year or equivalent to reduction of 13,000 ton CO2e emission (WBCSD, 2016). Table below presents some of the awardees.

Table 3-9. Some of the GREENSHIP recipients from the GBCI

No	Building name	Criteria	Building type
1	Main Building of Ministry of Public Work	Platinum	New building
3	PT. Dahana, Energetic Material Center, Subang/West Java	Platinum	New building
4	Prasetya Mulya University Campus, BSD	Platinum	New building
5	Office of Bank Indonesia, Solo	Platinum	New Building
2	Grand Indonesia-BCA Office Tower	Platinum	Existing building
6	Bandung Institute Technology and Science Campus	Gold	New building
7	Jakarta's Rasuna Tower business compound	Gold	New building
8	Sampoerna Strategic Square	Gold	Existing building
9	German Centre at Bumi Serpong Damai, Tangerang		Existing building
10.	Sequis Center, SCBD Jakarta	Gold	Existing building

Source: compilation

4. Conclusion and Recommendation

4.1 Conclusion

- Based on the collected information, implementation of energy saving measures in all sectors of the economy has been stipulated in Article 25 of the Energy Law (UU no 30/2007) and regulated through the Government Regulation (PP) no 70/2009 on Energy Conservation. The regulation emphasized that energy consumers consuming 6000 TOE and more are obliged to implement energy management by setting energy conservation program, appointing energy manager and implementing energy audit. In term of electricity consumption for buildings, this is equivalent to 69.78 GWh. From PLN Statistic 2014, the average consumption of business customers (B Group) is around 14 GWh/customer indicating that commercial customers still below the mandatory level of implementing energy management.
- Although not mandatory, energy saving initiatives of the GoI and international organization (UNDP, USAID, Danish Government, etc.) has encouraged commercial sector to implement energy conservation measures. Implementing energy saving measures will not only impact on energy security but also on the reduction of GHG emission. The Presidential Regulation (PerPres) no 61/2011 on RAN-GRK set a target of 26% GHG emission reduction by 2020 by own efforts and 41% if including international support. National and regional government are encouraging green concept for sustainable development including green city, green building, etc. In terms of regulatory framework, implementing green initiatives will relate not only to Energy Law but also other law such as Water Resources Law, Building Law, Local Government Law, etc. In addition series of regulations has been issued to enforce these Laws.
- Green building or energy saving building is one of the attributes of a green city initiatives. To promote the implementation of green building, the central government provide a ministerial regulation, incentive, guidance, and invite public participation. To gain lesson learned, MOPW appointed three cities as pilot cities. For benchmark, the MOPW refers to Indonesia National Standard (SNI) related to energy efficiency in buildings, which cover the standardization of lighting system, air conditioning system and building envelope. In addition, the MOPW established green building concept for their own office compound, both for the new and existing buildings, as a role model.
- Prior to the promotion by the central government, green building concept have been introduced by the DKI Jakarta Province and the Green Building Council Indonesia (GBCI), which provide lesson learned for the central government. DKI Jakarta has issued Governor Regulation since 2012, and implemented it by utilising IMB and SLF permit as instruments for monitoring. In parallel, the promising development can be seen from the lesson learned provide by the GBCI. It has been involving at least 125 corporate members which own or manage commercial or residential buildings which fall into green building category. The Council has been promoting public awareness and formulate GREENSHIP, a rating tool to be used as a communication tools with the public.

4.2 Recommendation

To promote energy efficiency in building sector and green building programme, the government could consider points as presented below.

- The initiative could be commenced from buildings owned and/or managed by the governments or state-owned companies, as a role model to promote public participation. There are some good examples of green buildings initiated both by government and private sectors providing best practices that are necessary to be promoted and publicised.
- Following the issuance of the ministerial regulation, government should provide general and technical guidelines on technical implementation, procedures of performance evaluation and assessment for certification, preparation of business case and best practice modules, as well as guideline of incentives for green building implementers.
- It is expected that government would provide incentive that allow public participation, such as reduction on land and building tax (PBB), and on energy saving equipment for building. In a short term, this policy could reduce government revenue from tax, but would contribute to energy, water, and other resources conservation, and reducing green house gases emission, in a long run.

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Appendix 1. Classification of buildings required to implement green building based on complexity and height

Class	Function	Classification basis					
		1. Complexity			2. Height		
		Simple	Not simple	Specific	High	Medium	Low
1	Ordinary residential buildings:						
	1a. Single occupancy buildings (houses, villas, garden houses, row houses)						
	1b. Boarding houses, guest houses, hostels or the like, which is less than 300 m2, inhabited by a maximum of 12 people						
2	Residential building consisting of two or more dwelling units, each of which is a separate residence						
3	Residential buildings outside of Class 1 and 2 (dormitories, guest houses, inns, elderly homes, disabled parlors)						
4	A mixture of residential buildings (dwellings in buildings of class 5, 6, 7, 8, 9)						
5	Office buildings						
6	Building trade: includes dining rooms, cafes, restaurants, bars, shops and kiosks as part of the hotels and motels, barber, salon, launderette, markets and showrooms, repair						
7	Storage or warehouse building including a public parking, warehouse or showroom of goods produced for sale or clearance						
8	Laboratory buildings, industrial, plant, and / or a car repair shop						
9	Public buildings:						
	9a. Health care buildings, including laboratories as part of the building						
	9b. Building meetings, including workshops, workshops, laboratories or the like in elementary school or secondary school, hall, worship, culture, or similar buildings but are not included any part of a building of other class						

Note: Other buildings with specific function is defined by the Minister

	Mandatory
	Recommended

	Recommended with exception for building with certain floor size
	Voluntary

Source: Appendix of the Minister Regulation Number 02/PRT/M/2015

Reference 2 Concept Note on Green Building Awareness Award

DRAFT

Proposal for Introducing a Monitoring Scheme of CO_2 Emissions in the Surabaya Green Building Awareness Award

IGES/KUC

2015.08.07

1. BACKGROUND

Surabaya City has initiated the Green Building Awareness Award (GBAA) in 2013 and conducted its first call for application and awarding in 2014. This program is a significant achievement and initiative by the city and has a lot of potential in enhancing energy savings of buildings and diffusion of greener constructions in the city.

The GBAA has clearly set a target on how the green construction should be like and achieved to attract lots of building owners' attention in working toward greener buildings. Meanwhile, as the energy consumption data is optional (not obliged to be filled) in the current self-assessment sheet, the status of CO_2 emissions of the participated buildings is not clearly understood and there are no benchmark CO_2 emission range where building owners can set as their target in energy saving efforts.

The current proposal intends to fill that gap and further strengthen the program in particular the incentive aspect by supplementing a monitoring scheme of CO_2 emissions in the current GBAA program.

2. OBJECTIVE

The objective of this proposal is to add value to GBAA as a mechanism to enhance investment in energy savings of buildings in Surabaya by introducing a monitoring scheme of CO_2 emissions and make the CO_2 reduction efforts visible. The proposal does not intend to modify the existing GBAA framework or process but only focuses in adding a function of CO_2 monitoring which can also stand independently.

3. PROPOSED ACTIONS IN FY2015

i. <u>Develop a CO_2 emission calculator for buildings in Surabaya</u>

A simple CO_2 emission calculator specifically tailored for Surabaya will be developed by using EXCEL spreadsheet based on existing CO_2 emission calculators. With the calculator, the amount of CO_2 emissions per building will be

automatically calculated into a unit of "$kgCO_2/m^2/year$" by adding some basic information, such as energy consumptions (electricity, gas, oil, etc.), water use, and the floor space of the buildings. The alternative production of energy by PV panels or power generators will be also made available for calculation (Fig 1).

ii. Conduct a survey using the CO_2 emission calculator

A survey will be conducted to participants of GBAA in 2014 as a follow-up survey of GBAA 2014. In the survey, GBAA 2014 participants will be requested to input necessary data to the CO_2 emission calculator. The survey will be conducted by sending a request letter and the CO_2 emission calculator. If possible, direct hearing survey will also be conducted for some buildings.

iii. Develop a CO_2 emission scattering diagram

Based on the results of the follow-up survey, a CO_2 emission scattering diagram will be developed for each of four awarding sector of GBAA (i.e., Hotel, Apartment, Mall, Office) (Fig 2).

iv. Develop a low-carbon benchmark for buildings in Surabaya

The CO_2 emission scattering diagram will allow us to understand the possible range of CO_2 emissions of the buildings in Surabaya. Based on the findings, a draft Low-carbon Benchmark for Surabaya Buildings will be developed. As a test case, all the buildings participated in the follow-up survey will be classified into several rank categories depending on their CO_2 emission amount. The rank categories will be identified and agreed among GBAA stakeholders. The ranking will be visualized with different colors for each rank (Fig 3).

v. Develop a spatial distribution map of buildings plotted by the low-carbon benchmark

Location of buildings that contributed to the survey will be plotted on a map of Surabaya with the color identification of the Low-carbon benchmark. This will allow us to understand, at a glance, the spatial distribution of buildings which are advanced (or not advanced) in energy savings (Fig 4).

vi. Discuss the validity and the way forward of the current proposal

Based on the results from above procedure (i – v), the applicability of adding the CO_2 monitoring scheme in the GBAA and its possible way forward will be discussed among relevant stakeholders of GBAA.

4. POSSIBLE ACTIONS IN FY2016 AND ONWARD

If the GBAA stakeholders agrees to introduce the proposed CO_2 monitoring scheme in the existing GBAA, some other following actions may be planned for FY2016 and onward. The followings are examples of possible follow-up actions. Funding for the follow-up actions should be considered separately.

i. Conduct CO_2 monitoring once a year

It is proposed that a CO_2 monitoring (e.g., sending announcements, data collection, calculation, and posting results on the website) will be conducted in annual basis. The process should not take so much time and efforts for both organizers and participants.

ii. Develop a GBAA webpage

It is proposed that a website for GBAA program will be developed on Surabaya City government's website or wherever appropriate. The website may include information such as followings:

- GBAA information (background, schedule, announcements, application form, results, award winners, etc.)
- CO_2 emission calculator (to be made available for download)
- CO_2 emission scattering diagram
- Low-carbon benchmark for Surabaya buildings
- Spatial distribution map of buildings plotted by the Low-carbon benchmark
- Status summary of each participated building (Fig 5)
- Tips for successful CO_2 reduction of buildings (need to be developed)
- Funding opportunities (e.g., JCM and other external funding for energy savings)

iii. Create a CO_2 reduction category in the GBAA awarding

Aside from awarding the GBAA winners, an additional awarding category can be created to commend building owners who have accomplished certain level of or continued CO_2 reduction. A nomination criteria (possibly based on the Low-carbon benchmark) needs to be considered.

5. BENEFITS EXPECTED

- The proposed scheme will add value to GBAA without altering any portion of existing GBAA.

- The proposed scheme is simple and does not require lots of time and efforts to conduct for both organizers and participants compared to full-scale implementation of GBAA.
- The proposed scheme can either be conducted independently or as a subset of GBAA which will provide flexibility to GBAA. In case if it would be difficult to organize GBAA every year, yearly CO_2 monitoring can show continuity of the program to the public.
- Quantification and visualization of CO_2 reduction and showing the estimated cost reduction by energy savings can provide incentives to building owners to further promote CO_2 reduction. More entry to GBAA can be also expected.
- Introducing an absolute evaluation axis (as the GBAA is comparative evaluation) by the Low-carbon benchmark will enhance objectivity of the evaluation.
- Introducing an absolute evaluation axis will give due credit to building owners who primarily focused their efforts on energy savings.
- The current GBAA program where buildings are evaluated by overall rating system may *de facto* be limiting the participation of buildings. However, if we could introduce CO_2 reduction category in the awarding and/or allow partial participation only to CO_2 monitoring, it can encourage more participation of buildings such as those that have not started energy-saving efforts yet but are keen to do so. Increase of participation of buildings will likely lead to further CO_2 reduction in the city as a whole.
- Quantitative information obtained by the CO_2 monitoring scheme can provide a proof that GBAA can contribute to CO_2 reduction in Surabaya. This can be a leading case in CO_2 reduction efforts in Indonesia and can raise the reputation of the city.
- The buildings that have been adopted for the JCM Financing Program and also participated in the 2014 GBAA can be utilized as an example to show how installation of energy saving apparatus will be demonstrated in the CO_2 monitoring scheme.

6. POSSIBLE TIMEFRMAE (FY2015)

Aug 2015	Prepare draft CO_2 calculator and other materials
Sep 2015	Discussion of the current proposal among relevant GBAA stakeholders (in Surabaya). Hearing survey to some buildings may be conducted if time allows.
Oct 2015	Send request letters to 2014 GBAA participated building owners

Nov 2015	Prepare CO_2 emission scattering diagram and low-carbon benchmark based on the feedbacks from the building owners
Dec 2015	Internal circulation and review of the results
Jan-Feb 2016	Presentation of results and discussion on the way forward at the 2nd JCM meeting (in Surabaya)

FIGURES

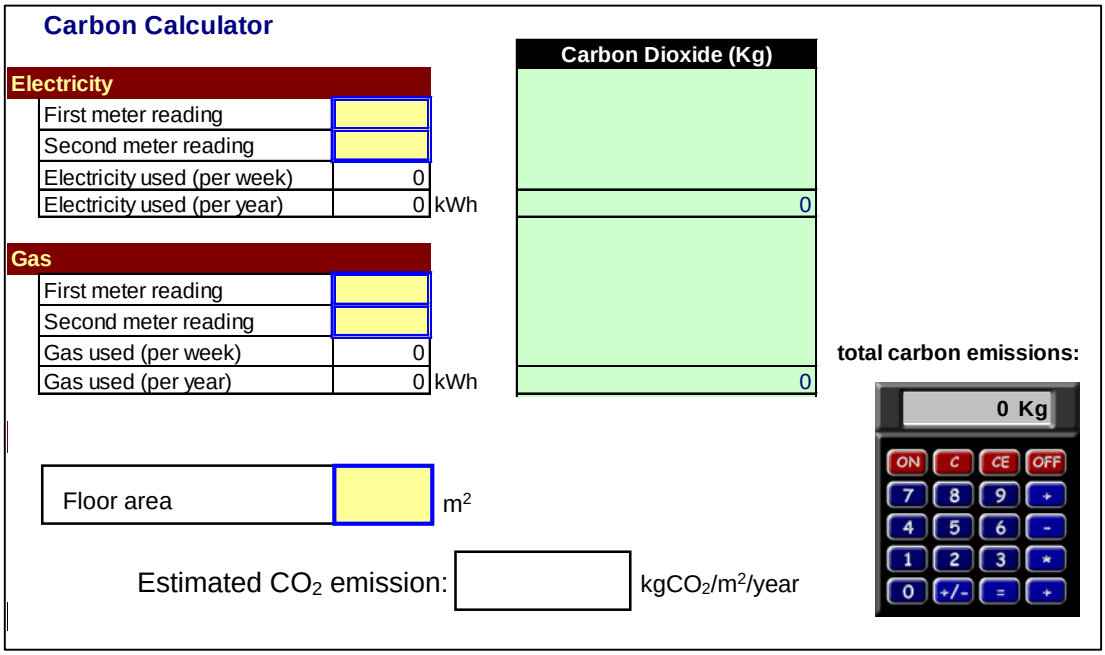


Fig 1. Image of the CO_2 emission calculator using EXCEL spreadsheet. By adding the floor space data, it will auto-calculate the CO_2 emission ($kgCO_2/m^2$/year) of each building.

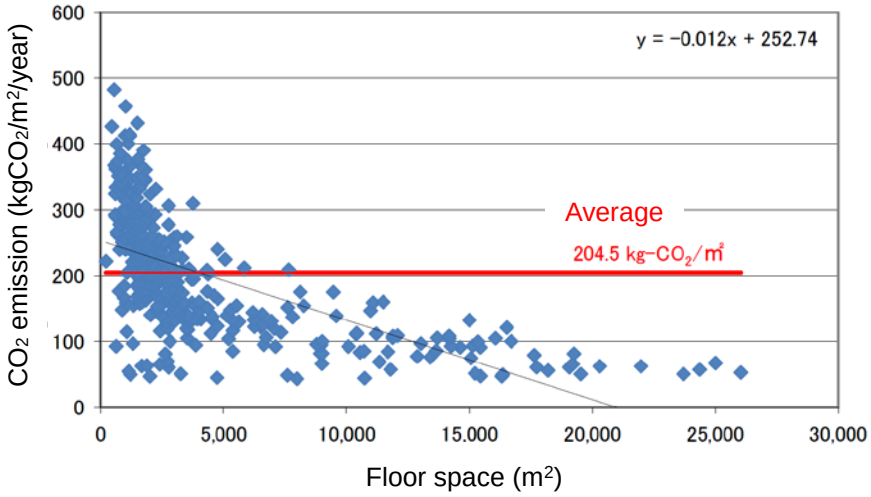


Fig 2. Image of the CO_2 emission scattering diagram (Copied and modified from Tokyo Carbon Reduction Reporting Program). The more plots (one plot represents one building) there are, the more reliable the data will become.

CO_2排出量 小

CO_2排出量 大

レンジ	基準	排出原単位(キログラム-CO_2÷平方メートル)範囲	割合
A4	0.25以下	19.6以下	0.7%
A3	0.25超-0.50以下	19.6超39.1以下	6.1%
A2	0.50超-0.75以下	39.1超58.6以下	26.2%
A1	0.75超-1.00以下	58.6超**78.1**以下	33.7%
B2	1.00超-1.25以下	78.1超97.7以下	16.1%
B1	1.25超-1.50以下	97.7超117.2以下	7.3%
C	1.50超	117.2超	9.9%
平均原単位		**78.1**	100%

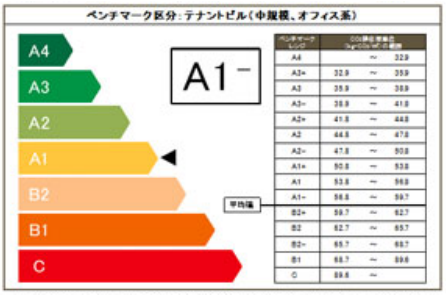


Fig 3. Image of the Low-carbon benchmark for buildings in Surabaya. The table in left describes the definition of the rank category and a figure in right describes the color identification of each rank (Copied from Tokyo Carbon Reduction Reporting Program). The rank category for Surabaya could be simplified to 3-5 ranks depending on the situation.

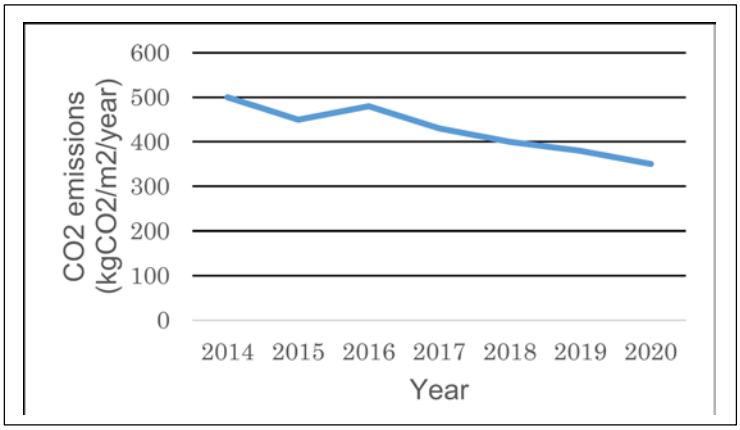
Fig 4. Image of spatial distribution map of buildings plotted by the low-carbon benchmark. Each participated building will be plotted on a map by color identification which they were categorized based on their CO_2 emission amount (Copied and modified from Tokyo Cap and Trade Program)

Building A

2014 GBAA (Office) Award Winner
2016 GBAA (Office) Award Winner
Surabaya low-carbon benchmark rating

A3

CO_2 emission: **350** $kgCO_2/m^2$/year (2020)
Cost reduction: Rp **50M** / year (in electric bill equivalent)



Descriptions.....
.....
.....

Fig 5. Image of the status summary of each participated building to be posted on the website. The information could include: past GBAA awards, Low-carbon benchmark rating, latest CO_2 emission rate and its transition, estimated cost reduction (this can be auto-calculated by converting the CO_2 emissions to an electric bill).

Reference 3 Report on Green Building Regulation of Surabaya City

Green Building Regulations of Surabaya City and its potential linkage with the Joint Crediting Mechanism

Last update: 2016/03/14
Kitakyushu Urban Centre
Institute for Global Environmental Strategies

1. INTRODUCTION

1-1. Green Building Initiatives by the City of Surabaya

The City of Surabaya initiated the Green Building Awareness Award (GBAA) Program in 2013 in accordance with relevant laws and regulations and the Green City Development Program (*Program Pengembangan Kota Hijau*/P2KH) which was launched by the Ministry of Public Works (MPW) in 2011 to promote the green city concept. The GBAA is a building rating system to evaluate the environment performance of the buildings based on voluntary participation. It was developed based on the GREENSHIP rating system which was developed by the Green Building Council Indonesia[1] with the first call for application and awarding being conducted in 2014. The City of Surabaya has since shifted the focus of development to formalize the Green Building Regulation as a Mayoral Regulations (PERWALI) in 2015.

1-2. Cooperation with the City of Kitakyushu and the Joint Crediting Mechanism

The City of Surabaya has been committed to environment conservation actions and fostering collaboration with the City of Kitakyushu since early 2000. Organic composting and greening of the city is one of the successful results from the collaboration between the two cities. The leadership and collaboration between these two cities has been strengthened through the signing of the Green Sister City Cooperation Agreement in 2012.

1-3. Joint Crediting Mechanism

The Government of Indonesia signed the Joint Crediting Mechanism (JCM) Cooperation Agreement with the Government of Japan in 2013 to encourage cooperation between Japanese and Indonesian institutions to promote implementation of low carbon development activities in Indonesia.

Based on the successful achievements of various environment cooperation projects between the City of Surabaya and the City of Kitakyushu, the City of Surabaya has been identified as a pilot site to conduct JCM Feasibility Studies (FS) with the City of Kitakyushu since 2013 to lead the greenhouse gas (GHG) emission reduction and credit issuance in Indonesia. The JCM FS seeks to identify tangible projects that can reduce a substantial amount of CO_2 emissions at a high cost-effectiveness by introducing advanced low carbon technologies that can be applied to JCM Model Projects. The JCM FS under the city-to-city cooperation also seeks to develop a mechanism that can potentially enhance the replication of JCM projects in Surabaya City and in other cities in Indonesia.

The Kitakyushu team has identified the Green Building Regulation as a potential mechanism to enhance JCM project replication in Surabaya City and in Indonesia. The Institute for Global Environmental Strategies (IGES) has conducted a study to identify the potential and feasibility of the Green Building Regulation development in terms of linkages with the JCM.

2. OBJECTIVES

This report is a summary result of the study and aims to:

- Review the status of Green Building Codes in Indonesia and other major South East Asian countries

[1] Green Building Council Indonesia & GREENSHIP: http://www.gbcindonesia.org/

and make objective comparisons between them;
- Identify the potential challenges in the Green Building Regulation development for Surabaya City; and
- Discuss the potential linkage between the Green Building Regulation of Surabaya City and JCM and the suggested way forward.

3. MATERIALS AND METHODS

A literature review on existing Green Building related regulations in national level and municipal levels in Indonesia and other countries was conducted. The review focused on major South East Asian countries given the similarity of climate, culture and economics which affects the environmental conditions of buildings.

The identified regulations at the national and municipal levels (see: 4-5. Comparative Analysis) were broken down into a technical requirements level to ease comparison and then be analysed for discussion. It is also expected that the compiled information will be useful should Surabaya City wish to refer to other similar regulations in the process of developing their Green Building Regulation.

4. RESULTS AND DISCUSSION

4-1. Green Building Policies and Programs at National Level in Indonesia

With the rapid increase of population, urbanization, and demands for various resources, the cities in Indonesia are experiencing an unprecedented increase of environment degradation and GHG emissions. In order to halt these problems and achieve sustainable cities, the Government of Indonesia has issued several regulatory instruments and developed a framework to support implementation of sustainable cities. Promotion of the green building concept has been one of the key focus of the policy framework for sustainable cities.

Based on the sustainable development principles, the Government of Indonesia has issued, among others, Law No. 26/2007 on Spatial Planning, Law No. 28/2002 on Building, and Government Regulation No. 36/2005 on Implementation of Law No. 28/2002 on Building, to guide the planning and implementation of sustainable building infrastructures. The government has also issued the Indonesia National Standard (SNI) which is commonly used as a reference to construct buildings and includes standards on energy and water efficiencies in buildings. Further to these regulations and standards, MPW has issued the Ministerial Regulation No. 2/PRT/M/2015 on Green Building in 2015 to provide detailed standard and guidance on construction and implementation of green building which the municipal governments are expected to follow and apply when developing Green Building Regulation.

Aside from these regulating frameworks, MPW has launched the Green City Development Program (*Program Pengembangan Kota Hijau*/P2KH) in 2011 to promote the Green City concept. P2KH Program has been implemented in two phases: Phase I in 2011-2014 and Phase II in 2015-2019. In Phase I, MPW promoted the application of green buildings by the local government as required by the Law No. 28/2002 and Government Regulation No. 36/2005 and supported the preparation and stipulation of Local Regulation (*Peraturan Daerah*/PERDA) on building infrastructure by the district/city. In Phase II, MPW focused on strengthening institutional capacities of the local governments in particular in metropolitan cities and districts within the National Strategic Region (KSN). As part of this program, MPW has assigned three cities, namely Bandung, Makassar and Surabaya, as pilot cities for the implementation of green building.

4-2. Green Building Regulations at Municipal Level in Indonesia

Based on these policies, the Capital Special Region of Jakarta (DKI Jakarta) became the first local government to regulate the implementation of the green building concept and stipulated the Governor

Regulation No. 38/2012 on Green Building. DKI Jakarta has initially issued the Local Regulation (PERDA) No. 7/2010 on Building referring to Governor Regulation No. 36/2005 and mandated the Governor to issue a Governor Regulation to define criteria and technical requirements of green buildings (article 110). The Governor Regulation No. 38/2012 was formulated in response to this mandate. The DKI Jakarta's Governor Regulation No. 38/2012 is mandatory for buildings that have a certain size and/or functions including both new buildings and existing buildings.

Aside from DKI Jakarta enacting the Governor Regulation No. 38/2012 and Surabaya City currently in the process of developing its own Green Building Regulation, other two pilot cities for the implementation of green buildings (Bandung City and Makassar City) have also started the development of green building regulation. The International Finance Corporation (IFC) has assisted DKI Jakarta in the development of the Governor Regulation No. 38/2012[2]. IFC is further assisting the City of Bandung[3] and City of Makassar[4], respectively. IFC has also approached the City of Surabaya but conditions were not agreed among the two parties and the offer of assistance was broken off. The City of Surabaya therefore has to develop its Green Building Regulation on its own (or with support from other donors).

4-3. Green Building Regulations in Other South East Asian Countries

Most countries have national building regulations and standards that the building developers are required to follow in order to get a permit for construction. There is a global trend of incorporating green building aspects in these building regulations to ensure the design, construction, operation, maintenance, etc. are environmentally responsible and resource-efficient. The type of regulations can be classified into two types: (a) a code which regulates to satisfy certain environment standards by the means of regulation or ordinance (e.g., CALGreen[5]); and (b) a rating system which provides certain credit or authorization by conducting a third-party evaluation of the building environment performances (e.g., LEED[6], BREEM[7], Green Star[8], CASBEE[9]).

