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Feasibility Study on FY2015 Large-Scale JCM Project for Realizing Low-Carbon Development in Asia

- Developing a Low Carbon Society under Collaboration between Bandung City and Kawasaki City - Introduction of an Energy Management System (EMS) in Commercial Establishments under the Joint Crediting Mechanism

Final Report

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Table of Contents

1 Overview of the Study

1.1. Background to the Study

Japan seeks to share the goal of reducing global greenhouse gas (GHG) emissions at least by half by 2050 with all the other countries in the world and aims to reduce the country's GHG emissions by 80% by 2050 in order to mitigate the impact of global warming and climate change under the Basic Environment Plan (Cabinet Decision of April 2012).

To halve global GHG emissions by 2050, it is necessary to identify and formulate GHG emissions reduction projects on a large scale in Asian and Pacific countries that are experiencing remarkable economic growth in order to expedite developments toward building sustainable low-carbon society. To that end, Japan needs to appropriately assess the emission reductions overseas that have been made possible by its aid modalities such as technical cooperation and technology transfer, build and implement the Joint Crediting Mechanism (JCM) for use in achieving its emission reduction goal, and then expand these activities.

In Indonesia, domestic electricity sales have been increasing rapidly. It rose 85% from 2005 to 2014. Of the service area of the Indonesia's State Electricity Corporation (Perusahaan Listrik Negara Persero or PLN), West Java Province, where Bandung City is situated, is characterized by a large proportion of the commercial sector in power demand due to a significant population concentration in the province and its proximity to the capital city of Jakarta. Given these circumstances, it is likely that GHG emissions will significantly increase in the region, especially from the commercial sector.

Power demand in the Java island-Bali island, which includes West Java Province, accounts for nearly 80% of total power demand in Indonesia. As of 2016, power supply in the region is provided by PLN and independent power producers (IPPs). It has been decided that some of PLN's power generation installations will be decommissioned due to facility deterioration or other reasons during its business plan's period of 2013-2022. The net reduction by 2020 in the installed capacity of PLN alone is estimated at 1.26 GW. The installed capacity of the IPPs will remain at 5.66 GW. As a result, the region, which includes West Java Province with the above-mentioned geographical characteristics, is expected to see a situation where power supply fails to catch up with power demand toward the early 2020s.[1]

For this reason, it is necessary to implement measures to address the tightening power supply and reduce GHG emissions at the same time.

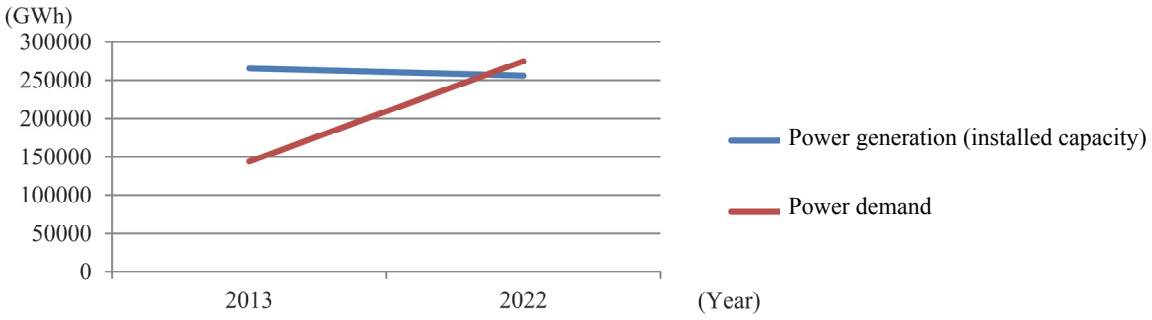

Fig 1-1: Projected Power Generation and Demand in the Java-Bali System

Note: Power generation represents total electricity generated by PLN and IPPs.
Source: Executive Summary, Electricity Supply Business Plan PT PLN (Persero) 2013-2022

[1] Executive Summary, Electricity Supply Business Plan PT PLN (Persero) 2013-2022, pp. 3, 4, and 10.