In the major South East Asian countries (top five in GDP, as of Feb 2016), all the countries had a building regulation that contained green building aspects at one level or another. Among these, only Singapore is applying a rating system (BCA Green Mark[10]). The remaining countries (i.e., Philippines, Singapore, Thailand and Vietnam) had a mandatory code at the national level (**Fig. 1**). There are several voluntary green building rating systems developed by the private sectors in these countries. These include: GREENSHIP[11] in Indonesia, BERDE[12] in the Philippines, GREEN BUILDING INDEX[13] and GreenRE[14] in Malaysia, TREES[15] in Thailand, and LOTUS[16] in Vietnam.

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[2] Cutting Jakarta's Greenhouse Gases (International Finance Corporation): http://www.ifc.org/wps/wcm/connect/region__ext_content/regions/east+asia+and+the+pacific/news/cutting+jakarta+greenhouse+gases

[3] City of Bandung (2015) Konsep pengaturan bangunan hijau di Kota Bandung. Presentation at National public awareness on Ministerial Regulation No. 02/PRT/M/2015, Jakarta 6 May 2015.

[4] Makassar Applies Green Building Concept (TEMPO. CO): http://en.tempo.co/read/news/2013/12/05/206534780/Makassar-Applies-Green-Building-Concept

[5] California Green Building Standards Code (CALGreen): http://www.bsc.ca.gov/Home/CALGreen.aspx

[6] Leadership in Energy and Environmental Design (LEED): http://leed.usgbc.org/

[7] Building Research Establishment Environmental Assessment Method (BREEM): http://www.breeam.com/

[8] Green Star: https://www.gbca.org.au/green-star/

[9] Comprehensive Assessment System for Building Environment Efficiency (CASBEE): http://www.ibec.or.jp/CASBEE/english/

[10] BCA Green Mark: A green building rating system developed by the Building and Construction Authority (BCA): http://www.bca.gov.sg/greenmark/green_mark_buildings.html

[11] GREENSHIP: A green building rating system developed by the Green Building Council Indonesia (GBCI): http://www.gbcindonesia.org/greenship

[12] Building for Ecologically Responsive Design Excellence (BERDE): A green building rating system developed by the Philippine Green Building Council (PHILGBC): http://berdeonline.org/

[13] GREEN BUILDING INDEX: http://new.greenbuildingindex.org/

[14] GreenRE: A green building rating system developed by the Real Estate & Housing Developers' Association Malaysia (REHDA): http://www.greenre.org/

[15] Thai's Rating of Energy and Environmental Sustainability (TREES): A green building rating system developed by the Thai Green Building Institute (TGBI): http://www.tgbi.or.th/trees.php

[16] LOTUS: A green building rating system developed by the Vietnam Green Building Council (VGBC): http://www.vgbc.org.vn/index.php/pages/green-building

Fig 1. Status of Green Building Regulations in Major South East Asian Countries.

Country	Regulation type		Mandatory (Y/N)	Regulations
	Code	Rating System		
Indonesia	√		N	Ministerial Regulation No. 2/PRT/M/2015 on Green Building (2015)
Malaysia	√		N	Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Building (MS 1525:2007)
Philippines	√		Y	The Philippine Green Building Code. A Referral Code of the National Building Code of the Philippines (P.D. 1096) (2015)
Singapore		√	Y	BCA Green Mark[17]; Building Control Act
Thailand	√		Y	Ministerial Regulation Prescribing Type or Size of Building and Standard, Rule and Procedure for Designing of Energy Conservation Building, B.E. 2552 (2009)
Vietnam	√		Y	Building Code of Vietnam, Building Control Decree

4-4. Green Building Regulations in Other South East Asian Countries

In other major South East Asian countries, Malaysia, Thailand, Singapore and Vietnam seem to be adopting a centralized approach with responsible government agencies issuing and enforcing the building regulations. Meanwhile, the Philippines has both government regulations and municipal regulations alike Indonesia.

In the Philippines, Quezon City was the first to implement a Green Building Ordinance to enforce sustainable building designs in the city. Quezon City government approved and enacted Ordinance No. SP-1917, the Green Building Ordinance in 2009. The “Implementing Rules and Regulations (Part I)” of the Green Building Ordinance of 2009 was then issued in 2010 to prescribe the necessary rules and regulations for the ordinance. More recently, Mandaluyong City has enacted Ordinance NO. 535, S–2014, the 2014 Green Building Regulation of Mandaluyong City with support from the International Finance Corporation (IFC)[18].

Both ordinances are mandatory for buildings of certain type and/or size for both new and existing buildings. The Green Building Ordinance of Quezon City is applying a rating system which is required to meet minimum Green Points (i.e., 50 points) for the issuance of standard certification[19]. While the Green Building Regulation of Mandaluyong city is a code which requires the developers to obtain the Green Building Pre–Compliance Certificate (GBPCC) and Green Building Compliance Certificate (GBCC)[20].

4-5. Comparative Analysis

Based on the above literature review, the following countries and municipalities were selected for further detailed comparison and analysis on the technical requirements. It was also intended that a detailed

[17] Building and Construction Authority Green Mark Scheme: http://www.bca.gov.sg/greenmark/green_mark_buildings.html
[18] Philippines: IFC helps Mandaluyong set green building ordinance: http://www.asiagreenbuildings.com/8447/philippines-ifc-helps-mandaluyong-set-green-building-ordinance/
[19] Implementing Rules and Regulations (Part I) – Green Building Infrastructure: http://quezoncity.gov.ph/index.php/component/content/article/94/342-implementing-rules-and-regulation-for-green-infrastructure
[20] ORDINANCE NO. 535, S–2014 Green Building Regulation of Mandaluyong City and its Implementing Rules and Regulations: http://www.mandaluyong.gov.ph/updates/downloads/files/merged.pdf

comparative table could serve as a reference for Surabaya City when they develop their Green Building Regulation. Singapore and Cebu City were not included because the regulations are in a rating system which is difficult to compare with the code system.

- National level: Indonesia, Philippines, Malaysia and Thailand
- Municipal level: DKI Jakarta (Indonesia) and Mandaluyong City (Philippines)

A summary of comparison between different green building regulations on the availability of technical requirements are provided in **ANNEX 1**; while further detailed technical requirements were extracted and compiled in a separate EXCEL file (file name: Green Building Code Summary).

Result of comparison revealed following points:

- The Ministerial Regulation No. 2/PRT/M/2015 covers the full spectrum of green building requirements including programming, technical design, construction, utilization, and demolition phases.
- Ministerial Regulation No. 2/PRT/M/2015 and Governor Regulation No. 38/2012 have similar requirements particularly on energy efficiency. They are both referring to corresponding SNI but the Ministerial Regulation is setting a higher standard, e.g., by referring to corresponding ISO standards and setting higher efficiency on OTTV & RTTV. This indicates that the Ministerial Regulation was developed based on the Governor Regulation No. 38/2012 by referring to the latest SNI.
- The requirements in the Governor Regulation No. 38/2012 is primarily focused on the “Technical design” (in particular on “Energy efficiency” and “Water efficiency”). Provisions of requirements on “Construction” are limited compared to Ministerial Regulation No. 2/PRT/M/2015, while provision of “Programming” and “Demolition” are lacking.
- The requirements in the Governor Regulation No. 38/2012 have detailed provisions on technical requirements of existing building which corresponds to “Utilization” in the Ministerial Regulation No. 2/PRT/M/2015. It includes development and submission of conservation program and implementation of monitoring on energy and water consumption and periodic (every 12 months) reporting to the authorities.
- Green building codes in other countries and municipalities are mostly focusing on energy efficiency and are much simpler (have less requirements) compared to the Governor Regulation No. 38/2012, which becomes obvious when compared to the Ministerial Regulation No.02/PRT/M/2015.
- Different countries are applying different technical standards and it is difficult to compare each country’s requirements directly. Meanwhile, the cross-country comparison is still useful in: (i) understanding the overall framework and scope of each country/city, (ii) getting an idea of requirements that the Indonesian regulations and standards are not covering (but could be worth consideration for inclusion), and (iii) considering the appropriate structure and format of the regulation.
- Requirements that regulations in other countries/cities have but Ministerial Regulation No.02/PRT/M/2015 does not have and may be worth consideration for inclusion includes:
  - Bicycle parking and shower facilities (DKI Jakarta)
  - Renewable energy and sustainable design (Thailand and Malaysia)
  - Provision of certificate (Mandaluyong City)
  - Incentives such as building height limit and tax discount (Mandaluyong City)

5. POTENTIAL CHALLENGES

Based on the review and analysis, the following challenges were identified:

<u>Competition and comparison with DKI Jakarta, Bandung, and Makassar</u>

The Green Building Regulation that Surabaya City is aiming to develop is likely to become the first green building regulation to be enacted by an Indonesian municipality after the Governor Regulation No. 38/2012

of DKI Indonesia issued in 2012. It is also likely to become the first of its kind after the issuance of Ministerial Regulation No. 2/PRT/M/2015 in 2015. So there is an implicit expectation that the regulation will be following the Ministerial Regulation No. 2/PRT/M/2015 and will be covering more advanced contents than the Governor Regulation No. 38/2012.

On the other hand, Bandung City and Makassar City are standing on the same track aiming to achieve the same objectives to develop and enforce their own green building regulations. Even though it is not a competition, these three cities are likely to be subject for comparison on the development, contents, and implementation of green building regulations as the pilot cities. Bandung City and Makassar City may have higher advantages as they are getting technical and financial assistance from IFC. While Surabaya City is free from guidance and requirements from IFC and could be advantageous in terms of focusing on developing a truly original regulation that suits the circumstances of Surabaya City.

Capacity for implementation

Developing and enforcing a new regulation will require not just the issuance of the regulation itself as a legal document but also developing a system and arrangement of staffing to ensure appropriate and efficient implementation of the regulation. These development needs to be in place in parallel with the development of the regulations. Thus, whatever process and requirements to be prescribed in the regulation should carefully consider the feasibility in terms of both capacity and adequacy.

Inclusion of existing building

The current ongoing building application, auditing and permit process in Surabaya City, including the Advice Planning (SKRK), Building Permit (IMB), and Certificate of Building Proper Function (SLF), will not likely change if the target of the regulation is restricted only to new buildings. However, if the target will include existing buildings, additional divisions (i.e., operational management/maintenance division) will be needed to handle the additional processes, including monitoring, evaluation, assessment and supervision of existing buildings. The number of target buildings will increase drastically if the existing buildings are also included in the target. It is indeed meaningful to include the existing buildings in the target from the environment conservation and GHG reduction point of view, but if capacity is limited, it may be worthwhile considering applying a step-by-step approach to commence with only new buildings and gradually expand the scope to include existing buildings in the near future.

Identification of right balance between cost & benefit

Too many and/or high requirements of green buildings will raise initial investment costs and will be a burden to developers and building owners. If the requirements are too basic, building owners as well as citizens will not be able to enjoy the advantages of the green building such as reduced running costs and achieving a cleaner environment and healthier lifestyle. Identifying the right balance is a critical point of development and will require extensive hearing and consultation with relevant stakeholders.

Financing

As Surabaya City is not getting financial support from IFC in the development of its Green Building Regulation, it needs to develop it independently, or if available, with the support from other donors. Developing the draft regulation itself may not need external support as there are already clear guidance and references to follow (i.e., Ministerial Regulation No. 2/PRT/M/2015, SNI, and Governor Regulation No. 38/2012). However, a certain amount of funding may be necessary for actions such as: consultation/reviewing of the draft, hearings and workshops with key experts and private sector players, training and capacity building of officials, testing and system development, etc.

6. RECOMMENDATIONS

Following recommendations could be made in order to address part of the identified challenges.

Lessons learned from DKI Jakarta

The Governor Regulation No. 38/2012 has come into effect since 2013 and already has a few years of experiences to learn from. It would be beneficial to conduct hearings from the officers in charge in DKI Jakarta to learn practical lessons in order to develop a functional regulation as well as administration systems. Keeping close contact and inviting technical assistance from MPW and cross-municipal exchanges with Bandung City and Makassar City for sharing would also be beneficial.

Step-by-step approach

Considering the capacity of Surabaya City, it is advisable to start simple within a feasible range, e.g., with basic requirements and only targeting new buildings, and updating the regulation in few years' time to ensure secured implementation of the regulation. In order to assure steady progress of development and implementation, it would be suggested to develop a medium-term (e.g. 5 years) development and implementation plan of the green building regulation to be followed up accordingly.

Consultation approach

It is also advised to conduct sufficient consultations with the building construction experts and private sector (e.g., hotel industry, department industry, commercial association, real estate industry, etc.) in the process of developing a regulation to obtain practical advice and support from relevant sectors.

Development of pilot project as a role model

The newly constructed main building of MPW has applied a green building concept and was awarded a PLATINUM rating of GREENSHIP rating category. It was intended as a pilot project to provide the initial best practice and serve a role model for public application and capacity building of officials in the implementation and monitoring[21]. The same approach could be applied to any future opportunities to construct new government buildings and/or retrofitting existing old government buildings in Surabaya City.

Application of new technologies

The new Green Building Regulation that Surabaya City will develop could make a difference from existing DKI Jakarta's Governor Regulation No. 38/2012 by introducing some new ideas. For example, there is no mentioning of renewable energy application particularly PV (photovoltaic) panels which is very popular nowadays but may have been new at the time when the Governor Regulation No. 38/2012 was developed in 2012. One idea is to accept the introduction of a solar farm in a private green open space (RTH), roof garden and/or vertical garden which are anticipated to be natural vegetation planting in the Ministerial Regulation No. 2/PRT/M/2015. It would enhance the efficient use of open space as well as producing clean renewable energy.

Monitoring and reporting

The Governor Regulation No. 38/2012 is applying a mandatory monitoring and reporting of energy and water consumption every 12 months to existing buildings. This mechanism has a high potential to enhance resource efficiency and awareness raising for greener operation of building sectors. The currently provided calculation and submission forms in the Governor Regulation No. 38/2012 could be further improved by developing a user friendly electric system (e.g., EXCEL, online application) and incentive mechanisms (e.g., bench marking), and effectively used for calculating CO_2 emissions from these buildings.

[21] Ministry of Public Works (2015) Best Practice Hemat Energi dan Air di Kementerian Pekerjaan Umum dan Perumahan Rakyat. Presentation at Investment Forum of EBTKE Connex. Jakarta, 20 August 2015.

7. POTENTIAL LINKAGE WITH JCM

This section explores the potential linkage between the Green Building Regulation of Surabaya City and JCM.

7-1. Potential CO_2 reduction

Buildings are responsible for more than 40% of global energy use and one third of global greenhouse gas emissions[22]. In Indonesia, emissions from the building sector is predicted to increase from 71 $MtCO^2e$ in 2005 to 215 $MtCO^2e$ in 2030, driven by growing consumption of residential and commercial energy. While by leveraging existing technologies, the buildings sector could potentially reduce its emissions by 22% in 2030[23].

7-2. Applied cases and technologies in JCM

In JCM, the new installation of high energy efficient systems or the replacement of existing old and inefficient systems to new systems in buildings are one of the most abundantly applied for JCM Model Projects (funding scheme of Ministry of the Environment, Japan). In the JCM Model Projects, energy saving systems are applied to buildings such as hotels, office buildings, shopping malls, convenience stores, etc. The applied technologies include: chillers, heat pumps, air-conditioning, refrigerator systems, heat recovery systems, boilers, co-generation, and LED systems. Although not applied to the JCM Model Project yet, energy management systems such as the BEMS (Building Energy Management System) also have a high potential for application in JCM.

7-3. Application of JCM in green buildings

The majority of CO_2 emissions from buildings occur during their long operation period so regulating their design and environment performance during construction or major retrofitting to ensure resource efficiency will lead to a significant impact to total CO_2 reduction if introduced at the city or national level. To satisfy such energy performance will require introducing highly efficient systems and hence raise the initial investment costs. The JCM will be a powerful tool to introduce such high efficient systems at a low cost (support is available for up to 50% of initial costs), and that will further benefit the owners as running costs are reduced, hence reducing the repayment period. In addition to these benefits, the high application rate of JCM in building sector is due to the relatively easier application of technologies compared to large projects.

By linking the Green Building Regulation of Surabaya City, which mandates to apply high environment performance, and JCM, which helps to introduce advanced low carbon technologies in buildings, it is expected that the dissemination and application of green buildings in Surabaya City will be enhanced.

7-4. Awareness raising on JCM

All of the above measures and benefits can only be obtained when the potential users are aware of JCM and there are supporting mechanisms for application and financing. Surabaya City (Cite Karya) could act as an information hub and supporting unit to disseminate and support JCM projects for application to the Green Building Regulation in Surabaya City.

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[22] UNEP SBCI (2009) Buildings and Climate Change Summary for Decision-Makers

[23] Dewan Nasional Perubahan Iklim (2010) Indonesia's greenhouse gas abatement cost curve: http://www.mmechanisms.org/document/country/IDN/Indonesia_ghg_cost_curve_english.pdf

ANNEX 1. Comparison between different green building regulations and standards on the availability of requirements at different phases based on the Ministerial Regulation No.02/PRT/M/2015 (further detailed table is provided separately in EXCEL file: Green Building Code Summary).

Phase	Requirements	Indonesia			Philippines		Thailand	Malaysia
		Ministerial Regulation No.02/PRT/M/2015	Indonesia National Standard (SNI)	Governor Regulation No. 38/2012	The Philippine Green Building Code	2014 Green Building Regulation of Mandaluyong City (ORDINANCE NO. 535, S–2014)	Ministerial Regulation Prescribing Type or Size of Building and Standard, Criteria and Procedure in Designing Building for Energy Conservation (B.E. 2552, 2009)	Code of Practice on Energy Efficiency and Use of Renewable Energy for Non-Residential Building (MS 1525:2007)
Programming	1) Site suitability	●						
	2) Determination of building object	●						
	3) Performance of green buildings in accordance with the requirements	●						
	4) Project delivery system	●						
	5) Building feasibility for a green building implementation	●						
Technical design	1) Site management							
	a. Buildings orientation	●						●
	b. Site management including accessibility/circulation	●			●			
	c. Contaminated land management of hazardous and toxic waste (B3)	●						
	d. Private green open space (RTH)	●		●	●	●		
	e. Pedestrian paths provision	●		●				
	f. Basement site management	●						
	g. Parking lots provision	●						
	h. Outdoor lighting systems	●						
	i. Buildings construction above and/or below the ground, water and/or public infrastructure/facilities	●						
	2) Energy efficiency							
	a. Building envelope	●	●	●	●	●	●	●
	b. Ventilation system	●	●	●	●	●		●
	c. Air conditioning system	●	●	●	●	●	●	●
	d. Lighting system	●	●	●	●	●	●	●
	e. Indoor transport system	●	●	●	●	●		
	f. Electrical system	●	●	●	●	●	●	●
	3) Water efficiency							
	a. Water sources	●	●	●	●	●		
	b. Water consumption	●	●	●	●	●		
	c. Use of water fixture sanitary equipment	●	●	●	●	●		
	4) Indoor air quality							
	a. Smoking ban	●			●	●		

	b. Carbon dioxide (CO_2) and carbon monoxide (CO) control	●		●				
	c. Refrigerant use control	●		●				
	5) Environmental-friendly materials use							
	a. Use control of hazardous materials	●		●	●			
	b. Use of certified environmental-friendly materials (eco-labelling)	●						
	6) Waste management							
	a. Application of 3R principles	●						
	b. Application of waste management system	●		●	●	●		
	c. Application of waste generation recording system	●						
	7) Management of waste water							
	a. Provision of facilities for solid waste and waste water management before discharge into municipal sewers	●		●				
	b. Grey water recycling	●						
Construction	1) Green construction process							
	a. Application of the green construction delivery system	●						
	b. Optimized use of equipment	●						
	c. Implementation of construction waste management	●						
	d. Implementation of water conservation during the construction process	●						
	e. Implementation of energy conservation during the construction process	●						
	2) Green behaviour practice							
	a. Implementation of Health and Safety Management System (SMK3)	●						
	b. Application of environmental-friendly behaviour	●						
	3) Green supply chain							
	a. Construction materials use	●						
	b. Suppliers and/or sub-contractors selection	●						
	c. Energy conservation	●						
Utilisation	1) Organization and governance of the green building utilisation	●						
	2) Operational Standards and Procedures (OSP) implementation for green building utilization	●						
	3) Preparation of guidelines for the building occupants/users	●						
Demolition	1) Procedure of demolition	●						
	2) Recovery efforts for environment footprint	●						

Reference 4 Official Letter Regarding JCM Implementation in Surabaya City

KEMENTERIAN KOORDINATOR BIDANG PEREKONOMIAN
REPUBLIK INDONESIA
Jl. Lapangan Banteng Timur 2-4, Jakarta 10710
Telp : 3521849 – Fax : 3521850

Nomor : S- 47 /D.VII.M.EKON.5/11/2015 19 November 2015
Perihal : Penghargaan atas partisipasi dalam Kegiatan *Joint Crediting Mechanism (JCM)*

Kepada Yth.
Walikota Surabaya
di tempat

Sebagaimana kita ketahui, sejak tahun 2013, Kementerian Koordinator Bidang Perekonomian mengoordinasikan pelaksanaan kegiatan kerjasama pembangunan rendah karbon *(low carbon development)* dengan Pemerintah Jepang melalui skema *Joint Crediting Mechanism* (JCM). Salah satu kegiatan yang sudah berjalan adalah *leapfrog project* berupa kerjasama antarkota *(sister city)* yang melibatkan Pemerintah Daerah di kedua negara. Kini sudah ada 3 (tiga) buah kerjasama yang sedang berjalan yaitu, antara Surabaya dan Kitakyushu, Bandung dan Kawasaki serta Batam dan Yokohama.

Bersama surat ini kami menyampaikan penghargaan kepada kota Surabaya yang telah berkomitmen untuk melakukan aksi konservasi lingkungan dan membina kolaborasi dengan Kota Kitakyushu melalui perjanjian kerjasama *Green Sister City* dan menjadi kota percontohan studi kelayakan JCM.

Kami berharap agar kerjasama dan studi kelayakan tersebut dapat berlanjut ke tahap implementasi yang akan dilaksanakan sesuai dengan aturan yang telah disepakati oleh Pemerintah Indonesia dan Jepang dengan tetap berlandaskan pada hukum dan peraturan yang berlaku di Indonesia. Selanjutnya, untuk mempermudah koordinasi, kami mohon kiranya Saudara berkenan menunjuk pejabat/ staf Pemkot Surabaya yang akan menangani kerjasama *Joint Crediting Mechanism* ini.

Demikian kami sampaikan. Atas perhatian dan kerjasama Saudara kami ucapkan terima kasih.

Asdep Kerja Sama Ekonomi
Multilateral dan Pembiayaan,

Rizal Edwin

Tembusan :
- Deputi Bidang Koordinasi Kerjasama Ekonomi Internasional
- Kepala Sekretariat JCM Indonesia

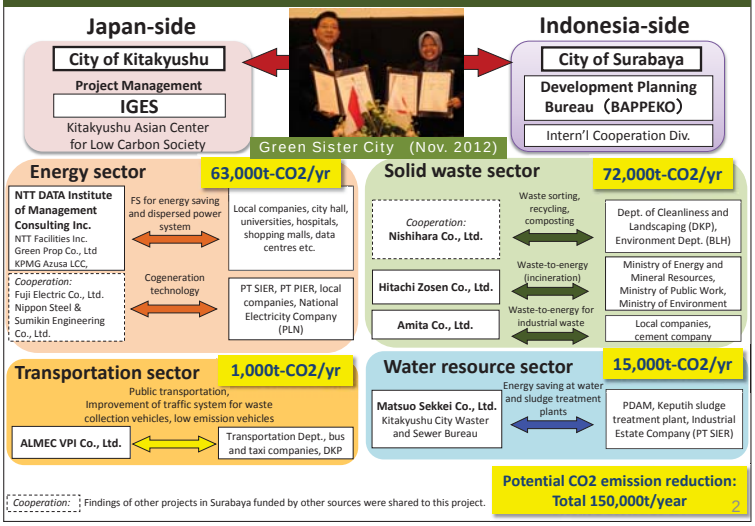
Reference 5　Materials of the First Workshop in Japan (Kick-off Workshop)

JCM F/S in FY2015

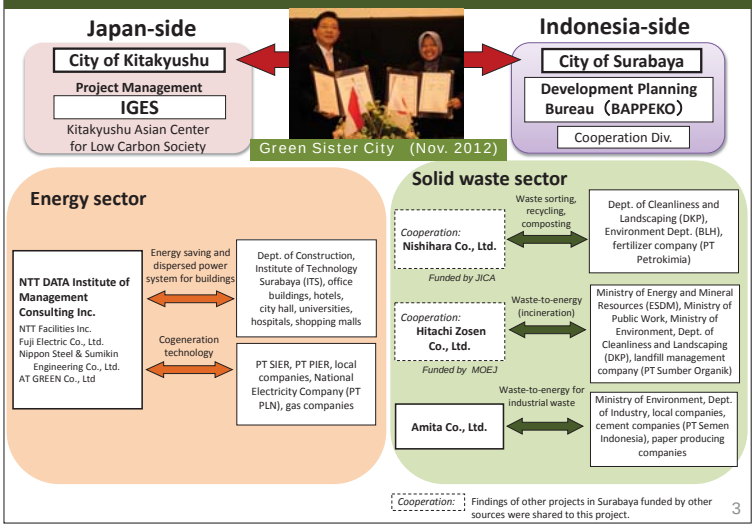
Low-Carbon Action Plan Development in Surabaya

28 May 2015, IGES

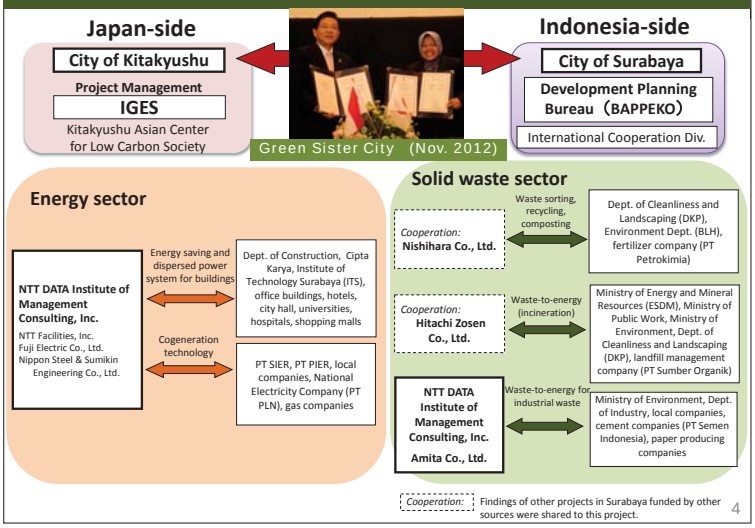
Project on Low-Carbon City Planning in Surabaya (JCM F/S, FY2013)



Project on Low-Carbon City Planning in Surabaya (JCM F/S, FY2014)



Low-Carbon Action Plan Development in Surabaya (JCM F/S, FY2015)



Results of F/S in FY2014: CO2 Emissions Reduction Potential

[ ] Including avoidance of methane emissions

Area		Contents	Emissions reduction potential (t-CO2/yr)	Project cost [USD 1,000]	1. Cost performance [USD /t-CO2/yr]	2. Cost performance per subsidy [USD/t-CO2]	Co-benefits (other impacts)
Energy	Energy saving in buildings (LED lights, A/C, BEMS, co-generation)	Hotel A	250	130	520	17	Reducing electricity consumption
		Hotel B	**3,600**	**4,000**	**1,100**	**37**	
		Commercial building A	1,600	3,400	2,100	70	
		Office building A	**200**	**350**	**1,800**	**60**	
	Heat and power supply (co-generation) at industrial zone	SIER (70MW, 30t/hr)	190,000	85,000	450	15	Energy saving, CNG utilization
		PIER (700MW, 30t/hr)	190,000	85,000	450	15	
Solid Waste	Waste separation, recycling, composting	150t/day capacity, reducing frequency collection vehicles	[8,300]	2,000-3,000	[240-360]	[13-20]	Recycling, reducing landfill waste
	Waste-to-energy, incineration	500t/day capacity, power 9,330kW (4MPa x 400°C)	30,200	50,000	160	53	Reducing landfill waste, resource efficiency
	Utilization of industrial waste	Liquid fuel: 5,000t/yr, Cement material: 24,000t/yr	6,200	3,400	550	30	Efficient use of hazardous waste

1. Cost performance = Project Cost / Emissions reduction potential
2. Cost performance per subsidy = Cost performance / expected useful life (15 years or 9 years) x 50% subsidy

5

Implementation Plan of JCM Pilot Projects

Area		Contents	Project cost [USD 1,000]	FY2015	FY2016	FY2017	FY2018 - 2019	Subsidy
Energy	Energy saving in buildings	1 hotel	4,000	EPC	O&M, MRV			MOEJ
		1 hotel, 1 commercial building, 1 office building	4,300	P/S	EPC	O&M, MRV		
	Heat and power supply (co-generation) at industrial zone	SIER (70MW, 30t/hr)	85,000	Detailed F/S	P/S	EPC	O&M in FY2019	JICA & MOEJ
		PIER (70MW, 30t/hr)	85,000	Detailed F/S	P/S	EPC	O&M in FY2019	
Solid waste	Waste separation, recycling, composting	150t/day capacity	2,000-3,000	EPC	O&M, MRV			JICA & MOEJ
	Waste-to-energy, incineration	500t/day capacity, power generation: 9,330kW (4MPa x 400°C)	50,000	Detailed F/S	P/S	EPC	O&M in FY2019	JICA & MOEJ
	Utilization of industrial waste	Liquid substitute fuel: 5,000t/yr Cement raw material: 24,000t/yr	3,400	Detailed F/S	P/S, EPC	O&M, MRV		MOEJ

* F/S: Feasibility Study P/S: Project Formulation Study MOEJ: Ministry of the Environment, Japan JICA: Japan International Cooperation Agency
EPC: Engineering, procurement and construction O&M: Operation and maintenance MRV: Measurement, reporting and verification

6

SURABAYA — Livable & Sustainable City — Green City Master Plan

1 GREEN PLANNING AND DESIGN	Spatial planning which maintain 30% area of Green Open Space from the total area of Surabaya .
2 GREEN OPEN SPACE	Expansion and optimization of Green Open Space.
3 GREEN BUILDING	The determination of green building development policy and infrastructure, the enforcement of Green Building Award.
4 GREEN TRANSPORT	Application Planning of Rapid Mass Transportation in form of Monorail and Tram, provision of non-motorized vehicle network.
5 GREEN COMMUNITY	Training of facilitators and env cadres, conducting Merdeka dari Sampah (Free from Waste) & Surabaya Green and Clean Event
6 GREEN WASTE	Development of recycle and compost center, development of Benowo Disposal Area by using "waste to energy" technology
7 GREEN WATER	Development of clean water network and potable water, wastewater network management and urban domestic waste
8 GREEN ENERGY	Development of alt energy such as solar cell on public infrastructure, development of cogeneration power source in the industry

Source: Surabaya City

GREEN BUILDING AWARENESS AWARD — TAHAPAN SELEKSI

Source: Green Building Awareness Award, Surabaya City

SELECTION 1
- Out of 138 buildings , 59 buildings are nominated
- Hotel : 15 buildings
- Apartment : 13 buildings
- Mall : 13 buildings
- Office building : 18 buildings

SELECTION 2
- From the fulfillment of selft assesment, 27 buildings are nominated
- Hotel : 10 buildings
- Apartment : 7 buildings
- Mall : 3 buildings
- Office building : 7 buildings

SELECTION 3
- From the presentation result, below are the **12 Awards Winnings**
- Hotel 3 buildings : *Sheraton, JW Marriot, Mercure*
- Apartment 3 buildings : *Waterplace, Trillium, Cosmopolis*
- Mall 3 buildings : *Tunjungan Plaza, Grand City, Lenmarc*
- Office Building 3 buildings : *Intiland, Esa Sampoerna, Grha Wonokoyo*

GREEN BUILDING AWARENESS AWARD — ASSESSMENT CRITERIA

Can we collect energy auditing data from the award-winning buildings?

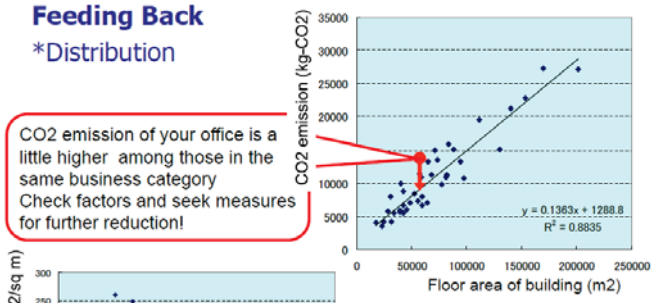
General Criteria
1. Traffic Factor
2. The existence of street vendors (PKL) in the building area

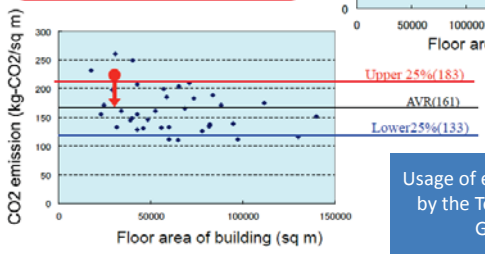
Technical Criteria
1. **Appropriate Site Development (ASD)** the criteria used to assess the accuracy of the order and function of eco-friendly building as well as the completeness of the building supporting facilities such as green open space, bicycle parking, etc.
2. **Energy Efficiency & Conservation (EEC)** the criteria used to assess the efficiency and energy conservation applied to the building
3. **Water Conservation (WAC)** the criteria used to assess the water conservation level applied to the building
4. **Material Resources & Cycle (MRC)** the criteria used to assess the use of environmentally friendly materials and waste management applied in the building
5. **Indoor Health & Comfort (IHC)** the criteria used to assess the building facilities supports in the health and comfort aspect of the user
6. **Building Environmental Management (BEM)** the criteria used to assess how the management of the building is done, including planning, innovation, operations and maintenance

Source: Green Building Awareness Award, Surabaya City

Feeding Back
*Distribution

CO2 emission of your office is a little higher among those in the same business category
Check factors and seek measures for further reduction!





Usage of energy auditing data by the Tokyo Metropolitan Government

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

Framework of Measures for the Buildings Sector

Tokyo Cap and Trade Program
Require annual emission reduction from existing buildings
Covers Existing buildings

TMG Green Building Programs
Require energy conservation design and renewable energy use in new buildings
Covers New buildings

Introducing energy efficient measures in new buildings design
► Easier emission reductions in the Cap&Trade

Investing in energy efficient measures in new buildings
◄ Because of the future reduction obligations by Cap&Trade

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

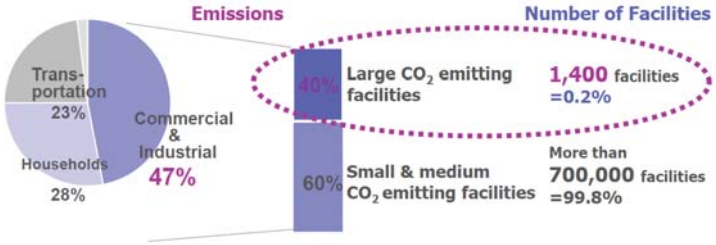
Policy Development

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

Facilities with annual energy consumption of more than 1,500kl (crude oil equivalent)

Tokyo Carbon Dioxide Footprint

Total CO_2 Emissions: 59 million tonnes (FY2010)

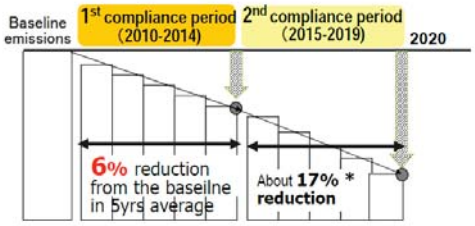


Source: Bureau of Environment, Tokyo Metropolitan Government
https://www.kankyo.metro.tokyo.jp/en/climate/attachement/TMG%20Presentation%28C40%26Siemens%20City%20Climate%20Leadership%20Awards%29.pdf

Strict Cap Setting to Achieve the TMG Target

Tokyo Cap & Trade Program

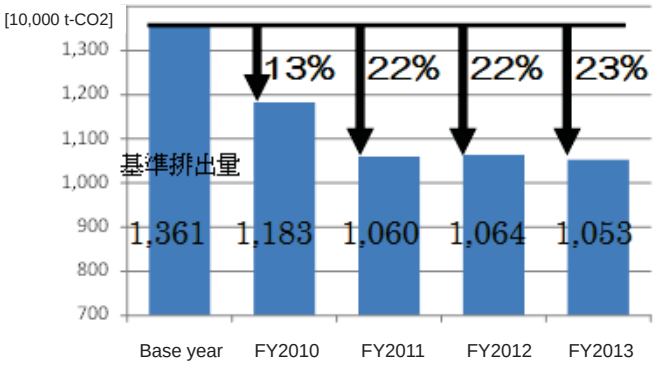
To achieve the Tokyo's emission reduction target "By 2020 25% reduction from 2000", the necessary reduction in industry & commercial sector is 17% reduction



* Current estimation.
The Cap for the 2nd compliance period will be fixed by the end of the 1st compliance period

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

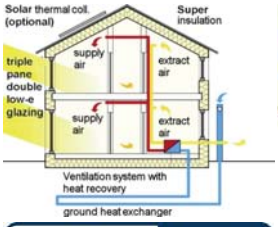
Total CO2 Emissions from the Targeted Buildings

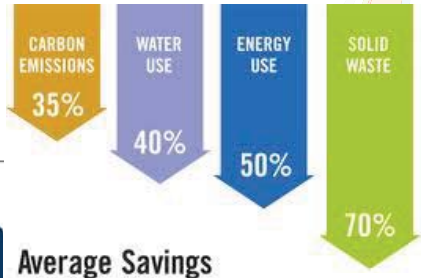


Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government
http://www.metro.tokyo.jp/INET/OSHIRASE/2015/02/20p2j700.htm

Objectives

Objective 2 To arrange, establish, and socialize the criteria and methods to establish green building





GREEN BUILDING COUNCIL INDONESIA

Average Savings of Green Buildings

Source: Green Building Awareness Award in Development Planning of Surabaya Green City, Surabaya City Government, October 2013

TOP30 Building List

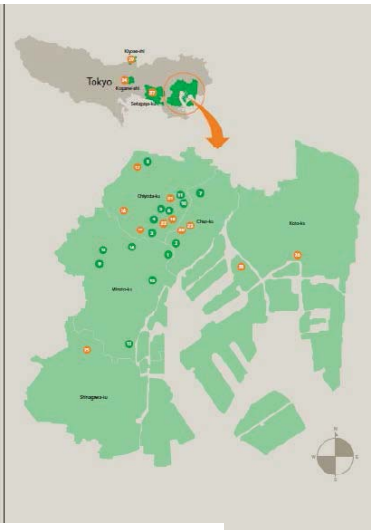
東京の低炭素ビルTOP30 所在地マップ

EXISTING BUILDING

1. Dentsu Shiodome Head Office Building
2. Ginza Mitsui Building
3. Hibiya International Building
4. Meiji Yasuda Seimei Building and Meiji Seimei Kan Building
5. Mitsubishi Jisho Building
6. Marunouchi Building
7. Nihombashi Mitsui Tower
8. Otsuka Corporation Head Office Building
9. Roppongi Hills
10. Sapia Tower
11. Shin-Otemachi Building
12. Sony City
13. Tokyo Midtown
14. Toranomon Towers Office
15. Keiouyu Shiba Koen Building

NEW BUILDING

16. Chiyoda Ward Kojimachi Junior High School
17. Fujitsu Mirai Kan
18. JP Tower (tentative name)
19. Kasumigaseki Common Gate Central Government Building No.7
20. Kyutaro 3-1 Project (tentative name)
21. Marunouchi 1-4 Project New Building (tentative name)
22. Marunouchi Park Building
23. Shimizu Corporation New Headquarters Construction Project
24. Shopping Center at 1-1 block in the first south area of Musashi-Koganei Station
25. Sony Corporation Sony City Osaki
26. Takenaka Corporation Tokyo Main Office
27. Tokyo Metropolitan Matsuzawa Hospital
28. Toyosu Cubic Garden
29. Obayashi Corporation Technical Research Institute Main Building (Tsuno Station)

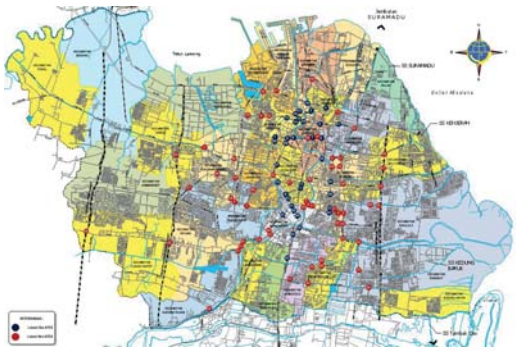


Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

Source: Green Building Awareness Award in Development Planning of Surabaya Green City, Surabaya City Government, October 2013

Objectives

Objective 4 To provide an overview of the distribution (map) of green buildings in Surabaya based on the existing criteria



- Commercial Building (Mall, Hotel, Apartment, Office)
- Government Building
- Housing Area
- School, Hospital, Market
- Manufacture

FY2015 JCM F/S in Surabaya: Work Plan

April 2015	■Stakeholders Meeting in Kitakyushu
May	■Inception Meeting in Surabaya
June	**Field Survey in Jakarta** (Ministry of Energy and Mineral Resources, Ministry of Environment and Forestry, JICA, UNDP, USAID)
July	**Field Survey in Thailand, Malaysia and Singapore** on Green Building Schemes
Aug	**Field Survey in Japan** (Tokyo Metropolitan Government, Saitama Pref., Yokohama City, Kawasaki City, The Energy Conservation Center, Japan)
Sep	■Green Building Workshop in Surabaya (t.b.c.)
Oct	★Presentation at the Smart City Week in Yokohama
Nov	Field Survey in Surabaya (follow up to the Workshop in September)
Dec	★Presentation at COP21 in Paris, France
Jan 2016	■Stakeholders Meeting in Kitakyushu
Feb	■Result Sharing Workshop in Surabaya ★Reporting to Indonesia JCM Secretariat (in Jakarta)
March	Final Report

Study of Energy Sector
"Energy Savings and Dispersed Generation in Buildings and Industrial park etc."

May 28, 2015 The field kick-off meeting (Inception meeting)
NTT DATA Institute of Management Consulting, Inc.

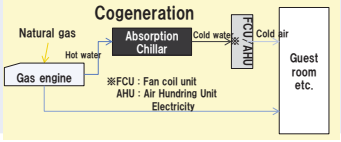
NTT DATA

1. Energy Sector -Outline

Indonesia
NTT DATA

Project Outline

We try to promote the commercial based project of installing Energy Savings and Dispersed Generation technologies in feasible buildings etc. Moreover, in order to launch new projects and expand them widely, we try to do the activities targeted to real estate enterprise and hotel franchise etc., and also try to corporate with Surabaya city according to Green Building promoting policy.

Target facility	Energy Savings and Dispersed Generation
Hotel Office building Commercial building	 

Main Activities

①Activity for realizing model project
②Activity for area expansion
③Corporation with policy for green building in Surabaya City

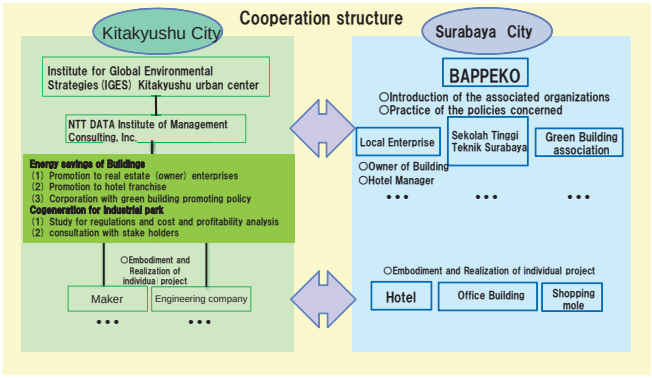
Embodiment and Realization of individual project

+

Developing the basement for area expansion in the Commercial Sector

2. Cooperation structure

NTT DATA



3. Activity (1)

NTT DATA

Item of Activity	Measure	
Promotion to real estate (owner) enterprises	Outline	In order to conduct promotion of energy saving and CO2 reduction effort for newly developed and existing buildings, consultation for real estate (owner) enterprises in Surabaya city and neighboring area will be implemented.
	Approach	ex.) Pakuon group and the other real estate (owner) enterprises.

3. Activity (2)

NTT DATA

Item of Activity	Measure	
Promotion to hotel franchise	Outline	In order to conduct promotion of energy saving and CO2 reduction effort for newly developed and existing hotel, consultation for hotel franchise enterprises in Surabaya city and neighboring area will be implemented.
	Approach	ex.) Sheraton, Marriott and the other hotel franchises.

3. Activity (3)

Item of Activity		Measure
Corporation with policy for green building	Outline	Green building certification policy have been started from last year by Green building association etc. Surabaya city and Sekolah Tinggi Teknik Surabaya are making an effort toward dissemination of Green building. Cooperating with these effort, we plan to pick up the certified or to be certified green buildings as candidates for JCM project site.
	Approach	ex.) Promoting program for Green Building such as GB Awareness Award etc.

4. Assumed GHG emission reduction

Hotel(Installing CHP and Absorption chiller)

Fiscal Year	FY2015	FY2016	FY2017	FY2018	FY2019	Total	Duration Period	Cost effectiveness (thousand yen/t-CO2)
Size of the business (million yen/year)	300					300 (①)	15 (④)	
GHG emission reduction (t-CO2/year)		3,700	3,700	3,700	3,700	14,800 (②)		①/(②/④)/④ 5.41
CO2 emissions from energy use (t-CO2/year)		3,700	3,700	3,700	3,700	14,800 (③)		①/(③/④)/④ 5.41

(Calculation of emissions reductions)
○Reference Emission: calculated from the net amount of electricity generated by project gas engine and the amount of chilled water produced by project absorption chiller
○As for the efficiency of the reference chiller, JCM approved methodology ID_AM002 "Energy Saving by Introduction of High Efficiency Centrifugal Chiller" will be referred.
○Project Emission: calculated from natural gas consumption of gas engine

Office building(Converting to high efficient chiller)

Fiscal Year	FY2015	FY2016	FY2017	FY2018	FY2019	Total	Duration Period	Cost effectiveness (thousand yen/t-CO2)
Size of the business (million yen/year)	140					140(①)	15(④)	
GHG emission reduction (t-CO2/year)		200	200	200	200	800(②)		①/(②/④)/④ 46.7
CO2 emissions from energy use (t-CO2/year)		200	200	200	200	800(③)		①/(③/④)/④ 46.7

(Calculation of emissions reductions)
○Chiller, pump and cooling power are assumed to be replaced to high efficient one. Because energy consumption of pump and cooling tower is much smaller than chiller, emission reduction target will be focused the replacement of chiller.
○Because project Chiller will be replaced to centrifugal chiller, ID_AM002 "Energy Saving by Introduction of High Efficiency Centrifugal Chiller" will be applied

4. Assumed GHG emission reduction

Shopping mole(Converting to high efficient chiller)

Fiscal Year	FY2015	FY2016	FY2017	FY2018	FY2019	Total	Duration Period	Cost effectiveness (thousand yen/t-CO2)
Size of the business (million yen/year)	470					470 (①)	15 (④)	
GHG emission reduction (t-CO2/year)		4,100	4,100	4,100	4,100	16,400 (②)		①/(②/④)/④ 7.64
CO2 emissions from energy use (t-CO2/year)		4,100	4,100	4,100	4,100	16,400 (③)		①/(③/④)/④ 7.64

(Calculation of emissions reductions)
○Chiller, pump and cooling power are assumed to be replaced to high efficient one. Because energy consumption of pump and cooling tower is much smaller than chiller, emission reduction target will be focused the replacement of chiller.
○Because project Chiller will be replaced to centrifugal chiller, ID_AM002 "Energy Saving by Introduction of High Efficiency Centrifugal Chiller" will be applied

Installation of CHP(Cogeneration) system

Fiscal Year	FY2015	FY2016	FY2017	FY2018	FY2019	Total	Duration Period	Cost effectiveness (thousand yen/t-CO2)
Size of the business (million yen/year)	4,500	4,500				9,000 (①)	15 (④)	
GHG emission reduction (t-CO2/year)			114,000	114,000	114,000	342,000 (②)		①/(②/③)/④ 5.26
CO2 emissions from energy use (t-CO2/year)			114,000	114,000	114,000	342,000 (③)		①/(③/③)/④ 5.26

(Calculation of emissions reductions)
○Reference Emission:calculated from calculated by electricity consumption, gas consumption, and electricity supply amount for PLN. These are calculated based on actual energy supply amount from CHP plant.
○Project Emission:calculated from natural gas consumption of cogeneration plant

5. Schedule

Items of Activities	FY2015 4	5	6	7	8	9	10	11	12	FY2016 1	2	3
Conference(about twice, @Kitakyushu City)		☆ Kick off				☆ First Conference (Interim report meeting)				☆ Second Conference (Final report meeting)		
Field Work shop (about twice)		☆ Kick off					☆ Interim report			☆ Final report		
1. Embodiment and Realization of existing project		Credit investigations			Examination of cost effectiveness, business model and details.					Preparation for application of subsidies for installing equipment		
2-1. Promotion to real estate (owner) enterprises		Channel building with top management of specified company			Consultation		Support for green city development by Surabaya city (exchanging memorandums etc.)					
		Consultation with Surabaya city(picking up new targets)	proposal and explanation of JCM project		Consultation, consideration of cost-effectiveness and business model etc.		Selection of model project site			Start to develop mode project		
2-2. Promotion to hotel franchise		Channel building with top management of specified company			Consultation		Support for building green city by Surabaya city (exchanging memorandums etc.)					
		Consultation with Surabaya city(picking up new targets)	proposal and explanation of JCM project		Consultation, examination of cost-effectiveness and business model etc.		Selection of model project site			Start to develop mode project		
2-3. Corporation with policy for green building		The current state confirmation of Green Building policy and examination of possibility for corporation			Preparation for making proposal documents and holding Irregular meeting			Consultation and preparation for finalizing proposal documents				
Reporting							☆(draft)				☆(Final draft) ☆(Final report)	
Field survey		☆			☆		☆	☆		☆		

Waste Sector

"Promotion of Low-Carbon Type Industrial Waste Recycling"

Inception Meeting in Surabaya, Indonesia
May 28, 2015

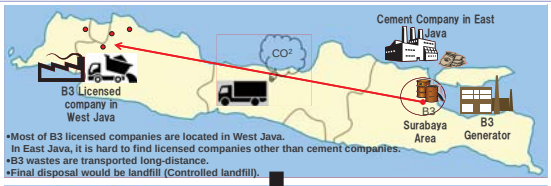
AMITA CORPORATION
NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

1. Waste Sector - Outline

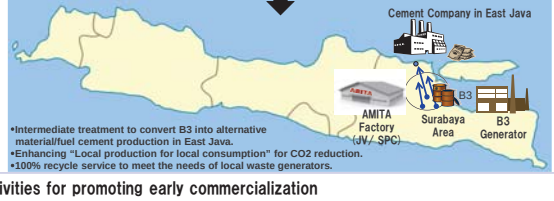
Project Outline

- Promotion of cement raw materials/fuels derived from industrial waste including biomass
- Development of quantification methods of CO2 emission reduction such as an MRV methodology taking the transportation distance into account

【Current Situation】



【Proposal】

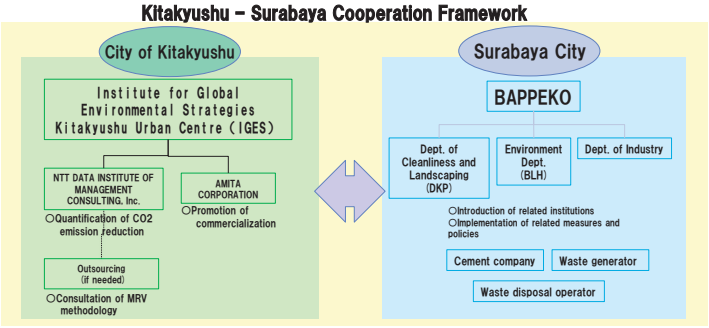


Main Activities

① Activities for promoting early commercialization
② Quantification of CO2 emission reduction considering the shortened transportation distance and raised ratio of biomass

2. Waste Sector – Cooperation Structure

Kitakyushu – Surabaya Cooperation Framework



○Waste generator

○Cement companies which potentially accept the cement raw materials

3. Background of The Project

① Most of Industrial waste (hazardous waste) generated inside and outside of the Surabaya city, is transported for more than 800km distance to treatment plants in West Java.

◆ Transportation cost and CO2 emission from the fuel consumption will be reduced by the proposed project.

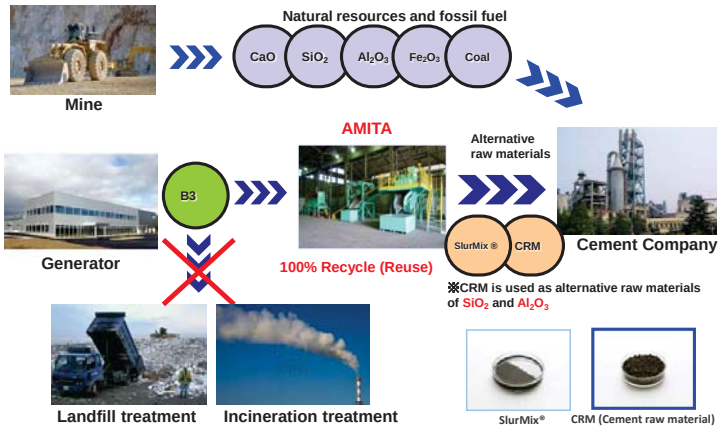
② Currently, cement companies accept copper slag, blast-furnace slag and biomass waste, etc. as raw materials.