This project draws on the outcomes of the project entitled "Developing a Low Carbon Society under Collaboration between Bandung City and Kawasaki City," which was implemented in Bandung City in Indonesia as part of the MOE's project for "Feasibility study on Large-Scale JCM Project for Realizing Low-Carbon Development in Asia" for FY2014. Under the framework of city-to-city partnership between Kawasaki and Bandung, this project is designed to introduce direct current (DC) power supply, one of Japan's low-carbon technologies, into commercial establishments, as a specific energy-saving undertaking toward turning Bandung into a low-carbon city. Specifically, the project will connect DC power supply units with solar power generation units and energy-saving units mounted on these establishments to reduce power losses and minimize the use of commercial grid power sources derived from fossil fuel, in order to significantly reduce GHG emissions.

With the JCM projects for the past two years serving as a catalyst, Kawasaki City and Bandung City will soon sign a memorandum of understanding (MoU) on city-to-city partnership in the environmental sector. On February 18, the mayors of the two cities will have talks and attend a signing ceremony in Kawasaki City.

1.2. Purpose of the Study

This project is aimed at identifying projects that can reduce carbon emissions (energy-derived CO_2 emissions) with the introduction of a DC power supply system--one of Japan's low-carbon technologies--in Bandung City in Indonesia, and implementing such projects to acquire JCM credits. Among the specific aspects to study are the CO_2 reduction potential, MRV methodology options, and the costs, laws, and institutions involved.

The city-to-city partnership framework has greatly contributed to the timely launch of this study. For example, at the request of Kawasaki City, Regional Development Planning Board (BAPPEDA) of Bandung City kindly introduced some potential counterparts to the study team.

1.3. Overview of the Study

1.3.1. Member of the study team

The study team is made up of the following members:

Name	Affiliation	Area of responsibility
Hideyuki Mori	Institute for Global Environmental Strategies	Supervising engineer
Ryoko Nakano	Institute for Global Environmental Strategies	General leader; formulation of a platform based on city-to-city partnership
Sudarmanto Budi Nugroho	Institute for Global Environmental Strategies	Liaison and coordination; formulation of a platform based on city-to-city partnership
Kazuaki Aoki	Kawasaki Environment Research Institute	Policy dialogue with Bandung City
Akira Ogihara	Kawasaki Environment Research Institute	Policy dialogue with Bandung City
Masahiko Fujimoto	Oriental Consultants Global Co., Ltd.	Business planning, designing of a local management structure, review of MRV methodologies

Name	Affiliation	Area of responsibility
Hirotsugu Kato	Oriental Consultants Global Co., Ltd.	Business planning, fiscal planning
Mitsukage Yamada	Oriental Consultants Global Co., Ltd.	EMS design
Soichiro Hayashi	Oriental Consultants Global Co., Ltd.	Economic and fiscal analysis
Kentaro Ofuji	Oriental Consultants Global Co., Ltd.	Collection of local information on DC power supply technology, review of MRV methodologies, HRD, and PDD preparation
Hiroaki Mandokoro	Kowa Company, Ltd.	Technical review; feasibility study
Shotaro Kurachi	Kowa Company, Ltd.	Technical review; feasibility study
Atsushi Kawamata	Tokyo Rectifier Co., Ltd.	Technical review; feasibility study

1.3.2. Study Schedule

The schedule of the field survey as part of this study is shown below:

Visits	Duration	Activities
1st visit	September 20-27, 2015	• Organizing a presentation meeting on GHG emissions reduction with the introduction of DC power supply technology under JCM for the Bandung City Government (BAPPEDA and other governmental organizations concerned) as well as the owners of buildings and establishments in the city (the local kick-off meeting) • Exchanging views with the JCM Indonesia Secretariat • Identifying local needs with special regard to GHG emissions reduction with the introduction of DC power supply technology under JCM (visits to establishments, discussions with competent officials, and data collection) • Holding policy dialogue toward strengthening the city-to-city partnership between Kawasaki and Bandung and formulating a project under such partnership
Second visit	October 18-24, 2015	• Consulting with the owners of local buildings and establishments toward a basic agreement on the implementation of a GHG emissions reduction project that takes advantage of DC power supply technology under JCM • Collecting information on the Government of Indonesia's regulations on government procurement in relation to such a project (interviews with officials at BAPPEDA of Bandung City, departments on government procurement regulations, among other government entities) • Holding policy dialogue toward strengthening the city-to-city partnership between Kawasaki and Bandung and formulating a project under such partnership

Visits	Duration	Activities
3rd visit (Self-financed)	December 14-19, 2015	• Holding continued consultations with the owners of local buildings and establishments toward a basic agreement on the implementation of a GHG emissions reduction project that takes advantage of DC power supply technology under JCM • Holding consultations toward the formulation of a JCM project based on the needs of Bandung City under the framework of city-to-city partnership between Kawasaki and Bandung (exchanging views with officials at BAPPEDA and the environmental management units and other entities concerned of Bandung City)
4th visit	January 24-29, 2016	• Organizing a progress report meeting for officials on the part of Bandung • Holding policy dialogue on the feasibility of a GHG emissions reduction project that takes advantage of DC power supply technology under JCM as well as on future assistance under the framework of city-to-city partnership between Kawasaki and Bandung (exchanging views with officials at BAPPEDA, the international cooperation section, and the environmental management units and other entities concerned of Bandung City) • Paying a visit to JICA Indonesia Office and the JCM Indonesia Secretariat

2 Indonesia's Policies and Measures Relevant to the Introduction of DC Power Supply Technology

2.1. Action Plan for Reducing GHG Emissions at the National, Regional, City (Bandung) Levels (Higher Program)

Indonesia is one of the largest emitter of greenhouse gases (GHGs) in the world. The most recently available figure for its total GHG emissions stood at 1.79 billion tons[2] as of 2005, according to the country's Second National Communication submitted to the Secretariat of the United Nations Framework Convention on Climate Change (UNFCCC).

In September 2009, the Indonesian government announced a target of a 26% reduction in GHG emissions below the Business-as-Usual (BaU) level by 2020 or a 41% reduction if it is given international support. This kind of target was the first of its kind announced by ASEAN countries. To achieve this target, the Indonesian president issued the "National Action Plan for Reducing Greenhouse Gas Emissions (Rencana Aksi Nasional penurunan emisi Gas Rumah Kaca: RAN-GRK)" in September 2011 in the form of a Presidential Decree. This decree requires central government offices, local governments and private businesses among other entities to reduce their emissions by 2020.

Among other things, RAN-GRK calls on provincial governments to promptly come up with a Provincial Action Plan for Reducing Greenhouse Gas Emissions (Rencana Aksi Daerah penurunan emisi Gas Rumah Kaca: RAD-GRK). West Java Province, to which Bandung City belongs, has already formulated its RAD-GRK as of February 2016. The table below lists the energy-related items relevant to this study out of the province's RAD-GRK.

[2] This figure includes emissions from land use, land use change and forestry (LULUCF).

Reducing GHG emissions by limiting power losses with the introduction of DC power supply technology is consistent with the agenda of the action plan, and by extension, with the province's policy.

Table 2-1: Policies, Strategies and Action Plan Agenda of West Java Province's RAD-GRK

Policies	Strategies	Action Plan Agenda
1. Increased energy saving 2. The use of cleaner fuels 3. Enhancement of renewable energy utilization	1. Conserve the final energy both through the application of cleaner and more efficient technologies and through reduction in the consumption of non-renewable energy (fossil) 2. Encourage the use of renewable energy in small and medium scales	1. Introduction of alternative energy (conversion of 25% of energy consumption to alternative energy by 2025)
		2. Promotion of the concept of Clean Production
		3. Provision of training on Clean Production
		4. Implementation of environmental audits
		5. Revitalization of machinery and equipment that may deteriorate efficiency and environmental quality in the energy and environmental aspects
		6. Provision of policy incentives to businesses engaged in pollution control (the relevant policy under formulation)
		7. Promotion of the concept of Green Industry
		8. Presentation of Green Industry Awards (annual)
		9. Implementation of energy audits, energy-saving audits, and energy management audits
		10. The increase of the percentage of biofuel in the fuel and diesel consumption (to 15% by 2025)
		11. Improvement of energy efficiency (by 25% by 2030)
		12. Education and training on vehicle inspection
		13. Traffic control and engineering in the region including the Bandung Metropolitan Area
		14. Traffic control and engineering at intersections
		15. Railway construction in West Java
		16. Traffic control and engineering on roads under provincial jurisdiction
		17. Replacement of kerosene with LPG
		18. Implementation of an energy efficiency improvement program in accordance with the National Energy Conservation Plan (Rencana Induk Konservasi Energi Nasional: RIKEN).