◆ The accepting rate is about one third of that of Japan and there is room to increase the rate utilizing raw materials derived from industrial waste.

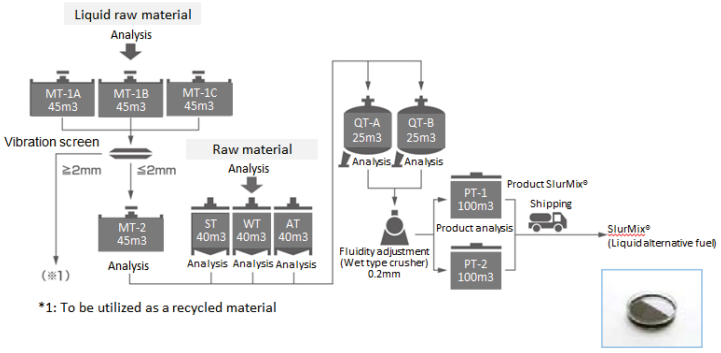
③ Due to the amendment of the waste management law in Indonesia, the legal compliance for the proper treatment of hazardous waste is getting more stringent recently in terms of the generators responsibility.

◆ The project would serve the increased needs for the proper treatment of hazardous waste.

4. Project Image

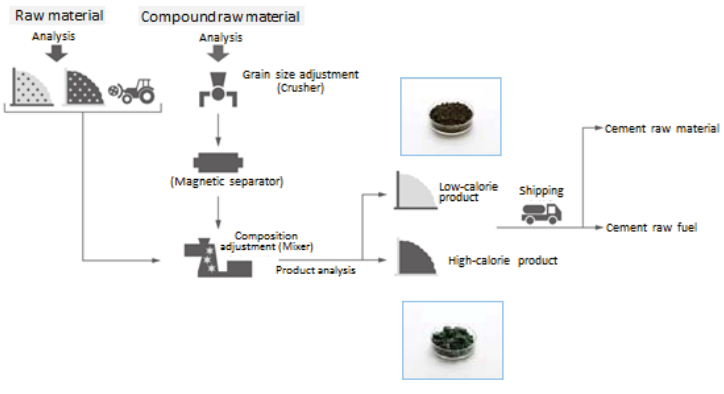


4. Project Image – Recycling Line (1) SlurMix® –



*1: To be utilized as a recycled material

4. Project Image – Recycling Line (2) Cement Raw Material (CRM) –



5. Activity Contents ①

Item of Activity	Measure
Promotion of Commercialization	○ Detailed survey on the basis of the past two-year study □Generators: Detailed data collection on waste generation amount, treatment cost, transportation distance, etc. □Cement company: Detailed discussion on the price, conditions, amount of the CRM acceptance. Examination of conversion of the cement factory facility to introduce the CRM. □Intermediate treatment facility to convert B3 wastes into CRM and SlurMix: Cost estimate, business profitability, etc. ○ Survey in cooperation with the Surabaya city □ Amount of biomass waste generation □ Identification of the construction site of the intermediate treatment facility to convert B3 wastes into CRM and SlurMix ○ Technical survey □ Technology to produce cement raw materials from biomass wastes ○ Negotiation for the business phase □Consensus building amount the stakeholders

5. Activity Contents ②

Item of Activity	Measure
Quantification of CO2 Emission Reduction ◆Transportation Distance Reduction	○CO2 emission reduction effect □ Data collection on the road transportation □ Interview survey with the related business operators ○JCM application □ Reference/project scenarios □ Basic units necessary for CO2 emission calculation □ Monitoring items □ (If necessary) (1) Outsourcing to an expertise organization of MRV methodologies, and (2) Interview with Indonesian JC
Quantification of CO2 Emission Reduction ◆Biomass Rate Increase	○CO2 emission reduction effect □ Examination of types and amounts of biomass which can be included into cement raw materials □ Examination of the conditions of the exhaust heat recovery power generation at the cement factories which accept CRM ○JCM application □ Reference/project scenarios □ Basic units necessary for CO2 emission calculation □ Monitoring items □ (If necessary) (1) Outsourcing to an expertise organization of MRV methodologies, and (2) Interview with Indonesia JC

6. Assumed GHG Reduction Amount

※ The target year is FY2017 to start the business.

The figures below shows rough estimates of CO2 emission reduction by SlurMix

Fiscal Year	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	Total	Duration Period	Cost Effectiveness (thousand yen/t-CO2)
Scale of the Business (million yen/yr)	340					① 340	④ 9	
GHG Emission Reduction (t-CO2/yr)		6,197	6,197	6,197	6,197	② 24,788		①/(②/④)/④) 6.1
CO2 Emissions Reduction of Energy Origin (t-CO2/yr)		6,197	6,197	6,197	6,197	③ 24,788		①/(③/④)/④) 6.1

○Reference CO2 Emission: To be calculated by setting a CO2 emission factor, etc. in the case where CRM is NOT used.
○Project CO2 Emission: To be calculated by setting a CO2 emission factor, etc. in the case where CRM is used.

7. Project Schedule (FY2015)

Items of Activities	2015 year								2016 year		
	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.
○ Domestic Meeting (City of Kitakyushu)					☆ #1 (Meeting for Interim report)				☆ #2 (Meeting for Final report)		
○ Workshop (Surabaya)	☆ Kickoff					☆ Interim report			☆ Final report		
○ Field Study	☆	☆		☆		☆		☆			
1. Promotion of commercialization	Detailed Survey on Generator, Transportation distance, etc				Survey and Consultation regarding of terms of sales			Consultation and Negotiation toward business phase			
	Biomass Survey (Potential amount, technology to convert, collection approach, transportation distance, etc)				Examination of the construction of the intermediate treatment facility (Location, scale, etc)			Cost estimate, Business profitability			
2. Quantification of CO2 Emission Reduction Transportation	Data collection and organization for the calculation				Development of Reference Scenario		Development of Project Scenario		Consultation with experts and involved parties (i.e. JC)		
2. Quantification of CO2 Emission Reduction Biomass	Data collection and organization for the calculation				Development of Reference Scenario		Development of Project Scenario		Consultation with experts and involved parties (i.e. JC)		
4. Survey on Relative Information	Information collection (i.e. basic data, law, regulation, etc.)										
○ Report Writing						☆ Draft (Oct.30)				☆ Final Draft (Feb.5)	☆ Final report (Mar.4)

Future Plans

◇ JV/SPC Formation

B3 Licensed Company — Joint Venture/ SPC (East Java) — Cement Company (East Java)

◇Implementation Schedule

FY2015
- Selection of local partner
- Consensus between relative administration
- Fund raising

FY2016
- JV contract with local partner
- Related application for license

FY2017
- Plant construction, Start operation

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NTT DATA
変える力を、ともに生み出す。

Reference 6　Materials of the Second Workshop in Japan (Reporting Workshop)

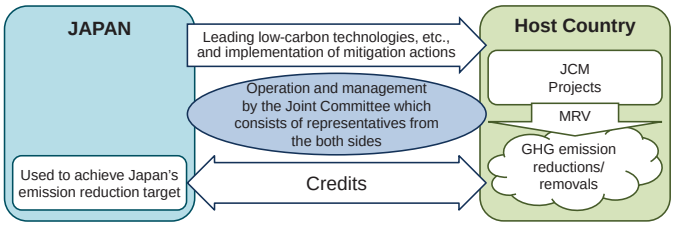
Overview of JCM and its Feasibility Studies in Surabaya

Yatsuka KATAOKA
Kitakyushu Urban Center
Institute for Global Environmental Strategies

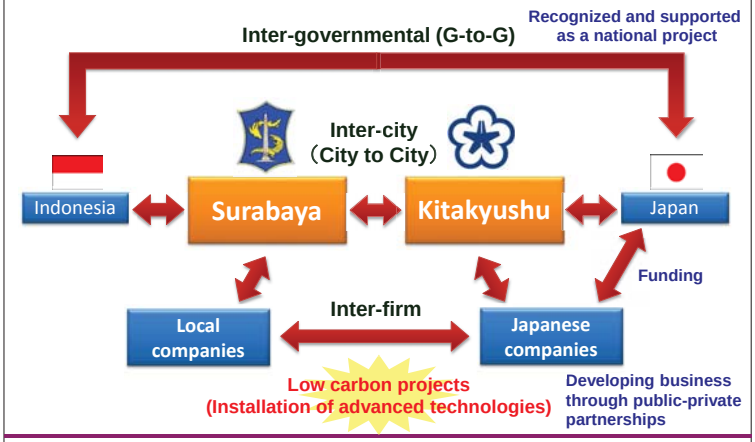
Reporting workshop for Joint Crediting Mechanism (JCM) Feasibility Study in Surabaya, FY2015
15th January 2015, BAPPEKO, Surabaya City

IGES Institute for Global Environmental Strategies

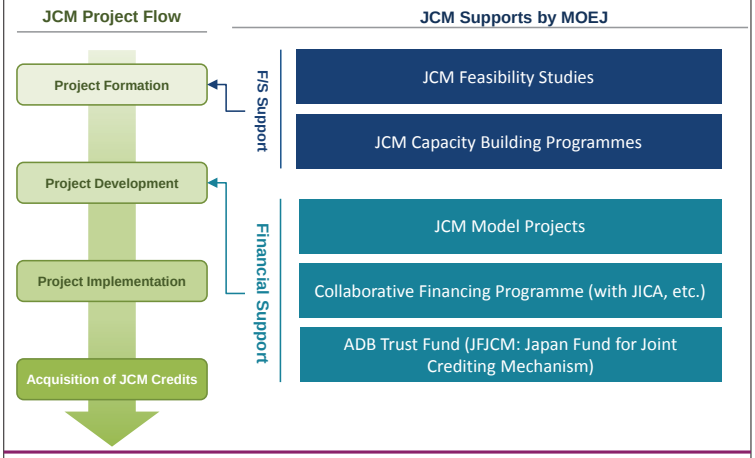
Basic concept of Joint Crediting Mechanism (JCM)



City-to-City collaboration JCM



JCM Project Flow and JCM Supports by MOEJ



Advantages

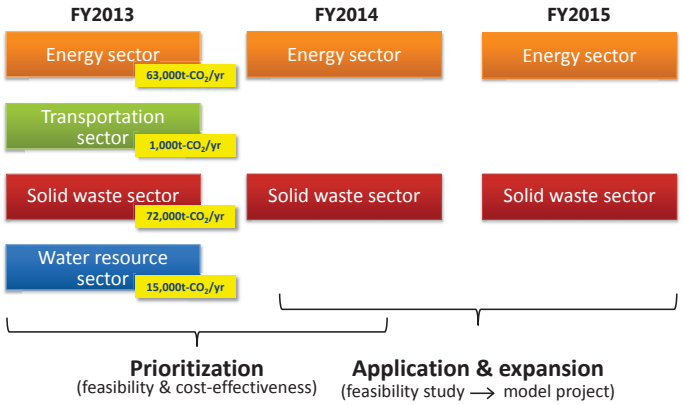
LOCAL BUSINESSES

- ✓ Japan's low-carbon technologies can be introduced at low costs
- ✓ Reduced operating costs due to its high efficiency and durability
- ✓ Support by both cities can be expected

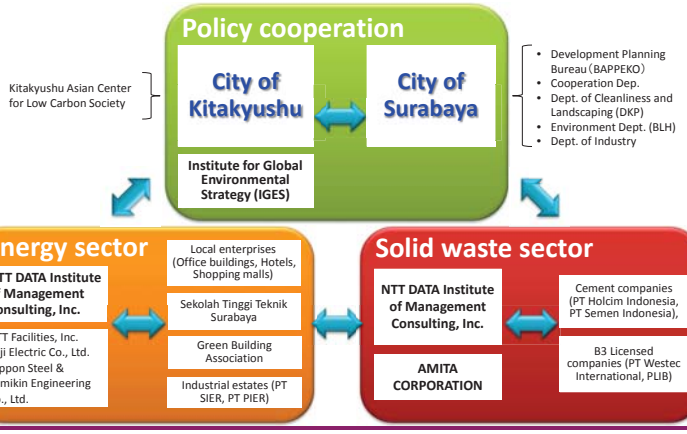
LOCAL GOVERNMENT

- ✓ Low carbon objectives can be achieved at lower administrative costs
- ✓ Reduction of CO_2 can lead to mitigation of pollution and improvement of living quality
- ✓ Long-term follow-up can be received through inter-city cooperation

Transition of JCM F/S in Surabaya



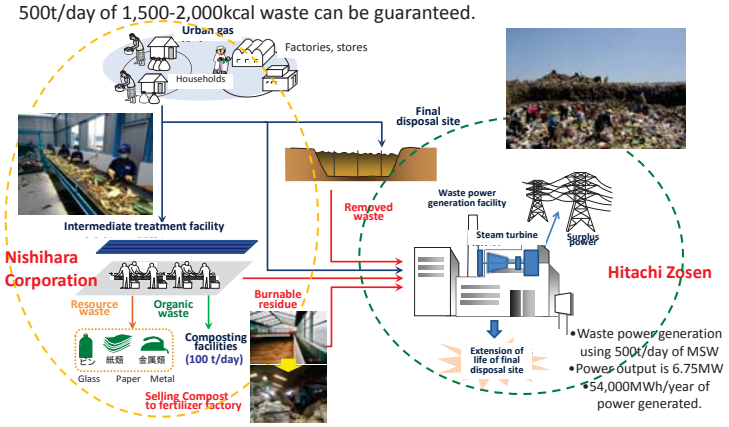
FY2015 JCM F/S Cooperation Structure



Waste Power Generation from Urban Waste

Hitachi Zosen

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



Study of Energy Sector
"Energy Savings and Dispersed Generation in Buildings and Industrial park etc."

Jan. 15, 2016 The workshop (Surabaya Indonesia)
NTT DATA Institute of Management Consulting, Inc.

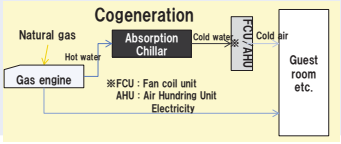
NTT DATA

1. Energy Sector -Outline

Indonesia NTT DATA

Project Outline

We try to promote the commercial based project of installing Energy Savings and Dispersed Generation technologies in feasible buildings etc. Moreover, in order to launch new projects and expand them widely, we try to do the activities targeted to real estate enterprise and hotel franchise etc., and also try to corporate with Surabaya city according to Green Building promoting policy.

Target facility	Energy Savings and Dispersed Generation
Hotel Office building Commercial building	 

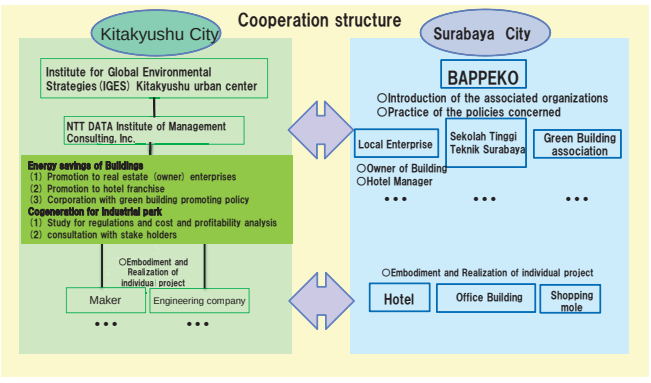
Main Activities

①Activity for realizing model project
②Activity for area expansion
③Corporation with policy for green building in Surabaya City

Embodiment and Realization of individual project
+
Developing the basement for area expansion in the Commercial Sector

2. Cooperation structure

NTT DATA



3. Process of Research

NTT DATA

We not only promote commercialization of on-going projects started from the last fiscal year, but also commence the rollout our efforts from three points of view to scale up the project in this fiscal year.

Commercialization of on-going projects

○We conduct the developed and organized projects from the former years to introduce most appropriate technology, design optimal operation and lead the projects, in order to JCM financing program projects in light of each project's own challenges.

Project's Scale up with area expansion

Promotion to real estate (Owner) enterprises

○In order to conduct promotion of energy saving and CO2 reduction effort for newly developed and existing buildings, consultation for real estate (owner) enterprises in Surabaya city and neighboring area will be implemented.

○Promotion activities to the real estate (owner) enterprises not only having started consultation on JCM method application but also develop and organizing new targets will be implemented.

Promotion to hotel franchise etc.

○ In order to conduct promotion of energy saving and CO2 reduction effort for newly developed and existing hotel, consultation for hotel franchise enterprises etc. in Surabaya city and neighboring area will be implemented.

○Promotion activities to the hotel franchise not only having started consultation on JCM method application but also develop and organizing new targets will be implemented.

Corporation with policy for green building

○Green building certification policy have been started from last year by Green building association etc. Surabaya city and Sekolah Tinggi Teknik Surabaya are making an effort toward dissemination of Green building. Cooperating with these effort, we plan to pick up the certified or to be certified green buildings as candidates for JCM project site.

○Cooperation with GB Awareness Award (an Surabaya city's indoctrination program for wider recognition of GB started the last year) etc., developping the basis for collaboration with building owners interested in energy-saving and CO2 reduction will be implemented.

4. Activity (1) Promotion of on-going project's commercialization

NTT DATA

Commercialization of Facility Installation for on-going projects has been evolved around FY 2015 MOE-J JCM financing program.

Projects	CO2 reduction (tCO2/y)	Progress
Energy saving at a shopping mall by Introducing High efficiency turbo chiller	996	Applying with FY 2015 MOE-J JCM financing program, and adopted as the first case of Surabaya Project. Time consuming adjustment for business commencement has fairly undertaken.
Installing Co-generation system to hotels	3,200	Applying with financing program, and unofficial notification of adoption has announced. However, formal consortium agreement for the project implementation have not concluded between Fuji electric Do., Ltd. and the local hotel owner

As major reason, at the cogeneration introduction, arrangement of private power generation supplementary contract has not smoothly agreed with electric power company; nor the long term basic gas supply contract with gas company has not agreed on price therefore stable supply could not secured. We explain the situation to Indonesia JCM office.

...

(Reference) Energy saving at a shopping mall by Introducing High efficiency turbo chiller

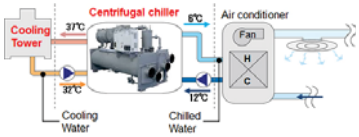
NTT DATA

■Project Participant
(Japan) : NTT FACILITIES, INC., Project Participant
(Indonesia) : PT.PAKUWON JATI Tbk

■Map

■Outline of GHG Mitigation Activity

The project aims to reduce electricity consumption in the shopping mall through introducing advanced & efficient Japanese centrifugal Chiller system.
The project is to replace existing central cooling system with high efficient centrifugal chiller with capacity of 966TR ×4 sets and 569TR × 1 set in Pakuwon's shopping mall, Tunjungan Plaza, as well as to replace existing 8 cooling towers with efficient Japanese models.



Centrifugal chiller in the A/C system

■Expected GHG Emission Reductions

996 tCO2/ year

The GHG emission reductions are calculated based on the estimated electricity consumptions based on the conservatively estimated COP of a reference cooling system and a project COP of the centrifugal chiller as well as the grid emission factor.

4. Activity (2) Project's Scale up with area expansion (A) Real estate owner enterprises

NTT DATA

We have contacted with a number of real estate owner enterprises and presented specific proposals .

Real estate owner enterprises	Progress
Owner A	Active developer of complex facilities. It has been developed not only A few complexes (Shopping malls, office buildings, hotels and condominiums etc.) in Surabaya but in Jakarta. Adjusting commercialization of on-going project, area expansion is on approach. With confirming the implementation status of the first case of on-going Japanese Government JCM financing program project, the agreements for the project is going to be embodied and realized.
Owner B	Owns several hotels in Bali Island, Jakarta, Jog-Jakarta and more; formerly owned hotels in Surabaya, too. As hotels has large scale cold demand, highly interested in introduction of chillers and co-generation and positively motivated with Japanese Government JCM financing program project.

■Issue to be solved and Challenge Point

No matter with publicly-traded companies, some privately hold real estate owners express reluctance about disclosure of financial condition. Some owners also express concern on smooth conduction of Contract with local electric and gas company at the introduction of cogeneration. Therefore, we move negotiation forward with increasing achievement one by one on existing cases.

4. Activity (2) Project's Scale up with area expansion (B) Hotel franchise etc.

NTT DATA

For hotel franchise, from viewpoint of operation performance, we contact several business owners and presented specific proposals .

hotel franchisee etc.	Progress
Hotel franchise A	Operating hotels in Surabaya, Jakarta, etc. With large cold demand in daytime, highly interested in Photovoltaic power generation. We have started survey at a Surabaya hotel on situation of roof for installation possibility of PV panels and confirmation of feasibility.
Hotel franchise B	Operating hotels in Surabaya, Jakarta, etc.; belongs to global hotels franchise group and have global energy saving policy "save 30% in electricity and 20% in water till 2020".
Shopping mole C	Developed and operating complex including shopping malls, hotels, etc. in Surabaya, Jakarta and more. Chiller exchange in shopping malls is on examined now.

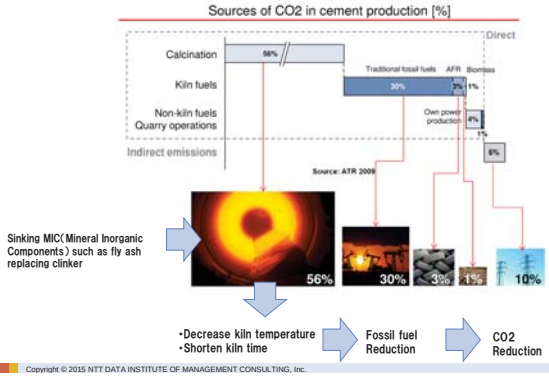
■Issue to be solved and Challenge Point

Hotel franchisee often undertake only operation of hotels. In this case, they are highly interested in energy efficiency, stable use of energy and countermeasures against disasters. On the other hand, in the case hotel facilities are owned by real estate owner and utility cost is on the real estate owners, they are neutral for facility installation; final dicision is on the owner.; therefore negotiation with the hotel franchisee is desirably executed in concurrence with negotiation with the owner. It is necessary to construct a scheme profitable for both hotel franchisee and local owners.

(Reference) Reach out for Manufacturers

NTT DATA

Reach out for Manufacturers has been started as an approach of energy sector. As a part of the approach, a hearing survey of H Inc., an associated company of G Inc., a major cement manufacturer, had executed. As a result, we recognized that they are highly interested in specific energy consumption's improvement and CO2 reduction by replacing clinker with MIC in cement manufacturing process. H Inc is searching for the Japanese technology to realize it.



5. Schedule

NTT DATA

Items of Activities	FY2015 4	5	6	7	8	9	10	11	12	FY2016 1	2	3
Conference(about twice, @Kitakyushu City)		☆ Kick off				☆ First Conference (Interim report meeting)				☆ Second Conference (Final report meeting)		
Field Work shop (about twice)		☆ Kick off					☆ Interim report			☆ Final report		
1. Embodiment and Realization of existing project		Credit investigations		Examination of cost effectiveness, business model and details.						Preparation for application of subsidies for installing equipment		
2-1. Promotion to real estate (owner) enterprises		Channel building with top management of specified company		Consultation			Support for green city development by Surabaya city (exchanging memorandums etc.)					
		Consultation with Surabaya city(picking up new targets)		proposal and explanation of JCM project		Consultation, consideration of cost-effectiveness and business model etc.		Selection of model project site		Start to develop mode project		
2-2. Promotion to hotel franchise		Channel building with top management of specified company		Consultation			Support for building green city by Surabaya city (exchanging memorandums etc.)					
		Consultation with Surabaya city(picking up new targets)		proposal and explanation of JCM project		Consultation, examination of cost-effectiveness and business model etc.		Selection of model project site		Start to develop mode project		
2-3. Corporation with policy for green building		The current state of Green Building policy and examination of possibility for corporation		confirmation and		Preparation for making proposal documents and holding irregular meeting				Consultation and preparation for finalizing proposal documents		
Reporting							☆(draft)				☆(Final draft)	☆(Final report)
Field survey		☆			☆		☆			☆		

Surabaya Waste Sector
"Promotion of Low-Carbon Type Industrial Waste Recycling"

AMITA CORPORATION
NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

AMITA NTT DATA

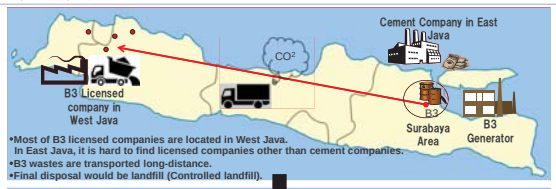
1. Waste Sector – Outline

NTT DATA AMITA

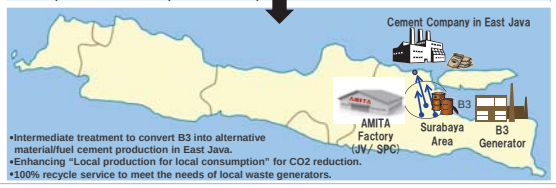
Objectives

- Promotion of B3 waste recycling as cement raw materials/fuels
- Development of an MRV methodology to quantify CO2 emission reduction by the proposed project

【Current Situation】



【Proposal】



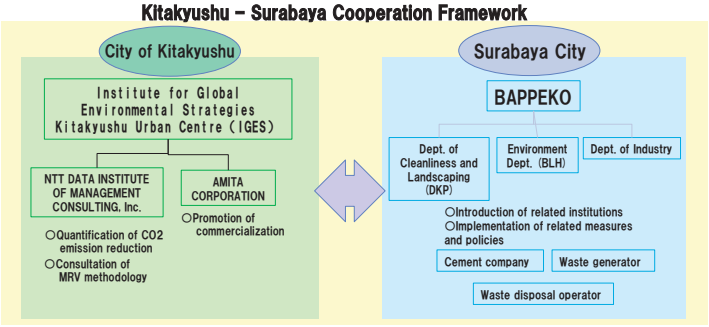
Main Activities

① Activities for promoting early commercialization of the B3 waste recycling project
② Activities for quantification of CO2 emission reduction considering replacement of incineration, raised ratios of biomass inputs and shortened transportation distance

2. Waste Sector – Cooperation Structure

NTT DATA AMITA

Kitakyushu – Surabaya Cooperation Framework



○Waste generator
(Completed surveys in 2013-2014)

○Cement companies which potentially accept the cement raw materials
(Continuing discussion….)

3. Background of The Project

NTT DATA AMITA

① Most of Industrial waste (hazardous waste) generated inside and outside of the Surabaya city, is transported for more than 800km distance to treatment plants in Bogor, West Java.

◆ Transportation cost and CO2 emission from the fuel consumption will be reduced by the proposed project.

② Currently, cement companies accept copper slag, blast-furnace slag and biomass waste, etc. as raw materials.

◆ The accepting rate is about one third of that of Japan and there is room to increase the rate utilizing raw materials derived from industrial waste.