Source: Ministry of National Development Planning (BAPPENAS). *Potret Rencana Aksi Daerah Penurunan Emisi Gas Rumah Kaca (RAD-GRK)*. pp. 75-77.

Bandung Mayor Ridwan Kamil is endorsing the Ecosystem Smart City initiative. This initiative is aimed at greater transparency of the city government by improving the quality of citizens' lives through (i) more efficient effective distribution of resources, (ii) reduction of

social inequalities, (iii) alleviation of traffic congestions, and (iv) reduction of pollution and CO_2 emissions.[3]

The table below lists the energy-related items relevant to this study out of the "local action plan for mitigating the climate change impact in Bandung City" (Rencana Aksi Daerah Penanganan dampak Perubahan Iklim di Kota Bandung: RAD-PI), which describes actions to be taken to reduce GHG emissions from Bandung City. Reducing GHG emissions by curbing power losses with the introduction of DC power supply technology is consistent with the initiative of the mayor of Bandung and No. 1, 8, 9, and 12 on the action plan agenda shown in the table above, and by extension, with the city's policy.

Table 2-2: Energy-related Actions in Bandung City RAD-PI

1.	Socialization of fuel savings
2.	Socialization of biogas energy utilization in households
3.	Biodigester installation program from organic waste, animal and human feces in the household
4.	Socialization of biofuels to the public following the provision of fuels
5.	Development of biofuels from local resources, such as paddy straw or organic waste rice fields
6.	Utilization of biofuels
7.	Increase of the percentage of biofuels in total fuel consumption
8.	Socialization of energy savings in residential area and industries
9.	Utilization of energy-efficient appliances (lighting, air-conditioning, refrigeration)
10.	Implementation of smart technology with sensing-technology in electricity use
11.	Implementation of eco-building concept in the offices
12.	Installation of solar cells in residencies and industries
13.	Development of micro-hydro power
14.	Utilization of wind energy (wind turbine)
	(Non-technical RAD-PI)
15.	Development of information system that provides energy data from each region to RAD-PI
16.	Socialization of RAD-PI to all districts
17.	Development of information system for RAD-PI
18.	Integration of RAD-PI into the primary and secondary education curricula

Source: *Bandung City RAD-PI Final Report V-23*, p. 24.

2.2. Energy (Electric Power)

Power supply services in Indonesia is subjected to the law concerning electricity (No. 30/2009).

Articles 9-18 of this law largely divides electricity business into power supply business (power generation, power transmission, power distribution, power sale, etc.) and power support business (consultancy, construction, checking, testing, installation, maintenance, R&D, laboratory testing, etc.). Each type of electricity business is divided into public power supply business and other power supply business (including power for self-consumption). Article 46 provides regulations on government direction and supervision of electricity business.

[3] Bandung City Government. "*Smart Government and Development of Bandung Smart City."* (a material announced by the Bandung City Government at the local kick-off meeting that was held as part of this study)

The provisions of this law that are relevant to DC power supply technology are those on power safety. Article 44 provides electricity safety requirements for electric business activities. This article states the electricity safety requirements aiming at achieving condition that is reliable and safe for installations, safe from any danger for humans and other living things, and environment-friendly, although they are not specifically defined. The article further states: (i) Any power installation in operation must hold a commissioning certificate; (ii) Any power tool and equipment must meet the Indonesian national standard requirements; (iii) Any technician engaged in electricity business must hold a competency certificate. It stipulates that specific provisions be established by Regulation of the Government.

The provisions that have been identified by February 2016 are described in the table below:

Category	Provisions identified
A commissioning certificate for power installations in operation	• The government regulation on power supply business (No. 14/2012) and the government regulation on power support business (No. 62/2012) have established administrative, technical, and environmental requirements for the certificate, which must be obtained for each site or unit. • The ministerial decree on power installations (No. 45/2005) and the amended ministerial decree on power installations (No. 46/2005) subject to inspection and testing designed to confirm its compatibility with the current standards after the construction, installation, and repair of any electric structure and any other change to it.
Indonesian national standard requirements for power tools and equipment	SNI and various safety standards are being established (for SNI, see 2.4.1)
A competency certificate for technicians engaged in electricity business.	• Article 47 of the government regulation concerning power supply business (No. 14/2012) provides the details of the competency certificate for technicians engaged in power supply business. • The government regulation on power support business (No. 62/2012) provides the details of the competency certificate for technicians engaged in power support business.

Source: Examination Center for Electrical Engineer. "Kaigaishokoku ni Okeru Denki Gijutsusha no Gijutsu Gino Kojo no Torikumi [initiatives to improve the skills of electrical engineers in selected countries."

For the laws and regulations on energy saving and renewable energy, see 2.3 below.

2.3. Energy (energy saving, renewable energy utilization, etc.)

In Indonesia, there is said to be room for improvement in energy saving and renewable energy utilization both in the supply and demand sectors. Accordingly, Indonesia has established various strategies and government and ministerial regulations. Of these, those relevant to DC power supply technology are shown in the table below.

Indonesia has also energy-saving regulations including incentives and penalties in place. In addition, the central government and PLN have been committed to the introduction of renewable energy including solar power that entails numerical targets and increased generation capacity.

The phase-in of DC power supply technology in Bandung City and other parts of Indonesia will likely help increase the generation capacity of solar power generation units that are connected to DC power supply units. The introduction of DC power supply technology, which has potential to significantly save energy by reducing power losses is consistent with the national policy of Indonesia. It can also contribute to both sustainable development and climate change mitigation there.

Table 2-3: Indonesia's Strategies and Government and Ministerial Regulations Concerning Energy Saving and Renewable Energy Utilization

Sector	Name	Issuer; year issued	Description
Energy in general (including renewable energy utilization)	National Energy Policy 2003-2020 (Kebijakan Energi Nasional: KEN)	Ministry of Natural Resources and Energy (MNRE); 2004	• Aiming to raise the percentage of renewable energy, excluding large-scale hydropower, to 5% or more by 2020. • Aiming to reduce energy consumption per GDP by 1% every year. • Aiming to diversify energy and promote energy saving to achieve the optimal and economical economy mix, among other goals
	Blueprint of National Energy Management 2005-2025	MNRE; 2005	Setting the target percentage of each energy resource in the primary energy mix under the optimal scenario by 2025 (0.020% for solar, 0.028% for wind, and so on)
	Presidential Decree on national energy policy (No. 5/2006)	Presidential Office; 2006	• Aiming to reduce energy elasticity (the ratio of energy consumption growth to economic growth energy growth) below 1 by 2025 • Aiming to promote the development of coal, natural gas and renewable energy and significantly reduce the percentage of oil in the primary energy supply. • Aiming to raise the percentage of new and renewable energy in the primary energy mix to 17% by 2025 (the breakdown: 5% for biofuel, 5% for geothermal, 5% for biomass, nuclear, hydro, solar, and wind, 2% for liquefied coal)
	Energy Law (No. 30/2007)	Presidential Office; 2007	• Establishing governmental management of energy resources; aiming to prioritize domestic supply of energy and increase the domestic procurement rate • Establishing governmental assistance for the supply and use of renewable energy and for energy-saving efforts
	Vision 25/25 of the Ministry of Natural Resources and Energy	MNRE; 2010	• Aiming to raising the percentage of new and renewable energy to 25% from 17% in the Presidential Decree of 2006 • Aiming to reduce energy consumption in 2025 by 15.6% from the BaU scenario by saving energy and diversifying energy
	Electricity Supply Business Plan (RUPTL) 2011-2020	PLN; 2011	Aiming to raise the domestic solar generation capacity to 7 GW by 2020 (from 22.45 MW in 2011)