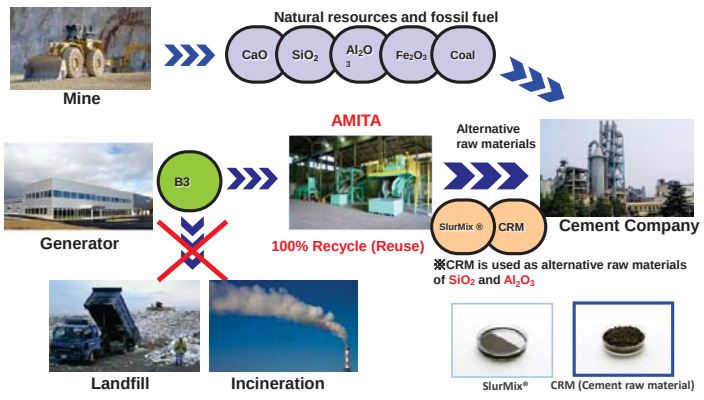
③ According to the hearing survey with Japanese companies in Indonesia, due to the amendment of the waste management law, the legal compliance for the proper treatment of hazardous waste is getting more stringent recently in terms of the generators responsibility.

◆ The project would serve the increased needs for the proper treatment of hazardous waste.

4. Project Image

NTT DATA AMITA

- Manufacture alternative cement raw materials/fuels derived from B3 waste to promote resource circulation which contribute to reduction of fossil fuel and natural resources consumption.
- Verify business feasibility utilizing JCM scheme based on the survey on CO2 emission reduction by the proposed project.



5. Activity Report ①
"Promotion of Commercialization of B3 waste recycling"

NTT DATA AMITA

【Progress of discussion with candidate business partners】

Date	Discussion with	State of progress
H27.5.27 H27.8.3 H27.11.25	Cement Company A	○In August-October, Company A positively discussed the possibility of cooperation with Amita, budgeting on their own in FY2016 for introduction of treatment facilities to accept raw materials derived from B3 wastes in their cement plant. After consideration, however, as it turned out that payout time would be longer than their criteria, and due to the necessity of continuing market research to secure the input amount of B3 wastes, they withdrew their investment plan, and thus it became difficult to cooperate with Amita in the very near future. ○On the other hand, Company A has a strong interest in JCM subsidy project to realize low-carbon of their cement production process, and discuss some ideas for possible JCM projects with NTT Data Institute of Management Consulting, Inc.
H27.5.26 H27.8.5 H27.11.24	B3 Licensed Company A (Pretreatment operator in West Java)	○B3 Licensed Company A is planning to introduce Amita's treatment facilities. ○They currently employ a simple incineration treatment. Introduction of pretreatment of cement raw materials/fuels will realize a low-carbon process. ○They have an interest to do business in East Java.
H27.8.6 H27.11.24	B3 Licensed Company B (Pretreatment operator in West Java)	○Company B is now carrying forward a construction plan of their 2nd plant. ○As Amita suggests that Company Bintroduce Amita's facilities, on the contrary, Company B is interested in establishing a JV with Amita. We will continue this consultation watching carefully business environments in Indonesia.

5. Activity Report ②
"Development of MRV methodology"

◆ Four factors of CO2 emission reduction
① Replacement of coal fuels by the alternative fuels in cement plant.
・・・Examine the difference of carbon densities between coals and the alternative fuels.
② Replacement of incineration of industrial wastes
・・・ Simple incineration of B3 wastes at a certain rate is considered as a reference scenario. The incineration ratio was investigated.
③ Avoid methane generation from disposal sites by increasing the rate of biomass inputs.
④ Shortened transportation distance

・SlurMix®, a liquid alternative fuel, is out of scope for the quantification of CO2 emission reduction as it has high carbon density and it does not include incineration as the reference scenario.
・Scope 3 is out of boundary for method discussion.

【Calculation of reference emission】
RE = (Emission from coal fuels consumption in the cement plant)+(Emission from incineration)+ (Methane emission from disposal sites) +(Emission from transportation)

【Calculation of project emission】
PE = (Emission from alternative fuels consumption in the cement plant)+(Emission from electricity and fuels consumption in the recycling plant)+(Emission from transportation)

【Calculation of emission reduction】
ER = RE − PE = (Emission reduction by the replacement of coal by the alternative fuels in the cement plant)+ (Emission from incineration)+(Methane emission from disposal sites) − (Emission from electricity and fuels consumption in the recycling plant) +(Emission reduction by the shortened transportation distance)

5. Activity Report ②
"Quantification of CO2 emission reduction"

【Calculation of emission reduction】
ER = RE − PE = (1. Emission reduction by the replacement of coal by the alternative fuels in the cement plant) +(2. Emission from incineration)+(3. Methane emission from disposal sites) − (4. Emission from electricity and fuels consumption in the recycling plant) +(5. Emission reduction by the shortened transportation distance)

(Trial calculation based on rough assumptions)

1. Replacement of coal	2. Replacement of incineration	3. Methane emission avoidance	4. Energy consumption in the recycling plant	5. Shortened transportation distance
【Assumption】 ・Calorific value Coal 5700kcal/kg CRM1800kcal/kg ・Ratio of density of carbon (EF ratio) Coal:CRM ≒2.4: 0.8 ⇒NO reduction	【Assumption】 ・Incineration rate: 5% ・ Impossible to calculate CO2 emission by incineration as the waste composition is undefined, on the assumption, however, that municipal solid wastes (referring to Surabaya' s case) includes 60% of plastic waste, the CO2 emission will be approx. 1,100 tons/year	−	0.009 (t-CO2/t-production) x 24,000 tons (production) = 216 tons	7,580 tons

CO2 emission reduction =1100−216+7580=8,464 tons/year

AMITA
NTT DATA
変える力を、ともに生み出す。

Green Building Policy

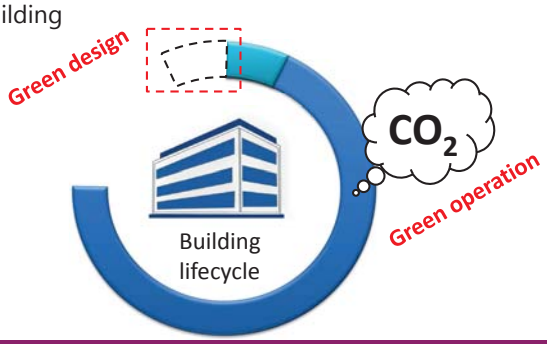
Yatsuka KATAOKA
Kitakyushu Urban Center
Institute for Global Environmental Strategies

Reporting workshop for Joint Crediting Mechanism (JCM) Feasibility Study in Surabaya, FY2015
15th January 2015, BAPPEKO, Surabaya City

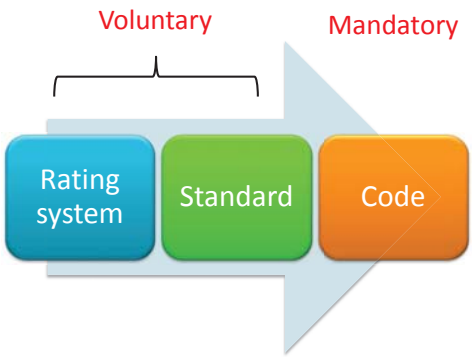
IGES Institute for Global Environmental Strategies

Needs of Green Building Policy

- Buildings account for almost 40% of CO_2 emission
- Applying green design at the construction stage will contribute to CO_2 reduction throughout the lifecycle of the building



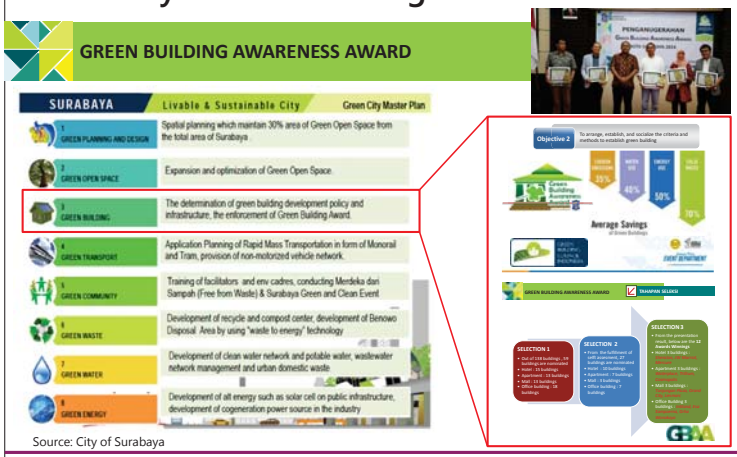
Trends of regulating green buildings



Green Building regulations in Indonesia

- **Laws and regulations**
  - Law No. 28/2002 on Building
  - Government Regulation No. 36/2005 on Implementation of Law No. 28/2002
  - Ministerial Regulation No. 02/PRT/M/2015
- **Standard**
  - Indonesia National Standard (SNI)
- **Green City Development Programme (P2KH)**
  - Phase 1 (2011-2014): MoU with MOPW on implementation of green city; Development of Local Regulations (PERDA)
  - Phase 2 (2015-2019): Strengthening capacities of National Strategic Region (KSN); assigned 3 cities as pilot cities for implementing green building (Bandung, Surabaya and Makassar)
- **DKI Jakarta**
  - Governor Regulation No. 38/2012

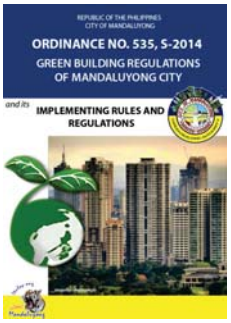
Surabaya Green Building Awareness Award



Source: City of Surabaya

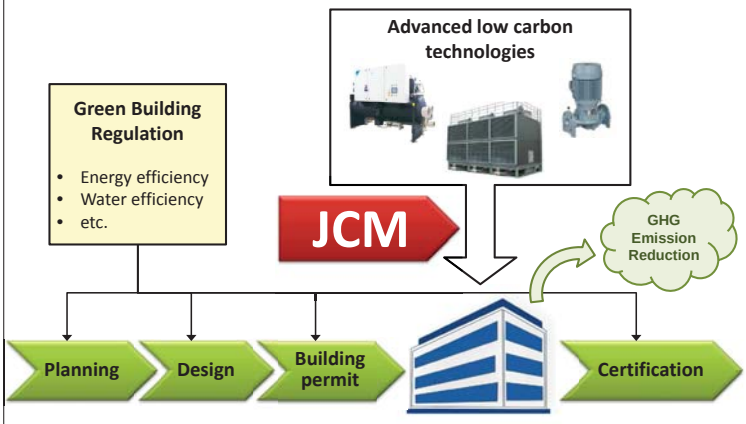
Surabaya Green Building Regulation

- Cipta Karya will be developing a mandatory regulation for green building (2016~)
- IGES will be supporting Cipta Karya by:
  - Gathering information of similar green building regulations in other cities & countries
  - Compiling the findings for reference



Example of similar green building regulation (Mandaluyong City, Philippines)

Expected use of JCM



Reference 7 Materials of the First Workshop in Surabaya (Kick-off Workshop)

Proyek Perencanaan Kota Karbon Rendah di Surabaya:

Lokakarya Sharing Hasil Studi Kelayakan JCM TA 2015

Mei 2015, IGES

Proyek Perencanaan Kota Karbon Rendah di Surabaya (JCM F/S, TA2013)

Pihak Jepang

City of Kitakyushu

Manajemen Proyek

IGES

Kitakyushu Asian Center for Low Carbon Society

Pihak Indonesia

Kota Surabaya

Badan Perencanaan Pembangunan Kota (BAPPEKO)

Bid.Kerja Sama Internasional

Green Sister City (Nov. 2012)

Bidang Energi — 63.000t-CO2/th

NTT DATA Institute of Management Consulting Inc.
NTT Facilities Inc.
Green Prop Co., Ltd
KPMG Azusa LCC

FS untuk penghematan listrik dan sistem listrik tersebar ↔ Perusahaan lokal, balai kota, universitas, rumah sakit, pusat perbelanjaan, sentral data, dll

Kerja sama: Fuji Electric Co., Ltd. Nippon Steel & Sumikin Engineering Co., Ltd.

Teknologi Cogeneration ↔ PT SIER, PT PIER, perusahaan lokal, Perusahaan Listrik Negara(PLN)

Bidang limbah padat — 72.000t-CO2/th

Kerja sama: Nishihara Co., Ltd. ↔ Pemisahan, daur-ulang, pembuatan kompos dari sampah ↔ Dinas Kebersihan dan Pertamanan (DKP), Badan Lingkungan Hidup (BLH)

Hitachi Zosen Co., Ltd. ↔ Limbah ke energi (pembakaran sampah) ↔ Kementerian Energi dan Sumber Daya Mineral, Kementerian Pekerjaan Umum, Kementerian Lingkungan Hidup

Amita Co., Ltd. ↔ Limbah ke energi untuk industri limbah ↔ Perusahaan lokal, perusahaan semen

Bidang Transportasi — 1.000t-CO2/th

Transportasi umum, Perbaikan sistem lalu lintas untuk kendaraan pengangkut sampah, Kendaraan rendah emisi

ALMEC VPI Co., Ltd. ↔ Bidang Transportasi, Perusahaan Taksi, DKP

Bidang sumber daya air — 15.000t-CO2/th

Matsuo Sekkei Co., Ltd. Kitakyushu City Waster and Sewer Bureau ↔ Penghematan energi pada instalasi pengolahan limbah dan air ↔ PDAM, Instalasi Pengolahan Limbah Tinja Keputih, Perusahaan Kawasan Industri (PT SIER)

Potensi pengurangan emisi CO2: Total 150.000t/tahun

Kerja sama: Ada proyek lain Surabaya yang dibiayai oleh sumber lain yang berbagi pada proyek ini.

Proyek Perencanaan Kota Karbon Rendah di Surabaya (JCM F/S, TA 2014)

Pihak Jepang

City of Kitakyushu

Manajemen Proyek

IGES

Kitakyushu Asian Center for Low Carbon Society

Pihak Indonesia

Kota Surabaya

Badan Perencanaan Pembangunan Kota (BAPPEKO)

Bid. Kerja Sama.

Green Sister City (Nov. 2012)

Bidang Energi

NTT DATA Institute of Management Consulting Inc.
NTT Facilities Inc.
Fuji Electric Co., Ltd.
Nippon Steel & Sumikin Engineering Co., Ltd.
AT GREEN Co., Ltd

Penghematan energi dan sistem listrik tersebar untuk bangunan ↔ Dep. Konstruksi Institut Technology Surabaya (ITS), gedung kantor, hotel, balai kota, universitas, rumah sakit, pusat perbelanjaan

Teknologi Cogeneration ↔ PT SIER, PT PIER, perusahaan lokal, Perusahaan Listrik Negara(PT PLN), perusahaan gas

Bidang limbah padat

Kerja sama: Nishihara Co., Ltd. — *Dibiayai oleh JICA* — Pemisahan, daur-ulang, pembuatan kompos dari sampah ↔ Dinas Kebersihan dan Pertamanan (DKP), Badan Lingkungan Hidup (BLH), PT Petro Kimia

Kerja sama: Hitachi Zosen Co., Ltd. — *Funded by MOEJ* — Limbah ke energi (pembakaran sampah) ↔ Kementerian Energi dan Sumberdaya Mineral (ESDM), Kementerian Pekerjaan Umum, Kementerian Lingkungan Hidup, Dinas Kebersihan dan Pertamanan (DKP), perusahaan pengelolaan timb.sampah (PT Sumber Organik)

Amita Co., Ltd. ↔ Limbah ke energi untuk industri limbah ↔ Kementerian Lingkungan Hidup, Kementerain Perindustrian, perusahaan lokal, PT Semen Indonesia, perusahaan produksi kertas

Kerja sama: Ada proyek lain Surabaya yang dibiayai oleh sumber lain yang berbagi pada proyek ini.

Proyek Perencanaan Kota Karbon Rendah di Surabaya (JCM F/S, TA 2015)

Pihak Jepang

City of Kitakyushu

Manajemen Proyek

IGES

Kitakyushu Asian Center for Low Carbon Society

Pihak Indonesia

Kota Surabaya

Badan Perencanaan Pembangunan Kota (BAPPEKO)

Bid. Kerja Sama.

Green Sister City (Nov. 2012)

Bidang Energi

NTT DATA Institute of Management Consulting Inc.
NTT Facilities Inc.
Fuji Electric Co., Ltd.
Nippon Steel & Sumikin Engineering Co., Ltd.

Penghematan energi dan sistem listrik tersebar untuk bangunan ↔ Dep. Konstruksi Institut Technology Surabaya (ITS), gedung kantor, hotel, balai kota, universitas, rumah sakit, pusat perbelanjaan

Teknologi Cogeneration ↔ PT SIER, PT PIER, perusahaan lokal, Perusahaan Listrik Negara(PT PLN), perusahaan gas

Bidang limbah padat

Kerja sama: Nishihara Co., Ltd. — *Dibiayai oleh JICA* — Pemisahan, daur-ulang, pembuatan kompos dari sampah ↔ Dinas Kebersihan dan Pertamanan (DKP), Badan Lingkungan Hidup (BLH), PT Petro Kimia

Kerja sama: Hitachi Zosen Co., Ltd. — *Funded by MOEJ* — Limbah ke energi (pembakaran sampah) ↔ Kementerian Energi dan Sumberdaya Mineral (ESDM), Kementerian Pekerjaan Umum, Kementerian Lingkungan Hidup, Dinas Kebersihan dan Pertamanan (DKP), perusahaan pengelolaan timb.sampah (PT Sumber Organik)

NTT DATA Institute of Management Consulting Inc. & Amita Co., Ltd. ↔ Limbah ke energi untuk industri limbah ↔ Kementerian Lingkungan Hidup, Kementerain Perindustrian, perusahaan lokal, PT Semen Indonesia, perusahaan produksi kertas

Kerja sama: Ada proyek lain Surabaya yang dibiayai oleh sumber lain yang berbagi pada proyek ini.

Hasil F/S TA2014: Potensi Pengurangan Emisi CO2

[ ] Including avoidance of methane emissions

Area		Uraian	Potensi pengurangan emisi (t-CO2/th)	Biaya proyek [USD 1.000]	1. Biaya pelaksanaan [USD /t-CO2/th]	2. Biaya pelaksanaan per subsidi [USD/t-CO2]	Manfaat tambahan (dampak lain)
Energi	Penghematan energi pada bangunan (Lampu LED, A/C, BEMS, co-generation)	Hotel A	250	130	520	17	Mengurangi pemakaian listrik
		Hotel B	**3.600**	**4.000**	**1.100**	**37**	
		Bangunan komersial A	1.600	3.400	2.100	70	
		Gedung kantor A	**200**	**350**	**1.800**	**60**	
	Pasokan panas dan listrik (co-generation) di kawasan industri	SIER (70MW, 30t/jam)	190.000	85.000	450	15	Penghematan energi, pemanfaatan CNG
		PIER (700MW, 30t/jam)	190.000	85.000	450	15	
Limbah Padat	Pemisahan, daur ulang, kompos	Kapasitas 150t/hari, mengurangi frekuensi kendaraan pengumpul	[8.300]	2.000-3.000	[240-360]	[13-20]	Daur ulang, mengurangi timbunan sampah
	Limbah ke energi, pembakaran sampah	Kapasitas 500t/hari, listrik 9.330kW (4MPa x 400°C)	30.200	50.000	160	53	Mengurangi timbunan sampah, efisiensi sumberdaya
	Pemanfaatan limbah industri	Bahan bakat cair: 5000t/th, Bahan semen: 24000t/th	6.200	3.400	550	30	Penggunaan limbah berbhaya yang efisien

1. Biaya pelaksanaan = Biaya Proyek/Potensi pengurangan emisi
2. Biaya pelaksanaan per subsidi = Biaya pelaksanaan/ masa manfaat yang diinginkan (9 or 15 years) x subsidi 50%

Rencana Pelaksanaan Proyek Percontohan JCM

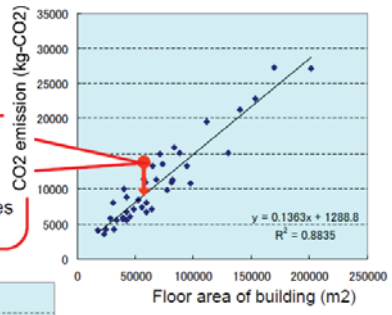
Bidang		Uraian	Biaya Proyek [USD 1.000]	TA2015	TA2016	TA2017	TA2018 - 2019	Subsidi
Energi	**Penghematan energi pada bangunan**	**1 hotel**	**4.000**	**EPC**	**O&M, MRV**			MOEJ
		1 hotel, 1 gedung komersial, **1 gedung kantor**	4.300	P/S	**EPC**	**O&M, MRV**		
	Pasokan panas dan listrik (co-generation) di kawasan industri	SIER (70MW, 30t/jam)	85.000	Detil F/S	P/S	**EPC**	**O&M in TA2019**	JICA & MOEJ
		PIER (70MW, 30t/jam)	85.000	Detil F/S	P/S	**EPC**	**O&M in TA2019**	
Limbah Padat	**Pemisahan, limbah, daur ulang, kompos**	**Kapasitas 150t/hari**	**2.000-3.000**	**EPC**	**O&M, MRV**			JICA & MOEJ
	Limbah ke energi, pembakaran sampah	Kapasitas 500t/hari, pembangkit listrik: 9.330kW (4MPa x 400°C)	50.000	Detil F/S	P/S	**EPC**	**O&M in TA2019**	JICA & MOEJ
	Pemanfaatan limbah indust	Substitusi bhn bakar cair: 5000t/th Bhn baku semen: 24000t/th	3.400	Detil F/S	P/S, **EPC**	**O&M, MRV**		MOEJ

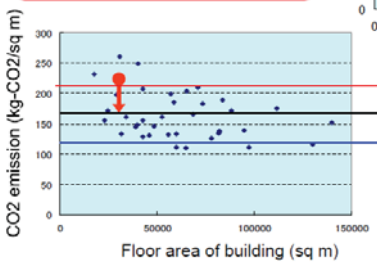
* F/S: Studi Kelayakan P/S: Studi Formulasi Projek MOEJ: Kementerian Lingk. Hidup, Japan JICA: Japan International Cooperation Agency
EPC: Rekayasa, pengadaan dan konstruksi O&M: Operasional dan pemeliharaan MRV: Pengukuran, pelaporan dan verifikasi

Feeding Back

*Distribution

CO2 emission of your office is a little higher among those in the same business category
Check factors and seek measures for further reduction!





Penggunaan data audit energi oleh Pemerintah Metropolitan Tokyo

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

SURABAYA Livable & Sustainable City

Green City Master Plan

1 GREEN PLANNING & DESIGN	Rencana Tata Kota yang mempertahankan 30% dari wilayah total Surabaya sebagai Ruang terbuka Hijau
2 GREEN OPEN SPACE	Perluasan dan Optimalisasi Ruang Terbuka Hijau
3 GREEN BUILDING	Penentuan kebijakan pembangunan bangunan hijau dan infrastruktur, Penyelenggaraan Green Building Award
4 GREEN TRANSPORT	Perencanaan penerapan Angkutan Masal Cepat dalam bentuk Monorail dan Trem, Penyediaan jaringan kendaraan non-motor (tak bermotor)
5 GREEN COMMUNITY	Pengembangan Fasilitator dan kader lingkungan, Menyelenggarakan kegiatan kompetisi "Merdeka Dari Sampah" dan Surabaya Green and Clean
6 GREEN WASTE	Pembangunan pusat pengolahan dan pengomposan, mengembangkan TPA Benowo dengan konsep teknologi "waste to energy"
7 GREEN WATER	Pembangunan jaringan air bersih dan air minum, manajemen jaringan limbah air, serta sampah domestik perkotaan
8 GREEN ENERGY	Pengembangan energi alternatif seperti penggunaan solar cell pada infrastruktur umum, pengembangan sumber daya kogereasi di kawasan industry

GREEN BUILDING AWARENESS AWARD

TAHAPAN SELEKSI

Source: Green Building Awareness Award, Surabaya City

SELECTION 1
- Out of 138 buildings , 59 buildings are nominated
- Hotel : 15 buildings
- Apartment : 13 buildings
- Mall : 13 buildings
- Office building : 18 buildings

SELECTION 2
- From the fulfillment of selft assesment, 27 buildings are nominated
- Hotel : 10 buildings
- Apartment : 7 buildings
- Mall : 3 buildings
- Office building : 7 buildings

SELECTION 3
- From the presentation result, below are the **12 Awards Winnings**
- Hotel 3 buildings : ***Sheraton, JW Marriot, Mercure***
- Apartment 3 buildings : ***Waterplace, Trillium, Cosmopolis***
- Mall 3 buildings : ***Tunjungan Plaza, Grand City, Lenmarc***
- Office Building 3 buildings : ***Intiland, Esa Sampoerna, Grha Wonokoyo***

GREEN BUILDING AWARENESS AWARD

KRITERIA PENILAIAN

Bisakah kita mengumpulkan audit data energi dari bangunan pemenang penghargaan?