Sector	Name	Issuer; year issued	Description
	New National Energy Policy (KEN)	MNRE; 2014	Setting the introduction targets concerning the percentages of oil, natural gas, coal, and renewable energy in energy supply (raising the percentage of renewable energy to 23% or more by 2025, and 31% or more by 2050)
	National Electricity General Plan (Rencana Unum Kenagalistrikan Nasional: RUKN) 2015-2034	MNRE; under formulation	・ Maintaining the numerical target by 2025 regarding the introduction of renewable energy that has been set under KEN ・ Aiming to achieve the energy mix (new and renewable energy (solar, wind, etc.) accounting for 25%, coal-fired for 50%, gas for 24%, and other fuels for 1%) by 2025 to achieve the target above[4]
Energy saving	RIKEN	MEMR; 1995 (revised in 2005)	Including such measures and introducing energy-saving guidelines for governmental buildings that have accepted energy-saving targets, and implementing energy audits at industrial and commercial establishments
	Government Regulation on energy conservation No. 70/2009	Presidential Office; 2009	・ Establishing energy-saving measures by energy suppliers and consumers, and energy-related service providers ・ Introducing incentives for large consumers (with an annual consumption of 6,000 tons of oil equivalent (TOE) or more) that have contributed to energy conservation, including local tax breaks and exemptions, as well as government subsidies for the cost of energy audits. ・ Publicizing the names of those who have failed to conserve energy and imposing fines on them as the case may be.
	Ministry of Finance regulation on tax and customs facilities for the utilization of renewable energy (No. 21/PMK.011/2010)	Ministry of Finance; 2010	Offering the following facilities for businesses that have used renewable energy (geothermal, wind, biofuel, solar, etc.): ・ A tax deduction equivalent to 30% of total investment; a shorter depreciation period for fixed assets; a reduction in the withholding tax rate on dividends paid overseas to 10%; and an extension of the carry-over period for losses up to ten years ・ Exemptions of VAT (value-added tax) for machinery and equipment, excluding spare parts, at the time of import ・ Exemptions of import duties ・ Taxes borne by the government

Sources:

・ Material available on the website titled "Indonesian Energy Electricity Sheet"
・ MNRE. *RENCANA UMUM KETENAGALISTRIKAN NASIONAL 2015 - 2034*. (draft as of 2015 July)
・ Tsuchiya, Takehiro (Embassy of Japan in Indonesia). "Indoneshia Enerugi Jigyo [energy business in Indonesia." 2011 April issue of *e-NEXI*. Nippon Export and Investment Insurance.
・ CIB Group, Global Planning Division, Bank of Tokyo-Mitsubishi UFJ, Ltd. "No. 216 Indoneshia: Saisei Enerugi Jigyo Yugu Kitei [No. 216 Indonesia: incentives for renewable energy business." February 22, 2010.

[4] According to the draft that MNRE published in July 2015.

Under the policies described above, the Bandung City Government has been responsible for energy-related measures in general, including energy conservation. In this regard, Bandung Mayor Ridwan Kamil announced in September 2015 that the city government will soon introduce a regulation relating to "green building" as one of the requirements for obtaining a City Building Permit known as “Izin Mendirikan Bangunan” or IMB. He also said that no permit will be issued to development projects without passing a green certification.[5]

2.4. Other

2.4.1. Standard National Indonesia (SNI)

From September 2007 onward, the Indonesian government subjects certain products manufactured in and out of Indonesia to the SNI requirements. The number of items subjected to the SNI requirements was 34 in September 2007, when the standards were introduced. The Indonesian Ministry of Trade later added some items to the list.

Some items on the list are related to DC power supply technology, which is relevant to this study. Such items are lighting, air-conditioning and other electronic instruments and related products.[6]

Such products must meet the SNI requirements when import traders and manufacturer/importers obtain a certificate of registration and a registration number that are issued for each import lot. These products must also be tested and inspected by a product certification body that is authorized by the National Accreditation Committee to obtain an SNI Certificate (SPPT-SNI).

An HS Code and SNI No. are designed to each of the items subject to SNI in official documents published by the government. Products that are thus designated but outside the scope of the designation requirements may be exempted from SNI only if the competent government office accepts a letter asking for an exemption and issues a letter certifying an exemption.