Kriteria Umum

1. Faktor Kemacetan
2. Keberadaan PKL di sekitar bangunan

Kriteria Teknis

1. Tepat Guna Lahan / Appropriate Site Development (ASD)
2. Efisiensi dan Konservasi Energi / Energy Efficiency & Conservation (EEC)
3. Konservasi Air / Water Conservation (WAC)
4. Sumber dan Siklus Material / Material Resources & Cycle (MRC)
5. Kesehatan dan Kenyamanan dalam Ruangan / Indoor Health & Comfort (IHC)
6. Manajemen Lingkungan dalam Bangunan / Building Environmental Management (BEM)

Framework of Measures for the Buildings Sector

Tokyo Cap and Trade Program
Require annual emission reduction from existing buildings
Covers Existing buildings

TMG Green Building Programs
Require energy conservation design and renewable energy use in new buildings
Covers New buildings

Introducing energy efficient measures in new buildings design
▶ Easier emission reductions in the Cap&Trade

Investing in energy efficient measures in new buildings
◀ Because of the future reduction obligations by Cap&Trade

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

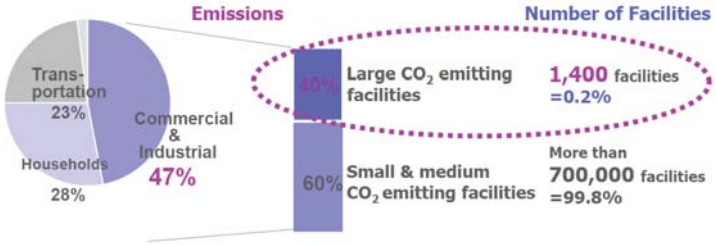
Policy Development

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

Fasilitas dengan konsumsi energi tahunan lebih dari 1,500kl (setara minyak mentah)

Tokyo Carbon Dioxide Footprint

Total CO_2 Emissions: 59 million tonnes (FY2010)

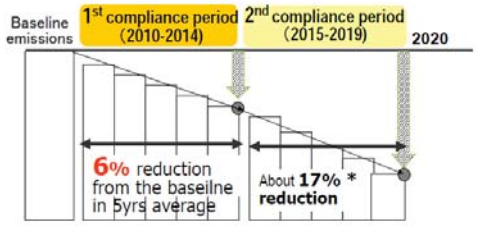


Source: Bureau of Environment, Tokyo Metropolitan Government
https://www.kankyo.metro.tokyo.jp/en/climate/attachement/TMG%20Presentation%28C40%26Siemens%20City%20Climate%20Leadership%20Awards%29.pdf

Strict Cap Setting to Achieve the TMG Target

Tokyo Cap & Trade Program

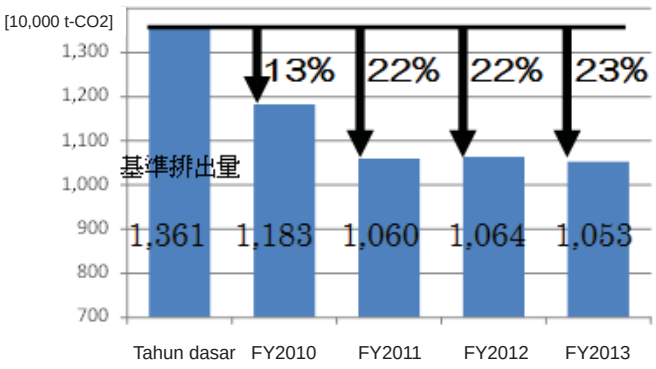
To achieve the Tokyo's emission reduction target "By 2020 25% reduction from 2000", the necessary reduction in industry & commercial sector is 17% reduction



* Current estimation.
The Cap for the 2nd compliance period will be fixed by the end of the 1st compliance period

Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

Total Emisi CO2 dari Bangunan Target

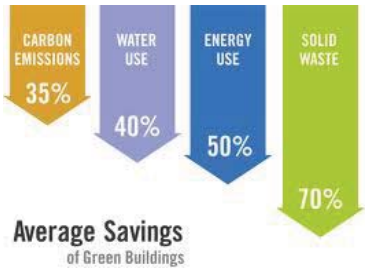


Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government
http://www.metro.tokyo.jp/INET/OSHIRASE/2015/02/20p2j700.htm

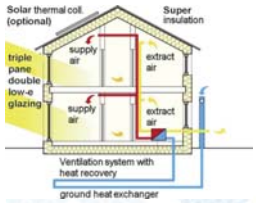
objective

Tujuan 2

Menyusun, menetapkan, dan mensosialisasikan kriteria dan metode pencapaian *green building*



Average Savings of Green Buildings

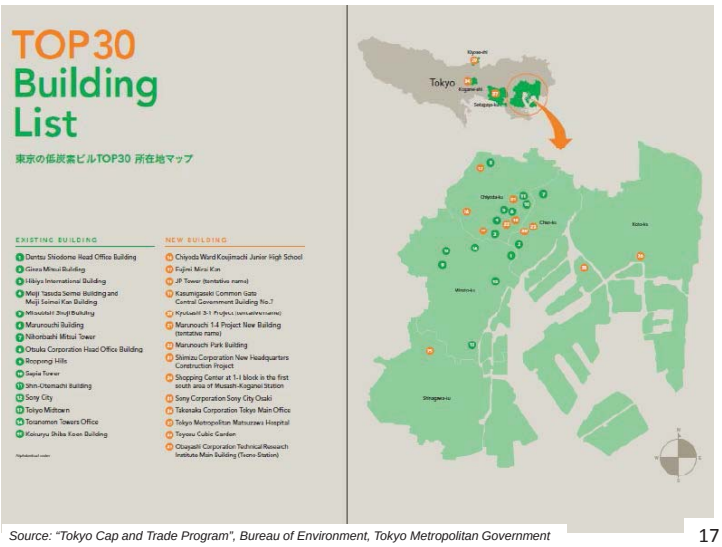


Source: Green Building Awareness Award in Development Planning of Surabaya Green City, Surabaya City Government, October 2013

Jawa Pos EVENT DEPARTMENT

TOP30 Building List

東京の低炭素ビルTOP30 所在地マップ



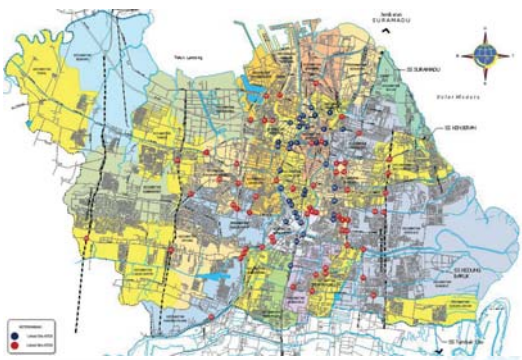
Source: "Tokyo Cap and Trade Program", Bureau of Environment, Tokyo Metropolitan Government

Source: Green Building Awareness Award in Development Planning of Surabaya Green City, Surabaya City Government, October 2013

objective

Tujuan 4

Memberikan gambaran persebaran (*map*) *green building* di kota Surabaya berdasarkan kriteria-kriteria yang ada



- Gedung Komersial (mall, hotel, apartemen, perkantoran)
- Gedung Pemerintahan
- Kawasan Perumahan
- Sekolah, Rumah Sakit, Pasar
- Pabrik

Jawa Pos EVENT DEPARTMENT

FY2015 JCM F/S di Surabaya: Rencana Kerja

April 2015	■Stakeholders Meeting di Kitakyushu
Mei	■Inception Meeting di Surabaya
Juni	**Survei Lapangan di Jakarta** (Kementerian Energi dan Sumber Daya Mineral, Kementerian Lingkungan Hidup dan Kehutanan, JICA, UNDP, USAID)
Juli	**Survei Lapangan di Thailand, Malaysia dan Singapura** pada Skema Green Building
Agusto	**Survei Lapangan di Jepang** (Tokyo Metropolitan Government, Saitama Pref., Yokohama City, Kawasaki City, The Energy Conservation Center, Japan)
Sep	■Green Building Lokakarya di Surabaya (t.b.c.)
Oct	★Presentasi di Pekan Cerdas Kota di Yokohama
Nov	Survei Lapangan di Surabaya
Dec	★Presentasi di COP21 di Paris, Prancis
Jan 2016	■Stakeholders Meeting di Kitakyushu
Feb	■Hasil Lokakarya Berbagi di Surabaya ★Pelaporan ke Indonesia JCM Sekretariat (di Jakarta)
Maret	Laporan Akhir

Kajian Sektor Energi
"Penghematan Energi dan Pembangkit yang Tersebar di Gedung-Gedung, Kawasan Industri, dll."

28 Mei 2015 Rapat awal proyek (Rapat Permulaan)
NTT DATA Institute of Management Consulting, Inc.

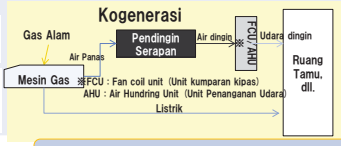
NTT DATA

1. Sektor Energi - Ringkasan

Indonesia
NTT DATA

Ringkasan Proyek

Kami mencoba untuk mengembangkan proyek berbasis komersial untuk pemasangan teknologi Penghematan Energi dan Pembangkit yang Tersebar di berbagai bangunan yang layak, dll. Selain itu, dalam rangka peluncuran proyek-proyek baru dan untuk mengembangkannya secara luas, kami mencoba melakukan berbagai kegiatan yang ditargetkan kepada perusahaan real estate , waralaba hotel, dll., dan juga mencoba untuk bekerja sama dengan pemerintah kota Surabaya sesuai dengan kebijakan pengembangan Bangunan Hijau.

Target fasilitas	Penghematan Energi dan Pembangkit yang Tersebar
Hotel Bangunan Perkantoran Bangunan Komersial	 

Aktivitas Utama

①Aktivitas untuk merealisasikan proyek model
②Aktivitas untuk perluasan daerah
③Perusahaan yang memiliki kebijakan mengenai bangunan hijau di Kota Surabaya

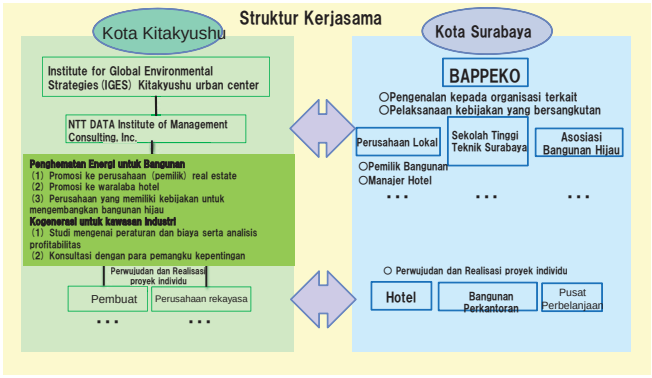
Perwujudan dan Realisasi proyek individu

+

Mengembangkan ruang bawah tanah untuk perluasan area di Sektor Komersial

2. Struktur Kerjasama

NTT DATA



3. Aktivitas (1)

NTT DATA

Item Kegiatan	Langkah-Langkah	
Promosi kepada perusahaan (pemilik) real estate	Ringkasan	Mendorong usaha-usaha penghematan energi dan pengurangan emisi CO2 untuk bangunan-bangunan yang sudah ada maupun yang baru dibangun, konsultasi bagi perusahaan (pemilik) real estate di kota Surabaya dan daerah sekitarnya yang akan menjadi tempat pengimplementasian.
	Pendekatan	ex.) Pakuon group dan perusahaan (pemilik) real estate lainnya.

3. Aktivitas (2)

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Item Kegiatan	Langkah-Langkah	
Promosi ke waralaba hotel	Ringkasan	Mendorong usaha-usaha penghematan energi dan pengurangan emisi CO2 untuk hotel-hotel yang sudah ada maupun yang baru dibangun, konsultasi bagi perusahaan waralaba hotel di kota Surabaya dan daerah sekitarnya yang akan menjadi tempat pengimplementasian.
	Pendekatan	ex.) Sheraton, Marriott dan waralaba hotel lainnya.

3. Aktivitas (3)

Item Kegiatan	Langkah-Langkah	
Perusahaan yang memiliki kebijakan mengenai bangunan hijau	Ringkasan	Kebijakan sertifikasi bangunan hijau telah dimulai sejak tahun lalu oleh asosiasi Bangunan Hijau dll. Kota Surabaya dan Sekolah Tinggi Teknik Surabaya berupaya untuk mensosialisasikan Bangunan Hijau. Untuk mendukung upaya ini, kami berencana untuk memilih bangunan yang telah tersertifikasi atau yang akan akan mendapat sertifikasi sebagai bangunan hijau untuk kandidat lokasi proyek JCM.
	Pendekatan	ex.) Mempromosikan program-program yang terkait dengan Bangunan Hijau seperti GB Awareness Award dll.

4. Asumsi pengurangan emisi GRK

Hotel(Pemasangan CHP dan Pendingin Serapan)

Tahun Fiskal	TH2015	TH2016	TH2017	TH2018	TH2019	Total	Lamanya periode	Efektivitas Biaya (ribu yen/t-CO2)
Ukuran bisnis (juta yen/tahun)	300					300 (①)	15 (④)	
Pengurangan emisi GRK (t-CO2/tahun)		3,700	3,700	3,700	3,700	14,800 (②)		①/(②/④) /④ 5.41
Emisi CO2 dari penggunaan energi (t-CO2/tahun)		3,700	3,700	3,700	3,700	14,800 (③)		①/(③/④) /④ 5.41

(Perhitungan pengurangan emisi)
○Emisi Referensi: dihitung dari jumlah bersih listrik yang dihasilkan oleh mesin gas proyek dan jumlah air dingin yang dihasilkan oleh pendingin serapan proyek (absorption chiller)
○Adapun untuk efisiensi pendingin referensi, JCM menyetujui metodologi ID_AM002 "Penghematan Energi dengan Pengenalan Pendingin Sentrifugal Berefisiensi Tinggi" yang akan direferensikan.
○Emisi Proyek: dihitung dari gas alam yang dikonsumsi oleh mesin gas

Gedung Perkantoran(Konversi ke pendingin berefisiensi tinggi)

Tahun Fiskal	TH2015	TH2016	TH2017	TH2018	TH2019	Total	Lamanya periode	Efektivitas Biaya (ribu yen/t-CO2)
Ukuran bisnis (juta yen/tahun)	140					140(①)	15(④)	
Pengurangan emisi GRK (t-CO2/tahun)		200	200	200	200	800(②)		①/(②/④) /④ 46.7
Emisi CO2 dari penggunaan energi (t-CO2/tahun)		200	200	200	200	800(③)		①/(③/④) /④ 46.7

(Perhitungan pengurangan emisi)
○Mesin pendingin, pompa dan daya pendinginan diasumsikan untuk diganti dengan yang memiliki efisiensi tinggi. Karena konsumsi energi pompa dan menara pendingin jauh lebih kecil daripada mesin pendingin (Chiller), target penurunan emisi akan lebih difokuskan pada penggantian chiller.
○Karena mesin pendingin proyek akan diganti dengan mesin pendingin sentrifugal, ID_AM002 "Penghematan Energi dengan Pengenalan Pendingin Sentrifugal Berefisiensi Tinggi" akan diterapkan

4. Asumsi pengurangan emisi GRK

Pusat Perbelanjaan(Konversi ke pendingin berefisiensi tinggi)

Tahun Fiskal	TH2015	TH2016	TH2017	TH2018	TH2019	Total	Lamanya periode	Efektivitas Biaya (ribu yen/t-CO2)
Ukuran bisnis (juta yen/tahun)	470					470 (①)	15 (④)	
Pengurangan emisi GRK (t-CO2/tahun)		4,100	4,100	4,100	4,100	16,400 (②)		①/(②/④) /④ 7.64
Emisi CO2 dari penggunaan energi (t-CO2/tahun)		4,100	4,100	4,100	4,100	16,400 (③)		①/(③/④) /④ 7.64

(Perhitungan pengurangan emisi)
○Mesin pendingin, pompa dan daya pendinginan diasumsikan untuk diganti dengan yang memiliki efisiensi tinggi. Karena konsumsi energi pompa dan menara pendingin jauh lebih kecil daripada mesin pendingin (Chiller), target penurunan emisi akan lebih difokuskan pada penggantian chiller.
○Karena mesin pendingin proyek akan diganti dengan mesin pendingin sentrifugal, ID_AM002 "Penghematan Energi dengan Pengenalan Pendingin Sentrifugal Berefisiensi Tinggi" akan diterapkan

Pemasangan System CHP(Kogenerasi)

Tahun Fiskal	TH2015	TH2016	TH2017	TH2018	TH2019	Total	Lamanya periode	Efektivitas Biaya (ribu yen/t-CO2)
Ukuran bisnis (juta yen/tahun)	4,500	4,500				9,000 (①)	15 (④)	
Pengurangan emisi GRK (t-CO2/tahun)			114,000	114,000	114,000	342,000 (②)		①/(②/③) /④ 5.26
Emisi CO2 dari penggunaan energi (t-CO2/tahun)			114,000	114,000	114,000	342,000 (③)		①/(③/③) /④ 5.26

(Perhitungan pengurangan emisi)
○Emisi Referensi: dihitung dari konsumsi listrik, konsumsi gas, dan jumlah pasokan listrik untuk PLN. Ini dihitung berdasarkan jumlah pasokan energi aktual dari mesin CHP.
○Emisi Proyek:dihitung dari gas alam yang dikonsumsi oleh mesin kogenerasi

5. Jadwal

Item Kegiatan	TH2015 4	5	6	7	8	9	10	11	12	TH2016 1	2	3
Konferensi(sekitar dua kali, @Kota Kitakyushu)		☆ Permulaan				☆ Konferensi Pertama (Pertemuan laporan interim)				☆ Konferensi Kedua (Pertemuan laporan akhir)		
Lokakarya Lapangan(sekitar dua kali)		☆ Permulaan					☆ Laporan interim			☆ Laporan akhir		
1. Perwujudan dan Realisasi proyek yang ada		Investigasi Kredit			Pengujian efektivitas biaya, rincian dan model bisnis.					Persiapan penerapan subsidi untuk pemasangan peralatan.		
2-1. Promosi kepada perusahaan (pemilik) real estate		Membangun Channel dengan manajemen puncak perusahaan terkenal			Konsultasi		Dukungan untuk pembembangan kota hijau oleh kota Surabaya (bertukar memorandum, dll)					
		Konsultasi dengan Kota Surabaya (memilih target baru)		Proposal dan penjelasan mengenai proyek JCM		Konsultasi, pertimbangan efektivitas biaya, model bisnis, dll.		Pemilihan lokasi proyek model		Mulai membembangkan proyek model		
2-2. Promosi kepada waralaba hotel		Membangun Channel dengan manajemen puncak perusahaan terkenal			Konsultasi		Dukungan untuk pembembangan kota hijau oleh kota Surabaya (bertukar memorandum, dll)					
		Konsultasi dengan Kota Surabaya (memilih target baru)		Proposal dan penjelasan mengenai proyek JCM		Konsultasi, pengujian efektivitas biaya, model bisnis, dll.		Pemilihan lokasi proyek model		Mulai membembangkan proyek model		
2-3. Perusahaan yang memiliki kebijakan mengenai bangunan hijau		Konfirmasi negara saat ini mengenai kebijakan Bangunan Hijau dan pemeiksaan terhadap kemungkinan untuk perusahaan			Persiapan pembuatan dokumen proposal dan mengadakan pertemuan luar biasa			Konsultasi dan persiapan penyelesaian dokumen proposal				
Pelaporan							☆(draf)				☆(Draf akhir) ☆(Laporan Akhir)	
Survei Lapangan		☆			☆		☆	☆		☆		

Sektor Limbah

"Mempromosikan Daur Ulang Limbah Industri Jenis Rendah Karbon"

Rapat Permulaan di Surabaya, Indonesia
28 Mei 28, 2015

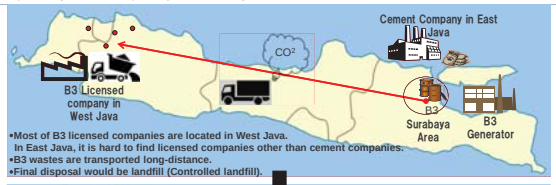
AMITA CORPORATION
NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

1. Sektor Limbah - Ringkasan

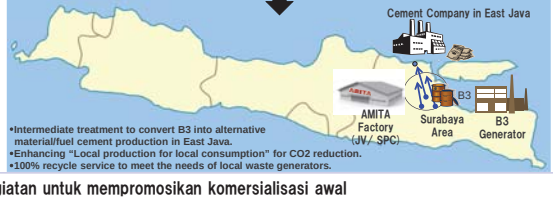
Ringkasan Proyek

- Promosi bahan baku semen / bahan bakar yang berasal dari limbah industri termasuk biomassa
- Mengembangkan metode kuantifikasi pengurangan emisi CO2, seperti metodologi MRV yang mempertimbangkan jarak transportasi

【Current Situation】



【Proposal】

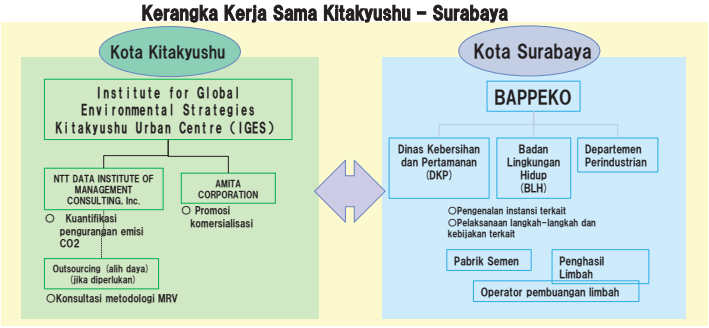


Kegiatan Utama

① Kegiatan untuk mempromosikan komersialisasi awal
② Kuantifikasi pengurangan emisi CO2 dengan mempertimbangkan pemendekan jarak transportasi dan peningkatan rasio biomassa

2. Sektor Limbah – Struktur Kerjasama

Kerangka Kerja Sama Kitakyushu – Surabaya



○Penghasil Limbah

○Pabrik semen yang berpotensi akan menerima bahan baku semen

3. Latar Belakang Proyek

① Sebagian besar limbah industri (limbah berbahaya) yang dihasilkan di dalam dan di luar kota Surabaya diangkut dengan jarak lebih dari 800km ke instalasi pengolahan di Jawa Barat.

- ◆ Biaya transportasi dan emisi CO2 dari konsumsi bahan bakar akan berkurang dengan adanya proyek yang diusulkan ini.

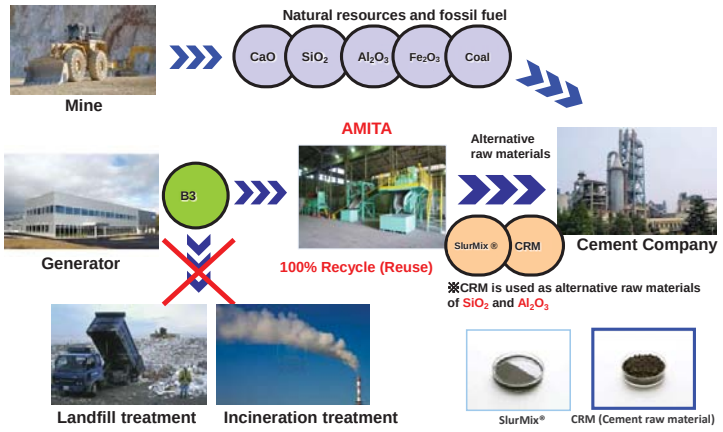
② Saat ini, pabrik semen menerima limbah peleburan tembaga (copper slag), terak tanur tinggi (blast-furnace slag), limbah biomassa, dll sebagai bahan baku.

- ◆ Tingkat penerimaan sekitar sepertiga dari yang diterima dari Jepang dan ada ruang untuk menambah tingkat penggunaan bahan baku yang berasal dari limbah industri.

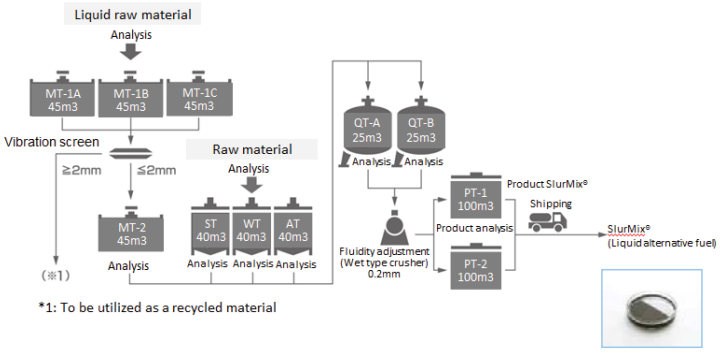
③ Baru-baru ini dengan adanya perubahan undang-undang mengenai pengelolaan limbah di Indonesia, tuntutan kepatuhan hukum atas pengolahan limbah berbahaya secara tepat menjadi semakin ketat sehubungan dengan tanggung jawab penghasil limbah.

- ◆ Proyek ini akan memenuhi peningkatan kebutuhan pengolahan yang tepat atas limbah berbahaya.

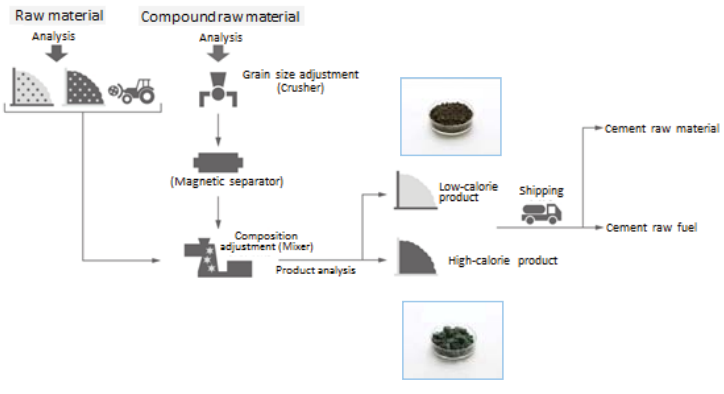
4. Gambaran Proyek



4. Gambaran Proyek – Jalur Daur Ulang (1) SlurMix® –



4. Gambaran Proyek – Jalur Daur Ulang (2) Bahan Baku Semen (CRM) –



5. Muatan Kegiatan ①

Item Kegiatan	Langkah-Langkah
Promosi Komersialisasi	○ Survei terinci berdasarkan kajian dua tahun terakhir □Penghasil Limbah: Pengumpulan data terinci mengenai jumlah limbah yang dihasilkan, biaya pengolahan, jarak transportasi, dll. □Pabrik Semen: Pembahasan rinci mengenai harga, kondisi, jumlah penerimaan CRM. Pengujian konversi fasilitas pabrik semen untuk memperkenalkan CRM. □Fasilitas pengolahan antara untuk merubah limbah B3 menjadi CRM dan SlurMix: perkiraaan biaya, profitabilitas bisnis, dll. ○ Survei bekerjasama dengan kota Surabaya □Jumlah limbah biomassa yang dihasilkan □Identifikasi lokasi pembangunan fasilitas pengolahan antaran untuk merubah limbah B3 menjadi CRM dan SlurMix ○ Survei Teknis □Teknologi untuk memproduksi bahan baku semen dari limbah biomassa ○ Negosiasi tahapan bisnis □Membangun konsensus di antara para pemangku kepentingan

5. Muatan Kegiatan ②

Item Kegiatan	Langkah-Langkah
Kuantifikasi Pengurangan Emisi CO2 ◆Pengurangan Jarak Transportasi	○Efek pengurangan emisi CO2 □Pengumpulan data mengenai angkutan jalan raya □Survei wawancara dengan pelaku bisnis terkait ○Penerapan JCM □Referensi / skenario proyek □Unit dasar yang dibutuhkan untuk perhitungan emisi CO2 □Item Monitoring □ (Jika diperlukan) (1) Outsourcing kepada organisasi keahlian metodologi MRV, dan (2) Wawancara dengan JC Indonesia
Kuantifikasi Pengurangan Emisi CO2 ◆Peningkatan Kadar Biomassa	○Efek pengurangan emisi CO2 □ Pengujian jenis dan jumlah biomassa yang dapat dimasukkan ke dalam bahan baku semen □ Pemeriksaan kondisi pembangkit listrk dengan memanfaatkan gas buang (exhaust heat recovery power generation) di pabrik semen yang menerima CRM ○Penerapan JCM □ Referensi / skenario proyek □ Unit dasar yang dibutuhkan untuk perhitungan emisi CO2 □ Item Monitoring □ (Jika diperlukan) (1) Outsourcing kepada organisasi keahlian metodologi MRV, dan (2) Wawancara dengan JC Indonesia

6. Asumsi Jumlah Pengurangan Emisi GRK

※ Targetnya adalah Tahun Fiskal 2017 untuk memulai bisnis.

Angka-angka di bawah ini menunjukkan perkiraan kasar estimasi pengurangan emisi CO2 dengan SlurMix

Tahun Fiskal	TH 2017	TH 2018	TH 2019	TH 2020	TH 2021	Total	Lamanya periode	Efektivitas Biaya (ribu yen/t-CO2)
Skala Bisnis (juta yen/th)	340					① 340	④ 9	
Pengurangan Emisi GRK (t-CO2/th)		6,197	6,197	6,197	6,197	② 24,788		①/(②/④)/④) 6.1
Pengurangan Emisi CO2 dari Energi Asal (t-CO2/th)		6,197	6,197	6,197	6,197	③ 24,788		①/(③/④)/④) 6.1

○Emisi CO2 Referensi: Dihitung dengan menetapkan faktor emisi CO2, dll. Dalam hal CRM TIDAK digunakan.
○Emisi CO2 Proyek: Dihitung dengan menetapkan faktor emisi CO2, dll. Dalam hal CRM digunakan.