Any product that has been confirmed to be within the scope of the SNI requirements is first checked to see whether it meets the SNI requirements and whether the factory that has manufactured it meets the quality control requirements. If the product clears this check, it is subjected to the certification process conducted by product certification bodies (Lembaga Sertifikasi Produk yang Berpartisipasi: LSPro) certified by Indonesia's National Accreditation Committee (Komite Akreditasi Nasional: KAN), authorized testing bodies, and authorized inspection bodies. A compulsory SNI certification mark is issued to the products that have been thus certified. Those that have obtained such a mark are regularly subjected to a product conformity check and a quality management system (QMS) check at a laboratory or inspection body in Indonesia.[7]

2.4.2. Import Tariffs and Customs Subsidies

The import tariffs applied to imports to Indonesia vary depending on whether they are subject to a bilateral or multilateral agreement. With regard to Japan's exports to Indonesia, some 92% of bilateral two-way trade (actual trade volume from May 2004 to April 2005) are tariff-tree

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5 "Indonesia: 'Green Building Assessment' for Building Permit." *Asia Green Buildings* September 23, 2015

6 JETRO. "Indoneshia Boeki Kawase Seido--Boeki Kanri Seido--'Yunyu Kanri Sonota' Shosai [Indonesia: the trade and exchange system--the trade control system--'import control, etc.' details," last updated on November 11, 2004.

7 Japan Electrical Safety and Environment Technology Laboratories. *JET Report*. Vol. 62, 2014 Spring, p. 6.

due to the Japan-Indonesia Economic Partnership Agreement (JIEPA), which took effect in July 2008.[8] The remaining 8% will be made tariff-free by 2018.

Table 2-4: Requirements to be recognized as being originated from Japan under JIEPA

	Requirements
Rules of origin	In accordance with the rules of origin as provided for in Chapter 3 of JIEPA, a good (or service) shall qualify as an originating good (or service) of a Party where: ・ the good is wholly obtained or produced entirely in the Party; ・ the good is produced entirely in the Party exclusively from originating materials of the Party; or ・ the good satisfies the substantial transformation criteria set out in Annex 2 of JIEPA (Product Specific Rules), when the good is produced in the Party using nonoriginating materials.
Consignment conditions	・ To be eligible for preferential tariff treatment under JIEPA, a good must be directly transported in principle. ・ In the case of transit through a third country, preferential tariff treatment is granted only if the work in that country involves only the transshipment of the freight and its storage for keeping it in good condition for the purpose of such transshipment.

Source: Compiled by the study team from "Boeki Toshi Sodan Q&A [trade and investment consultation Q&A" on the website of JETRO.

Any goods or services to be exported from Japan to Indonesia under JIEPA must meet the requirements and be recognized as originated from Japan and receive a certificate of origin (CO) under JIEPA from the Japan Chamber of Commerce and Industry by the time of shipment or no later than three days from the date of shipment in principle.[9] The table below shows the requirements to be recognized as being originated from Japan.

Imported goods and services that satisfy certain conditions are eligible for a reduction in or even an exemption from import tariffs. For example, the import tariff rate is reduced to 5% for equipment and parts for businesses that were freshly developed or expanded from existing businesses.[10] It is possible to claim a refund for such privileges after import. In addition, imported goods and services are subject to a 10% value-added tax (VAT). For custom clearance, the fee for preparing the customs declaration statement, the declaration fee, and other customs subsidies are needed apart from import tariffs and VAT.

2.4.3. Electricity Tariffs Charged by PLN

PLN has an electricity tariff structure made up of four tariff classes: residential, business, industry, and government offices & public street lighting (PSL). Customers in each class are charged based on the unit tariff (Rp/kWh) for the power capacity class (kVA) to which they subscribe, rather than electricity consumption.

The following is the latest electricity tariff table (average tariff based on groups) as carried in the latest version of PLN's annual report (2015):

[8] For applied tariff rates for exports from Japan to Indonesia, see Japan's Tariff Schedule (last updated in January 2016) on the website of Japan Customs. Note that the tariff rate is marked "free" for all the items in terms of HS code.
[9] Part 2, Section 1, Rule 3 of the Operational Procedures for the Japan-Indonesia Economic Partnership Agreement.
[10] JBIC. *Investment Climate in Indonesia [in Japanese]*. April 2012, p. 96.