7. Jadwal Proyek (TH2015)

Item Kegiatan	Tahun 2015								Tahun 2016		
	Mei	Juni	Juli	Agt.	Sep.	Okt.	Nov.	Des.	Jan.	Feb.	Mar.
○ Pertemuan Domestik (Kota Kitakyushu)					#1☆ (Pertemuan untuk laporan interim)				#2☆ (Pertemuan untuk Akhir)		Laporan
○ Workshop (Surabaya)	☆ Permulaan					☆ Laporan Interim			☆ Laporan Akhir		
○ Studi Lapangan	☆	☆		☆		☆		☆			
1. Promosi Komersialisasi	Survei Terinci mengenai Pembangkit Listrik, Jarak Transportasi, dll				Survei dan Konsultasi mengenai persyaratan penjualan			Konsultasi dan Negosiasi tentang tahapan bisnis			
	Survei Biomassa (jumlah potensi, teknologi untuk mengkonversi, pendekatan pengumpulan, jarak transportasi, dll)				Pemeriksaan pembangunan fasilitas pengolahan antara (Lokasi, skala, dll)			Perkiraan biaya, Profitabilitas bisnis			
2. Kuantifikasi Pengurangan Emisi CO2 Transportasi		Pengumpulan dan penyusunan data untuk penghitungan			Pengembangan Skenario Referensi		Pengembangan Skenario Proyek		Konsultasi dengan para ahli dan pihak-pihak yang terlibat (seperti: JC)		
2. Kuantifikasi Pengurangan Emisi CO2 Biomassa		Pengumpulan dan penyusunan data untuk penghitungan			Pengembangan Skenario Referensi		Pengembangan Skenario Proyek		Konsultasi dengan para ahli dan pihak-pihak yang terlibat (seperti: JC)		
4. Survei mengenai Informasi yang Berhubungan	Pengumpulan Informasi (seperti: data dasar, hukum, peraturan, dll.)										
○ Penulisan Laporan						☆ Draf (30 Okt)				☆ Draf Akhir (5 Feb.)	☆ Laporan Akhir (4 Mar)

Rencana di Masa Yang Akan Datang

◇ JV/SPC Formation

◇Implementation Schedule

FY2015
- Selection of local partner
- Consensus between relative administration
- Fund raising

FY2016
- JV contract with local partner
- Related application for license

FY2017
- Plant construction, Start operation

AMITA
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変える力を、ともに生み出す。

Perkembangan terkini skema JCM Indonesia

Ratu Keni Atika
Indonesia JCM Secretariat

Coordinating Ministry for Economic Affairs Republic of Indonesia

JCM JOINT CREDITING MECHANISM INDONESIA SECRETARIAT

JICA

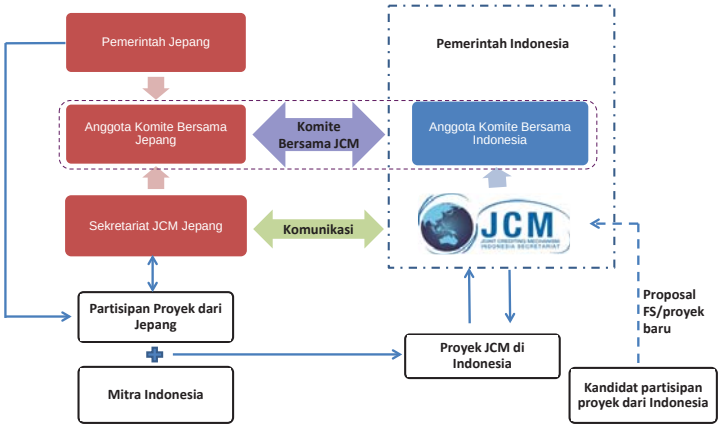
Outline presentasi

- Konsep dasar JCM
- Perkembangan terkini
- Skema pembiayaan JCM
- Kerja sama antar kota dalam skema JCM

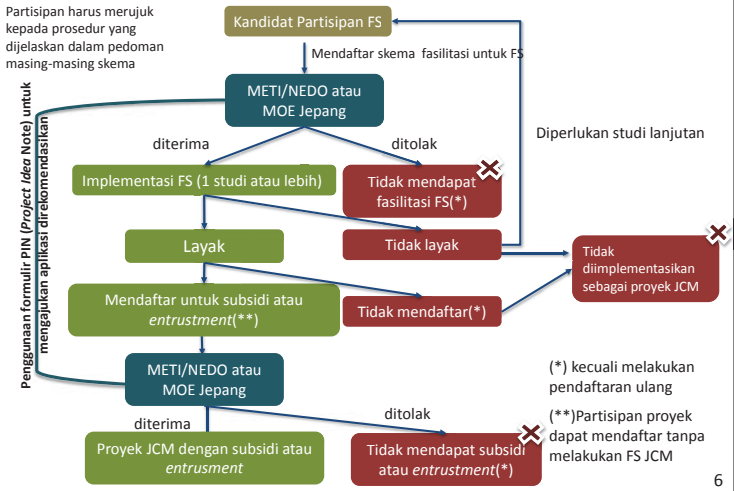
Konsep dasar JCM

- ***The Joint Crediting Mechanism*** atau Mekanisme Kredit Bersama antara Indonesia dan Jepang merupakan skema kerjasama antar pemerintah yang mendorong organisasi-organisasi swasta Jepang untuk bekerja sama dengan Indonesia dalam berinvestasi di kegiatan pembangungan rendah karbon di Indonesia dengan insentif dari pemerintah Jepang.
- **Kerjasama JCM tidak hanya dilakukan oleh Jepang dengan Indonesia, tetapi juga dengan 11 negara berkembang lainnya.**
- ***Dokumen Kerjasama Bilateral* tentang *Joint Crediting Mechanism untuk Kemitraan Pertumbuhan Rendah Karbon antara Republik Indonesia dan Jepang telah ditandatangani*** oleh Menteri Koordinator Perekonomian Indonesia dan Menteri Luar Negeri Jepang.
- **Tujuan JCM adalah:**
  1. Memfasilitasi penyebaran teknologi rendah karbon terkini, produk, sistem, jasa, dan infrastruktur serta implementasi kegiatan mitigasi, dan berkontribusi kepada pembangunan berkelanjutan di negara berkembang.
  2. Mengevaluasi secara akurat seluruh kontribusi penurunan atau pemusnahan emisi Gas Rumah Kaca (GRK) dari negara tuan rumah (dalam hal ini, Indonesia) secara kuantitatif, melalui langkah-langkah mitigasi yang diimplementasikan di negara tuan rumah dan menggunakan penurunan atau pemusnahan emisi tersebut untuk mencapai target penurunan emisi
  3. Berkontribusi terhadap pencapaian tujuan utama UNFCCC melalui fasilitasi langkah-langkah global untuk pengurangan atau penurunan emisi.

Sekretariat JCM Indonesia



Tahapan FS di JCM

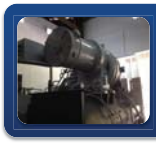


Tahapan Proyek JCM

*PDD: Project Design Document

FS di Indonesia (2010-2014)

Proyek yang telah teregistrasi



Energy Saving for Air-Conditioning and Process Cooling by Introducing High-efficiency Centrifugal Chiller

- Ebara Equipment & Systems dan PT Primatexco Indonesia
- Perkiraan penurunan emisi hingga 2020 adalah sebesar **799 tCO_2 eq**

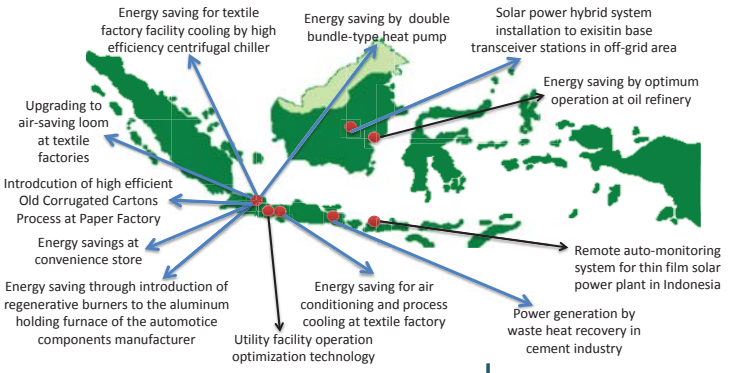
Project of Introducing High Efficiency Refrigerator to a Food Industry Cold Storage in Indonesia

- Mayekawa MFG Co., Ltd dan PT Adib Global Food Supplies
- Perkiraan penurunan emisi hingga 2020 adalah sebesar **845 tCO_2 eq**

Project of Introducing High Efficiency Refrigerator to a Frozen Food Processing Plant in Indonesia

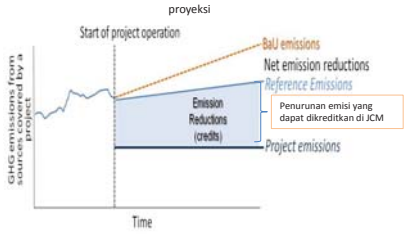
- Mayekawa MFG Co., Ltd dan PT Adib Global Food Supplies
- Perkiraan penurunan emisi hingga 2020 adalah sebesar **151 tCO_2 eq**

Proyek yang sedang berjalan



12 proyek = 10 Efisiensi energi + 2 Energi terbarukan

Metodologi JCM di Indonesia



Reference emission:
Emisi yang dihasilkan teknologi yang saat ini berada di pasaran

Peran Sekretariat JCM Indonesia dalam pengusulan metodologi:

- Peninjauan tenaga ahli
- Penggunaan *methodology review form*
- Diskusi dengan kementerian terkait ministries
- Menyiapkan website untuk komentar publik

Metodologi JCM di Indonesia

- **8 metodologi yang disetujui**
  1. Power Generation by Waste Heat Recovery in Cement Industry
  2. Energy Saving by High-Efficiency Centrifugal Chiller
  3. Installation of Energy-Efficient Refrigerators Natural Refrigerants at Food Industry Cold Storage and Frozen Food Processing Plant
  4. Installation of Air-Conditioning for Grocery Store
  5. Installation of LED lighting for grocery store
  6. GHG emission reductions through optimization of refinery plant
  7. GHG emission reductions through optimization of boiler operation in Indonesia
  8. Installation of a separate type fridge-freezer showcase by using natural refrigerant for grocery store to reduce air-conditioning load inside the store
- **2 usulan metodologi yang dikembangkan**
  1. Replacement of conventional burners with regenerative buners for aluminum holding furnaces
  2. Introducing double-bundle modular electric heat pumps to a new building

Skema pembiayaan proyek JCM dari MOEJ (Kementerian Lingkungan Jepang)

- Meliputi separuh dari biaya instalasi peralatan pengurang gas rumah kaca (GRK) yang dipasang
- Harus ada konsorsium internasional yang bersifat business to business
- Kredit pengurangan emisi karbon yang akan didapat MOEJ akan setara dengan besar investasinya

Subsidi diberikan sampai dengan maksimal 50% dari total nilai proyek

Biaya awal untuk pemasangan **peralatan baru**

Biaya konstruksi dan biaya terkait, biaya peralatan, biaya survei dan uji, biaya administrasi, serta **peralatan pemantauan**

Teknologi untuk mengurangi emisi CO2 dari sumber yang berhubungan dengan energi atau sumber emisi lain

- Peserta proyek

Entitas Jepang
Entitas Indonesia

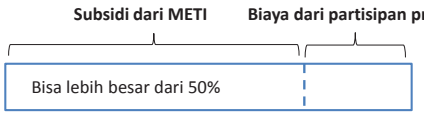
GEC: Global Environment Center Foundation, secretariat untuk skema subsidi MOEJ

Konsorsium internasional → **Mengirim proposal subsidi kepada MOEJ melalui GEC**

Biaya yang dibiayai subsidi MOEJ (Kementerian Lingkungan Jepang)

Jenis	Penjelasan
Biaya konstruksi	Biaya bahan Biaya tenaga kerja Biaya langsung (termasuk biaya listrik dan biaya air untuk konstruksi, biaya mesin, dll) biaya administrasi
Biaya pekerjaan tambahan	–
Biaya survey dan pengukuran	Biaya penelitian Biaya desain Biaya survei dan pengukuran
Biaya administrasi	Gaji staf Biaya operasional Biaya perjalanan Biaya sewa dll

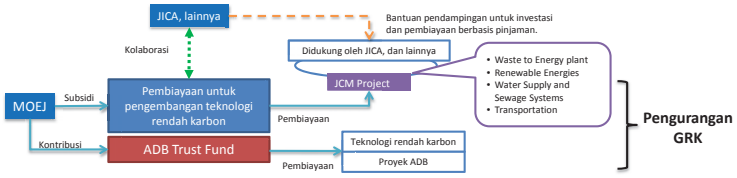
Biaya yang dibiayai subsidi METI (Kementerian Ekonomi, Perdagangan dan Industri Jepang)



Subsidi yang diberikan tergantung dari negosiasi dengan pihak METI

- Untuk beberapa waktu, peralatan tetap menjadi milik METI untuk kemudian diserahterimakan kepada peserta proyek.
- Subsidi langsung pada peralatan, barang modal, dan pengembangan kapasitas dari penerima proyek.
- Tidak membutuhkan konsorsium internasional.

Biaya menggunakan program pengembangan "leap-frog" oleh MOE



Pembiayaan untuk ekspansi teknologi rendah karbon

Budget untuk tahun fiskal 2014
4,2 Miliar Yen (42 juta USD)

Skema
Membiayai proyek yang memiliki efisiensi lebih baik dalam pengurangan emisi GRK dengan kolaborasi antara proyek lain yang didukung JICA dan organisasi nasional lain

Tujuan
Untuk mengekspansi teknologi rendah karbon yang terdepan dan superior dalam membangun masyarakat rendah karbon dalam skala kota dan skala area di lingkup yang lebih luas dan untuk mendapatkan kredit dari JCM

Trust Fund ADB

Budget untuk tahun fiskal 2015
1,8 Miliar Yen (18 juta USD)

Skema
Memberikan insentif finansial untuk adopsi teknologi rendah karbon terdepan yang dapat mengurangi emisi GRK dalam jumlah besar namun memiliki biaya yang tinggi dalam proyek yang dibiayai ADB

Tujuan
Untuk mengembangkan proyek ADB sebagai perkembangan "lompatan kodok" dengan teknologi terdepan dan untuk menunjukkan efektivitas dari skema JCM dengan akusisi kredit JCM

Pembiayaan dari ADB dengan program JFJCM

- JFJCM membantu membiayai biaya tambahan dari teknologi rendah karbon untuk penurunan emisi GRK
- Saat ini sebanyak 16.6 juta USD dikontribusikan untuk JFJCM
- Kedepannya diharapkan jumlah kontribusi bertambah
- *Grant* maksimum: 10 juta USD

Sovereign Projects

- Proyek dengan pemerintah
- (i) biaya proyek < 50 juta USD : Sekitar 5 juta USD
- (ii) Biaya proyek > 50 juta USD : 10% total biaya proyek atau 10 juta USD
- Bantuan dalam berupa *grant*

Non-sovereign Projects

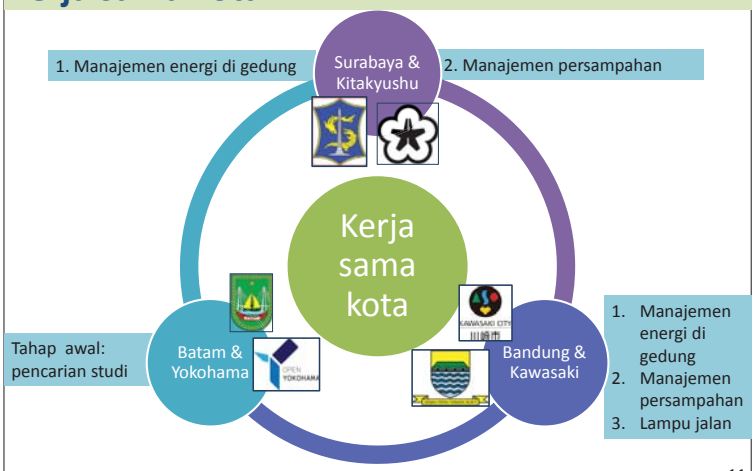
- Proyek dengan non-pemerintah (swasta)
- Pembiayaan maksimum: <10% total biaya proyek atau 10 juta USD
- Membantu *margin component* dengan bunga *loan* ADB

Kontak ADB untuk mengetahui lebih lanjut *fund* JCM: Ryozo Sugimoto (rsugimoto@adb.org)

Komunikasi dan aktivitas M&E

Memastikan PP dari kedua pihak memahami JCM:
- PP dari Japan mungkin memahami skema JCM, tapi tidak memahami peraturan di Indonesia
- PP dari Indonesia mungkin tidak mengetahui bahwa kerja sama yang mereka lakukan dengan pihak Jepang berada di bawah skema JCM.

Perkembangan terkini skema kerja sama kota



Pemeran kerja sama kota dengan skema JCM

Pemda
- Mempersiapkan APBD
- Ketentuan penunjukan langsung?
- Tender?

BUMD
- Ketentuan penunjukan langsung?
- Tender?
- Komitmen manajemen level atas

Swasta
- Lebih fleksibel
- Komitmen manajemen level atas

Terima Kasih!

- Kunjungi website kami: www.jcmindonesia.com
- Hubungi kami: secretariat@jcmindonesia.com

JCM Secretariat Indonesia
Kementerian BUMN Building, 18th floor
Jl. Medan Merdeka Selatan 13, Jakarta 10110

Reference 8　Materials of the Second Workshop in Surabaya (Reporting Workshop)

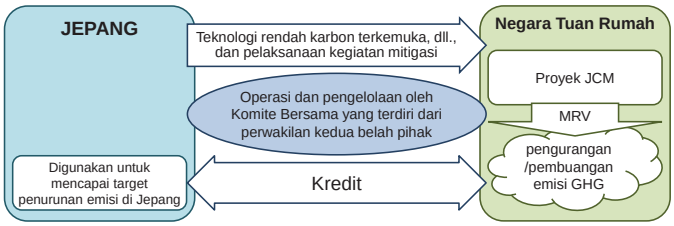
Gambaran Umum dan Studi Kelayakan JCM di Surabaya

Yatsuka KATAOKA
Kitakyushu Urban Center
Institute untuk Global Environmental Strategies

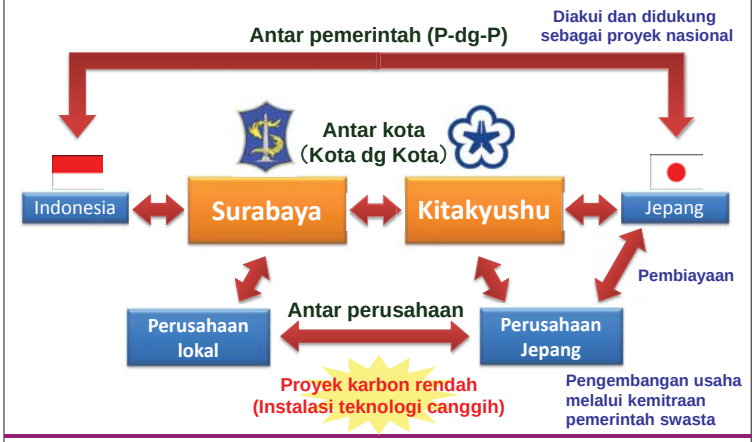
Laporan lokakarya untuk Studi Kelayakan Joint Crediting Mechanism (JCM) di Surabaya, FY2015
15 Januari 2015, BAPPEKO, Kota Surabaya

IGES Institute for Global Environmental Strategies

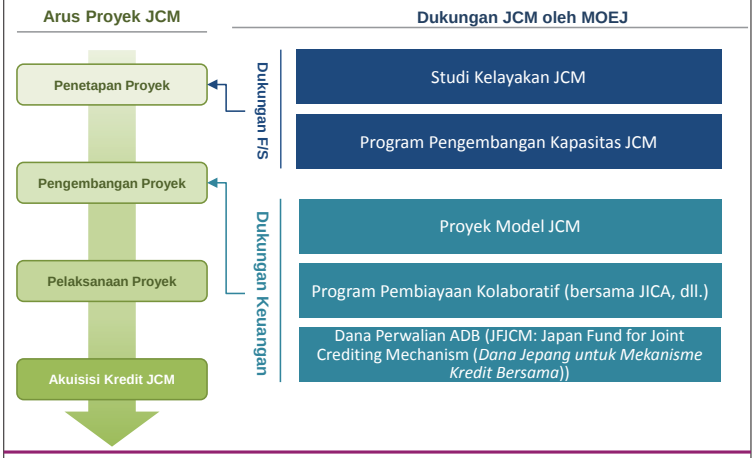
Konsep Dasar Joint Crediting Mechanism (JCM)



JCM kolaborasi Kota dengan Kota



Arus Proyek JCM dan Dukungan JCM oleh MOEJ



Keuntungan

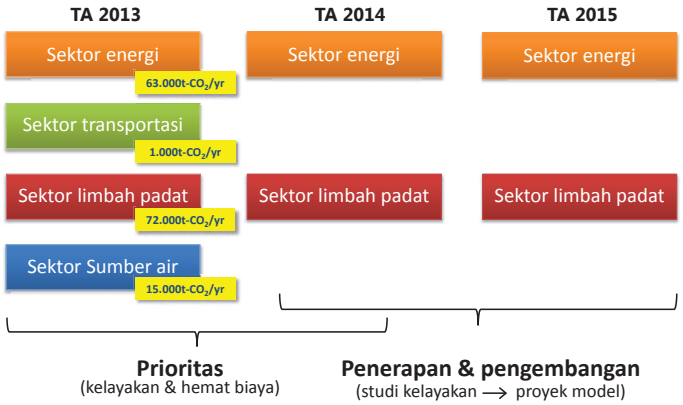
PERUSAHAAN DAERAH

- ✓ Teknologi rendah karbon Jepang dapat diperkenalkan dengan biaya rendah
- ✓ Biaya operasi berkurang karena efisiensi dan daya tahan yang tinggi
- ✓ Dukungan oleh kedua kota dapat diharapkan

PEMERINTAH DAERAH

- ✓ Sasaran rendah karbon dapat tercapai dengan biaya administrasi yang lebih rendah
- ✓ Pengurangan CO_2 dapat menyebabkan mitigasi pencemaran dan peningkatan kualitas hidup
- ✓ Tindak lanjut jangka panjang dapat diterima melalui kerja sama antar kota

Peralihan JCM F/S di Surabaya



Bentuk Kerja Sama JCM F/S TA 2015

Kitakyushu Asian Center for Low Carbon Society *(Pusat Kitakyushu Asia untuk Masyarakat Karbon Rendah)*

Kerja sama kebijakan

Kota Kitakyushu ⟷ **Kota Surabaya**

Institute for Global Environmental Strategy (IGES)

- Badan Perencanaan Pembangunan Kota (BAPPEKO)
- Departemen Kerjasama
- Dinas Kebersihan dan Pertamanan (DKP)
- Badan Lingkungan Hidup (BLH)
- Departemen Industri

Sektor energi

NTT DATA Institute of Management Consulting, Inc.

NTT Facilities, Inc.
Fuji Electric Co., Ltd.
Nippon Steel & Sumikin Engineering Co., Ltd.

- Perusahaan Daerah (Gedung kantor, Hotel, Pusat perbelanjaan)
- Sekolah Tinggi Teknik Surabaya
- Asosiasi Bangunan Gedung Hijau
- Kawasan industri (PT SIER, PT PIER)

Sektor limbah padat

NTT DATA Institute of Management Consulting, Inc.

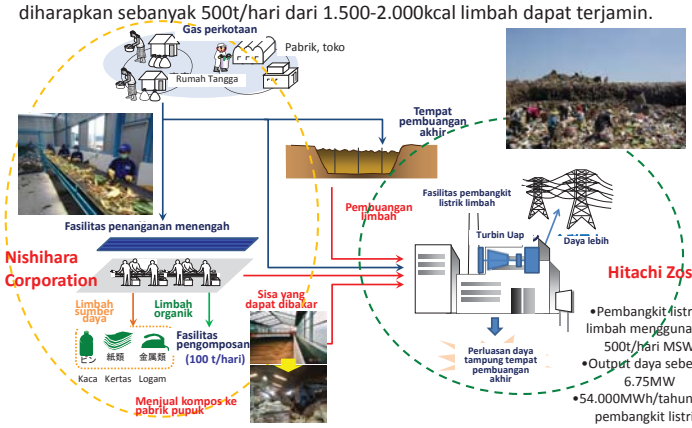
AMITA CORPORATION

- Perusahaan semen (PT Holcim Indonesia, PT Semen Indonesia),
- Perusahaan Berlisensi B3 (PT Westec International, PLIB)

Pembangkit Listrik Limbah dari Limbah Perkotaan

Hitachi Zosen

➢Dengan menggabungkan limbah kalori tinggi (Pemisahan dan pengomposan residu, limbah dipindahkan oleh Nishihara Corporation) dengan limbah perkotaan umum, diharapkan sebanyak 500t/hari dari 1.500-2.000kcal limbah dapat terjamin.



- Pembangkit listrik limbah menggunakan 500t/hari MSW
- Output daya sebesar 6.75MW
- 54.000MWh/tahun dari pembangkit listrik.

Studi Sektor Energi
"Penghematan Energi dan Pembangkit Tersebar di Bangunan Gedung dan Taman industri dll."

15 Jan. 2016 Lokakarya (Surabaya Indonesia)
NTT DATA Institute of Management Consulting, Inc.

NTT DATA

1. Sektor Energi -Ringkasan

Indonesia NTT DATA

Ringkasan Proyek

Kami berusaha mengembangkan proyek instalasi teknologi Penghematan Energi dan Pembangkit Tersebar berbasis komersial pada bangunan gedung layak pakai dll. Selain itu, dalam rangka peluncuran proyek-proyek baru dan perluasannya, kami mencoba melakukan kegiatan dengan fokus pada perusahaan real estat dan waralaba hotel dll, dan juga berusaha untuk bekerjasama dengan kota Surabaya sesuai kebijakan pengembangan Bangunan Gedung Hijau.

Fasilitas target	Penghematan Energi dan Pembangkit Tersebar
Hotel Gedung perkantoran Gedung komersial	 Kogenerasi: Gas alam → Mesin gas; Air panas → Chiller Penyerapan; Air dingin → FCU/AHU; Udara dingin → Kamar tamu dll. ※FCU : Fan coil unit (Unit gulungan kipas) AHU : Air Hundring Unit (unit hundring udara) Listrik

Kegiatan Utama

①Kegiatan dalam mewujudkan proyek percontohan
②Kegiatan untuk perluasan area
③Perusahaan dengan kebijakan bangunan gedung hijau di kota Surabaya

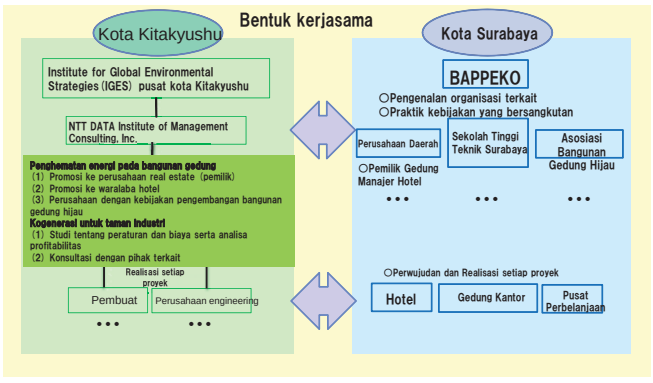
Perwujudan dan Realisasi setiap proyek

+

Mengembangkan ruang bawah tanah untuk perluasan wilayah di Sektor Komersial

2. Bentuj Kerjasama

NTT DATA



3. Proses Penelitian

NTT DATA

Kami tidak hanya meluncurkan proyek-proyek komersial yang sedang berjalan dari tahun anggaran terakhir, tetapi juga mulai memperkenalkan upaya kami dari tiga sudut pandang guna meningkatkan proyek dalam tahun anggaran ini.

Komersialisasi proyek yang sedang berjalan

○Kami mengerjakan proyek-proyek yang sudah dikembangkan dan dikelola dari tahun-tahun sebelumnya guna mengenalkan teknologi paling tepat, pengerjaan desain yang optimal dan mengarahkan proyek, agar kegiatan dalam program pembiayaan memperhitungkan setiap tantangan dalam proyek itu sendiri.

Peningkatan skala proyek melalui ekspansi area

Promosi ke perusahaan real estat (Pemilik)

○Dalam rangka promosi penghematan energi dan upaya pengurangan CO2 untuk bangunan gedung yang baru dibangun dan yang sudah lama, akan dilakukan konsultasi bersama perusahaan real estate (pemilik) di kota Surabaya dan sekitarnya.
○Kegiatan promosi ke perusahaan real estate (pemilik) tidak hanya memulai konsultasi mengenai penerapan metode JCM tetapi juga akan dilakukan pengembangan dan pengaturan target baru.

Promosi ke waralaba hotel dll.

○ Dalam rangka promosi penghematan energi dan upaya pengurangan CO2 untuk bangunan gedung yang baru dibangun dan yang sudah lama, akan dilakukan konsultasi bersama perusahaan real estate (pemilik) di kota Surabaya dan sekitarnya.

○Promosi kegiatan ke waralaba hotel tidak hanya memulai konsultasi mengenai penerapan metode JCM tetapi juga akan dilakukan pengembangan dan pengaturan target baru.

Perusahaan dengan kebijakan bangunan gedung hijau

○Kebijakan sertifikasi bangunan gedung hijau telah dimulai tahun lalu oleh asosiasi Bangunan Gedung Hijau dll. Kota Surabaya dan Sekolah Tinggi Teknik Surabaya melakukan upaya ke arah penyebaran bangunan gedung hijau. Bekerjasama dalam upaya ini, kami berencana memilih bangunan gedung hijau yang telah bersertifikat atau akan bersertifikat sebagai calon lokasi proyek JCM.

○Bekerja sama dengan GB Awareness Award (sebuah program indoktrinasi kota Surabaya guna pengenalan Bangunan Gedung Hijau yang lebih luas dimulai tahun lalu) dll., akan dilakukan pengembangan dasar dalam rangka kerjasama dengan pemilik bangunan gedung yang tertarik dengan penghematan energi dan pengurangan CO2.

4. Kegiatan (1) Promosi komersialisasi proyek yang sedang berjalan

Komersialisasi Pemasangan Instalasi untuk proyek yang sedang berjalan telah mendekati program pembiayaan JCM MOE-J TA 2015.

Proyek	Pengurangan CO_2 (tCO_2/t)	Perkembangan
Penghematan energi di pusat perbelanjaan dengan Memperkenalkan chiller turbo efisiensi tinggi	996	Menerapkan program pembiayaan JCM MOE-J TA 2015, dan digunakan sebagai kasus pertama Proyek Surabaya. Penyesuaian pemakaian waktu untuk permulaan bisnis telah cukup dilakukan.
Memasang sistem Kogenerasi di hotel-hotel	3.200	Menerapkan program pembiayaan, dan pemberitahuan penggunaan tidak resmi telah diumumkan. Namun, persetujuan konsorsium resmi untuk pelaksanaan proyek belum diputuskan antara Fuji electric Do., Ltd. dengan pemilik hotel setempat
...		Sebagai alasan utama, pada pengenalan kogenerasi, penyusunan kontrak pembangkit listrik swasta tambahan belum disetujui perusahaan listrik negara; atau kontrak suplai gas dasar jangka panjang dengan perusahaan gas negara belum menyepakati harga, oleh karena itu suplai yang stabil belum bisa dijamin. Kami telah menjelaskan situasi tersebut kepada kantor JCM Indonesia.

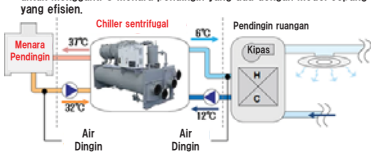
(Referensi) Penghematan energi pada pusat perbelanjaan dengan Memperkenalkan chiller turbo Efisiensi tinggi

■Peserta Proyek
(Japan) : NTT FACILITIES, INC., Peserta Proyek
(Indonesia) : PT.PAKUWON JATI Tbk

■Peta

■Ikhtisar Kegiatan Mitigasi GRK

Tujuan proyek untuk mengurangi pemakaian listrik dalam pusat perbelanjaan melalui sistem Chiller Sentrifugal Jepang yang canggih & efisien.
Proyek ini bertujuan mengganti sistem pendingin yang telah ada dengan chiller sentrifugal tinggi yang memiliki kapasitas 966TR *4 set dan 569TR * 1 set di pusat perbelanjaan Pakuwon, Tunjungan Plaza, serta untuk mengganti 8 menara pendingin yang ada dengan model Jepang yang efisien.



Centrifugal Chiller pada sistem A/C

■Pengurangan Emisi GHG yang Diharapkan

996 tCO2/ tahun

Pengurangan emisi GHG dihitung berdasarkan perkiraan pemakaian listrik yang didasarkan pada perkiraan COP sederhana sistem pendingin referensi dan COP proyek chiller sentrifugal serta faktor emisi jaringan.

4. Kegiatan (2) Peningkatan skala proyek melalui perluasan area (A) Perusahaan pemilik Real estat

Kami telah menghubungi via telepon perusahaan pemilik real estat dan mengajukan proposal khusus.

Perusahaan pemilik real estate	Perkembangan
Pemilik A	Pengembang aktif instalasi kompleks. Telah dikembangkan tidak hanya di beberapa kompleks saja (Pusat perbelanjaan, gedung kantor, hotel dan kondominium dll.) di Surabaya tetapi juga di Jakarta. Menyesuaikan komersialisasi proyek yang sedang berjalan, perluasan area sedang dalam pendekatan. Dengan memastikan status pelaksanaan kasus pertama proyek program pembiayaan JCM oleh Pemerintah Jepang yang sedang berjalan, perjanjian untuk proyek tersebut akan diwujudkan dan direalisasikan.
Pemilik B	Memiliki beberapa hotel di Pulau Bali, Jakarta, Jog-Jakarta dan banyak lagi; sebelumnya juga memiliki hotel di Surabaya. Sebagai hotel yang telah memiliki permintaan pendingin dalam skala besar, sangat tertarik dengan pengenalan chiller dan kogenerasi serta secara positif termotivasi dengan adanya proyek program pembiayaan JCM oleh Pemerintah Jepang.

■Masalah yang harus diselesaikan dan Fokus Tantangan

Tidak ada masalah dengan perusahaan umum, beberapa pemilik real estate swasta enggan mengungkapkan kondisi keuangan. Beberapa pemilik juga menyatakan khawatir atas aliran kelancaran Kontrak dengan perusahaan listrik dan gas setempat terkait pengenalan kogenerasi. Oleh karena itu, kami bergerak maju dengan melakukan negosiasi dan meningkatkan pencapaian satu per satu kasus yang ada.

4. Kegiatan (2) Peningkatan skala proyek melalui ekspansi area (B) Waralaba hotel, dll.

Untuk waralaba hotel, dari sudut pandang kinerja operasi, kami menghubungi beberapa pemilik usaha dan mengajukan proposal khusus.

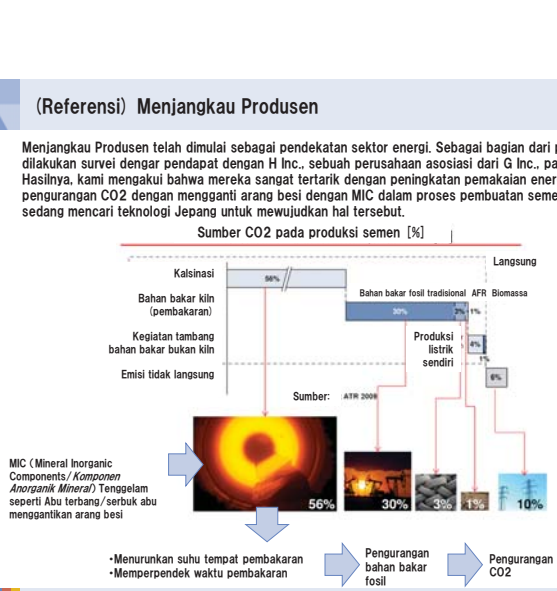
Waralaba hotel dll.	Perkembangan
Waralaba hotel A	Hotel yang beroperasi di Surabaya, Jakarta, dll. Dengan permintaan kamar berpendingin yang besar pada siang hari, mereka sangat tertarik dengan Pembangkit listrik fotovoltaik. Kami memulai survei di hotel Surabaya dengan kondisi atap siap untuk kemungkinan pemasangan panel PV dan memastikan kelayakan.
Waralaba hotel B	Hotel yang beroperasi di Surabaya, Jakarta, dll.: yang dimiliki grup waralaba hotel global dan memiliki kebijakan hemat energi global "hemat listrik 30% dan air 20% sampai 2020".
Pusat perbelanjaan C	Kompleks yang dikembangkan dan dioperasikan termasuk pusat perbelanjaan, hotel, dll., di Surabaya, Jakarta dan kota lain. Pertukaran chiller di pusat perbelanjaan sekarang sedang dalam pemeriksaan.

■Masalah yang harus diselesaikan dan Fokus Tantangan

Waralaba hotel sering hanya melakukan kegiatan hotel. Dalam hal ini, mereka sangat tertarik dengan efisiensi energi, pemakaian energi yang stabil dan penanggulangan terhadap bencana. Di sisi lain, dalam hal fasilitas hotel dimiliki oleh pemilik real estate dan biaya pemakaian ditanggung pemilik real estate, mereka bersikap netral untuk pemasangan fasilitas: keputusan akhir berada di tangan pemilik.; oleh karena itu negosiasi dengan penerima waralaba hotel ingin dilaksanakan dengan melakukan negosiasi dengan pemilik. Hal ini diperlukan untuk membangun skema yang menguntungkan bagi penerima waralaba hotel dan pemilik lokal.

(Referensi) Menjangkau Produsen

Menjangkau Produsen telah dimulai sebagai pendekatan sektor energi. Sebagai bagian dari pendekatan, telah dilakukan survei dengar pendapat dengan H Inc., sebuah perusahaan asosiasi dari G Inc., pabrik semen besar. Hasilnya, kami mengakui bahwa mereka sangat tertarik dengan peningkatan pemakaian energi tertentu dan pengurangan CO2 dengan mengganti arang besi dengan MIC dalam proses pembuatan semen. Geocycle Inc sedang mencari teknologi Jepang untuk mewujudkan hal tersebut.



5. Jadwal

Item Kegiatan	FY2015 4	5	6	7	8	9	10	11	12	FY2016 1	2	3
Konferensi(dua kali, @Kitakyushu City)		☆ Mulai				☆ Konferensi pertama (Rapat laporan sementara)				☆ Konferensi kedua (Rapat laporan akhir)		
Seminar lapangan(dua kali)		☆ Mulai					☆ Laporan sementara			☆ Laporan akhir		
1. Perwujudan dan Realisasi proyek yang ada	Pemeriksaan kredit		Pemeriksaan efektifitas biaya, contoh usaha dan rincian.							Persiapan permohonan subsidi untuk memasang peralatan.		
2-1. Promosi ke perusahaan (pemilik) real estat	Gedung channel (saluran) dengan manajemen puncak perusahaan tertentu			Konsultasi			Mendukung pengembangan kota hijau oleh kota Surabaya (menukar memorandum dll.)					
	Konsultasi dengan kota Surabaya (memilih target baru)		Proposal dan penjelasan proyek JCM		Konsultasi, pertimbangan efektifitas biaya dan model bisnis dll		Pemilihan lokasi proyek percontohan			Mulai mengembangkan proyek percontohan		
2-2. Promosi ke waralaba hotel	Gedung channel (saluran) dengan manajemen puncak perusahaan tertentu			Konsultasi			Mendukung pengembangan kota hijau oleh kota Surabaya (menukar memorandum dll.)					
	Konsultasi dengan kota Surabaya (memilih target baru)		Proposal dan penjelasan proyek JCM		Konsultasi, pertimbangan efektifitas biaya dan model bisnis dll		Pemilihan lokasi proyek percontohan			Mulai mengembangkan proyek percontohan		
2-3. Perusahaan dengan kebijakan bangunan gedung hijau	Menegaskan kondisi saat ini kebijakan Bangunan Gedung Hijau dan pemeriksaan kemungkinan kerjasama			Persiapan membuat dokumen proposal dan melakukan pertemuan tidak rutin			Konsultasi dan persiapan menyelesaikan dokumen proposal					
Pelaporan							☆(konsep)				☆(Konsep akhir) ☆(Laporan akhir)	
Survei lapangan		☆			☆		☆			☆		

Sektor Limbah Surabaya
"Promosi Daur Ulang Limbah Industri Tipe ReKarbon Rendah"

AMITA CORPORATION
NTT DATA INSTITUTE OF MANAGEMENT CONSULTING, Inc.

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1. Waste Sector – Outline

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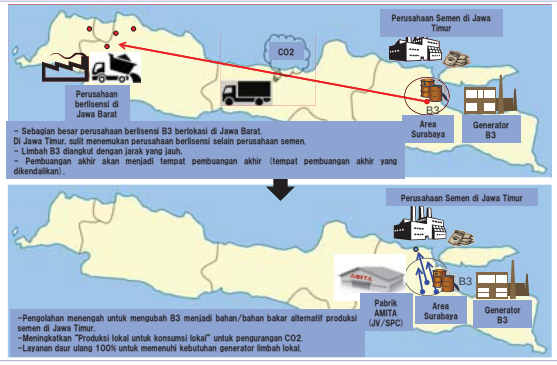
Tujuan

- Promosi daur ulang limbah B3 sebagai bahan mentah semen/bahan bakar
- Pengembangan metode MRV untuk mengukur pengurangan emisi CO2 melalui proyek yang diusulkan

【Situasi Terkini】



【Proposal】

Kegiatan Utama

① Kegiatan untuk mempromosikan komersialisasi awal proyek daur ulang limbah B3
② Kegiatan untuk menghitung pengurangan emisi CO2 mempertimbangkan penggantian insinerasi, meningkatkan rasio input biomassa dan memperpendek jarak transportasi

2. Sektor Limbah – Struktur Kerjasama

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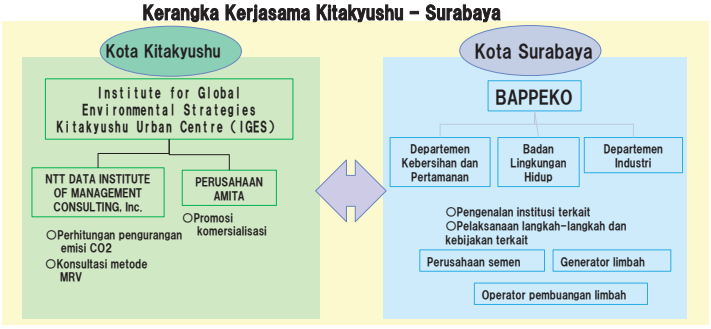
Kerangka Kerjasama Kitakyushu – Surabaya



○Generator limbah
(Surve selesai pada tahun 2013-2014)

○Perusahaan semen yang berpotensi menerima bahan baku semen
(Melanjutkan diskusi…)

3. Latar Belakang Proyek

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① Sebagian besar limbah industri (limbah berbahaya) yang dihasilkan di luar dan di dalam kota Surabaya diangkut dengan menempuh jarak lebih dari 800km ke pabrik pengolahan di Bogor, Jawa Barat.

◆ Biaya transportasi dan emisi CO2 dari pemakaian bahan bakar akan dikurangi melalui proyek yang diajukan.

② Saat ini, perusahaan semen menerima limbah peleburan tembaga, limbah tanur sembur dan limbah biomassa dll. sebagai bahan baku.

◆ Tingkat penerimaan sekitar tiga puluh dari bagian Jepang dan terdapat ruang untuk meningkatkan tingkat tersebut dengan menggunakan bahan baku yang berasal dari limbah industri.

③ Menurut survei dengar dengan perusahaan Jepang di Indonesia, karena amandemen dalam undang-undang pengelolaan limbah, kepatuhan hukum untuk pengolahan limbah berbahaya yang tepat baru-baru ini semakin ketat dalam hal tanggung jawab generator.

◆ Proyek ini akan melayani kebutuhan yang meningkat untuk pengerjaan limbah berbahaya yang tepat.

4. Gambaran Proyek

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- Memproduksi bahan baku/bahan bakar semen alternatif yang berasal dari limbah B3 untuk mempromosikan perputaran sumber daya yang menyumbang pengurangan pemakaian bahan bakar fosil dan dumber daya alam.
- Memeriksa kelayakan usaha menggunakan skema JCM berdasarkan survei terhadap pengurangan emisi CO2 melalui proyek yang diusulkan.

5. Laporan Kegiatan ①
"Promosi Komersialisasi daur ulang limbah B3"

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【Perkembangan diskusi dengan calon mitra usaha】

Tanggal	Diskusi dengan	Kondisi perkembangan
H27.5.27 H27.8.3 H27.11.25	Perusahaan Semen A	○Pada bulan Agustus-Oktober, Perusahaan A positif mendiskusikan kemungkinan kerjasama dengan Amita, anggaran mereka pada TF2016 untuk pengenalan fasilitas pengolahan untuk menerima bahan baku yang berasal dari limbah B3 dalam pabrik semen mereka. Setelah mempertimbangkan, bagaimanapun, ternyata waktu pembayaran akan lebih lama dari prinsip mereka, dan karena perlunya melanjutkan riset pasar guna menjamin jumlah imasukan limbah B3, mereka menarik diri dari rencana investasi mereka, dan dengan demikian akan sulit untuk bekerjasama dengan Amita idalam waktu yang sangat dekat. ○Disisi lain, Perusahaan A sangat tertarik dengan proyek subsidi JCM guna mewujudkan rendah karbon dalam proses produksi semen mereka, dan membicarakan beberapa ide untuk kemungkinan proyek JCM bersama NTT Data Institute of Management Consulting, Inc.
H27.5.26 H27.8.5 H27.11.24	Perusahaan A Berlisensi B3 (Operator pengolahan awal di Jawa Barat)	○Perusahaan A berencana untuk mengenalkan fasilitas pengolahan Amita. ○Saat ini mereka menggunakan pengolahan insinerasi sederhana. Pengenalan pengolahan awal bahan baku/bahan bakar semen akan mewujudkan proses rendah karbon. ○Mereka tertarik menjalankan usaha di Jawa Timur.
H27.8.6 H27.11.24	Perusahaan B Berlisensi B3 (Operator pengolahan awal di Jawa Barat)	○Perusahaan B kini mengedepankan rencana pembangunan pabrik ke-2. ○Sebagaimana Amita mengusulkan Perusahaan B mengenalkan fasilitas Amita, sebaliknya, Perusahaan B tertarik membangun JV bersama Amita. Kami akan terus membicarakan hal ini dengan hati-hati memperhatikan lingkungan usaha di Indonesia.

5. Activity Report ②
"Development of MRV methodology"

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◆ Empat faktor pengurangan emisi CO2
① Penggantian bahan bakar batu bara dengan bahan bakar alternatif dalam pabrik semen.
・・・Menguji perbedaan kepadatan karbon antara batu bara dan bahan bakar alternatif.
② Penggantian insinerasi limbah industri
・・・ Insinerasi sederhana limbah B3 pada tingkat tertentu dianggap sebagai skenario referensi. Rasio insinerasi diselidiki.
③ Menghindari metana dari tempat pembuangan dengan meningkatkan tingkat masukan biomassa.
④ Memperpendak jarak transportasi

・SlurMix®, bahan bakar alternatif cair, di luar lingkup perhitungan pengurangan emisi CO2 karena memiliki kepadatan karbon yang tinggi dan tidak termasuk insinerasi sebagai skenario referensi.
・Scope 3 is out of boundary for method discussion.

【Perhitungan emisi referensi】
RE = (Emisi dari pemakaian bahan bakar batu bara di pabrik semen)+(Emisi dari insinerasi)+ (Emisis metana dari tempat pembuangan) +(Emisi dari transportasi)

【Perhitungan emisi proyek】
PE = (Emisi dari pemakaian bahan bakar alternatif di pabrik semen)+(Emisi dari pemakaian listrik dan bahan bakar di pabrik daur ulang)+(Emisi dari transportasi)

【Perhitungan pengurangan emisi】
ER = RE – PE = (Pengurangan emisi melalui penggantian batu bara dengan bahan bakar alternatif di pabrik semen)+(Emisi dari insinerasi)+(Emisi metana dari tempat pembuangan) – (Emisi dari pemakaian listrik dan bahan bakar di pabrik daur ulang) +(Pengurangan emisi melalui memperpendak jarak transportasi)

5. Laporan Kegiatan ②
"Perhitungan pengurangan emisi CO2"

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【Calculation of emission reduction】
ER = RE – PE = (1. Pengurangan emisi melalui penggantian batu bara dengan bahan bakar alternatif di pabrik semen)+(2. Emisi dari insinerasi)+(3. Emisi metana dari tempat pembuangan) – (4. Emisi dari pemakaian listrik dan bahan bakar di pabrik daur ulang) +(5. Pengurangan emisi melalui memperpendak jarak transportasi)

(Perhitungan percobaan berdasarkan asumsi kasar)

1. Penggantian batu bara	2. Penggantian insinerasi	3. Pencegahan emisi metana	4. Pemakaian energi di pabrik daur ulang	5. Jarak transportasi yang diperpendek
【Asumsi】 ・Nilai kalori Batu bara 5700kcal/kg CRM1800kcal/kg ・Rasio kepadatan karbon (rasio EF) Batu bara:CRM ≒2.4: 0.8 ⇒TIDAK ADA pengurangan	【Asumsi】 ・Tingkat insinerasi: 5% ・ Tidak memungkinkan untuk menghitung emisi CO2 melalui insinerasi sebagai komposisi limbah yang tidak terdefinisi, terhadap asumsi, bagaimanapun, bahwa limbah padat kota (mengacu pada kasus Surabaya) yang meliputi 60% limbah plastik, emisi CO2 akan kira-kira sebanyak1.100 ton/tahun	–	0.009 (t-CO2/t-produksi) x 24.000 ton (produksi) = 216 ton	7.580 ton

Pengurangan emisi CO2 =1100−216+7580=8.464 ton／tahun

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変える力を、ともに生み出す。

Kebijakan Bangunan Gedung Hijau

Yatsuka KATAOKA
Kitakyushu Urban Center
Institute for Global Environmental Strategies

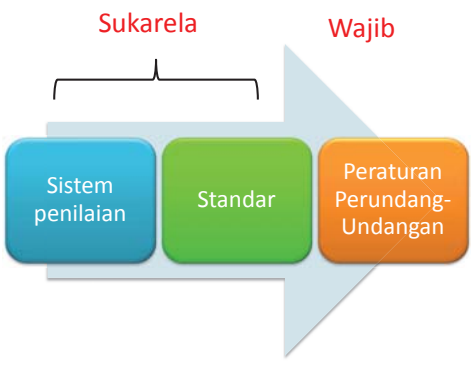
Laporan lokakarya untuk Studi Kelayakan Joint Crediting Mechanism (JCM) di Surabaya, FY2015
15 Januari 2015, BAPPEKO, Kota Surabaya

IGES Institute for Global Environmental Strategies

Kebutuhan Kebijakan Bangunan Gedung Hijau

- Bangunan gedung bertanggung jawab atas hampir 40% dari emisi CO_2
- Menerapkan desain hijau pada tahap pembangunan akan membantu dalam pengurangan CO_2 di seluruh siklus hidup bangunan.

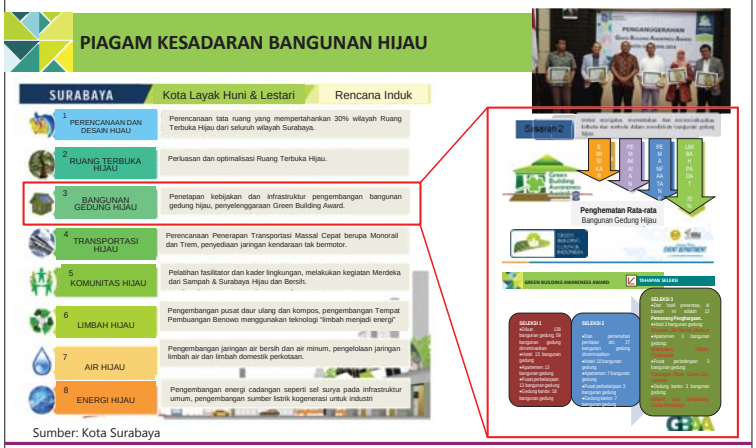
Tren mengatur bangunan gedung hijau



Regulasi Bangunan Gedung Hijau di Indonesia

- **Undang-Undang dan peraturan**
  - Undang-Undang No. 28/2002 tentang Bangunan Gedung
  - Peraturan Pemerintah No. 36/2005 tentang Pelaksanaan Undang-Undang No. 28/2002
  - Peraturan Menteri No. 02/PRT/M/2015
- **Standar**
  - Standar Nasional Indonesia (SNI)
- **Program Pengembangan Kota Hijau(P2KH)**
  - Tahap 1 (2011-2014): MoU bersama MOPW tentang pelaksanaan kota hijau; Pengembangan Peraturan Daerah (PERDA)
  - Tahap 2 (2015-2019): Penguatan kapasitas Kawasan Strategis Nasional (KSN); menetapkan 3 kota sebagai kota perintis untuk melaksanakan bangunan gedung hijau (Bandung, Surabaya and Makassar)
- **DKI Jakarta**
  - Peraturan Gubernur No. 38/2012

Piagam Kesadaran Bangunan Hijau Surabaya



Sumber: Kota Surabaya

Peraturan Bangunan Gedung Hijau Surabaya

- Dinas Cipta Karya akan mengembangkan peraturan wajib untuk bangunan gedung hijau (2016~)
- IGES akan mendukung Dinas Cipta Karya dengan:
  - Mengumpulkan informasi mengenai peraturan bangunan gedung hijau yang sama di kota & negara lain
  - Mengumpulkan temuan untuk referensi

Contoh peraturan bangunan gedung hijau yang sama (Kota Mandaluyong, Filipina)

Pemanfaatan JCM yang Diharapkan