Table 2-5: PLN Latest Electricity Tariff Table (average tariff based on groups)

Tarif Listrik Rata-rata Menurut Golongan, Tahun 2014
(Rp/kWh)
Average Electricity Tariff Based on Groups, 2014
(in Rp/Kwh)

Golongan Tarif Tariff Class	Tegangan Voltage	TTL (Rp kWh) Tariff	BPP (Rp/kWh) Basic Cost of Electricity Production	Subsidi (Rp/kWh) Subsidy (RpkWh)
S.2 / 450 VA	TR	316,43	1.553,59	1,237,16
S.2 / 900 VA	TR	440,80	1.553,59	1,112,79
S.2 / 1.300 VA	TR	726,54	1.553,59	827,05
S.2 / 2.200 VA	TR	775,52	1.553,59	778,07
S.2 / > 3.500 s/d 200 kVA	TR	923,23	1.553,59	630,36
S.3 > 200 kVA	TM	921,69	1.347,53	425,84
R.1 / s/d 450 VA	TR	414,88	1.553,59	1,138,71
R.1 /900 VA	TR	586,47	1.553,59	967,13
R.1 / 1.300 VA	TR	1.105,44	1.553,59	448,15
R.1 / 2.200 VA	TR	1.127,96	1.553,59	425,63
R.2 /> 3.500 s/d 5.500 VA	TR	1.230,56	1.553,59	323,03
R.3/ > 6.600 VA	TR	1.493,20	1.553,59	60,39
B.1 / s/d 450 VA	TR	504,70	1.553,59	1,048,89
B.1 /900 VA	TR	601,54	1.553,59	952,05
6.1 /1.300 VA	TR	989,31	1.553,59	564,28
B.1 / 2.200 s/d 5.500 VA	TR	1.134,77	1.553,59	418,82
B.2 / > 6.600 s/d 200 kVA	TR	1.520,75	1.553,59	32,84
B.3 / > 200 kVA	TM	1.223,97	1.347,53	123,55
1.1 /450 VA	TR	446,04	1.553,59	1,107,55
1.1 /900 VA	TR	567,22	1.553,59	986,37
1.1 / 1.300 VA	TR	953,23	1.553,59	600,36
1.1 / 2.200 VA	TR	988,41	1.553,59	565,18
1.1 / 3.500 s/d 14 kVA	TR	1.194,70	1.553,59	358,89
1.2/ > 14 kVA s/d 200 kVA	TR	1.106,80	1.553,59	446,79
1.3/ > 200 kVA	TM	997,99	1.347,53	349,54
1.4/ > 30.000 kVA	TT	920,47	1.266,23	345,76
P.1 / sd 450 VA	TR	671,99	1.553,59	881,60
P.1 1900 VA	TR	766,31	1,553,59	787,28
P.1 / 1.300 VA	TR	1.093,75	1,553,59	459,85
P.1 / 2.200 s/d 5.500 VA	TR	1.116,62	1.553,59	436,97
P.1 / > 6.600 std 200 kVA	TR	1.515,24	1.553,59	38,35
P.2 / > 200 kVA	TM	1.114,05	1.347,53	233,47
P.3	TR	1.107,32	1.553,59	446,27
T / > 200 kVA	TM	766,56	1.347,53	580,97
C / > 200 kVA	TM	715,25	1.347,53	632,27
L	TM	1.151,32	1.347,53	196,20

Source: *Laporan Tahunan PT PLN (Persero) 2014*. p. 190.

Under the current tariff structure, PLN ascertains the power capacity class to which an electricity user subscribes and establishes his tariff class accordingly. Therefore, a change in electricity consumption does not translate into a change in the unit electricity tariff.

3 Proposals to Introduce EMS Technology in Bandung City

3.1. Case 1: Hotel A

3.1.1. Overview of the establishment

Hotel A is located in the northwestern part of Bandung City. It is made up of eight floors, including two floors that house multi-purpose meeting rooms. The Hotel has 90 guest rooms. LED is used for the lightening of some rooms and some of the hotel lobby sections on the first floor.

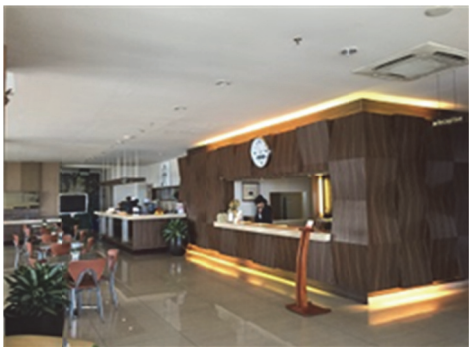


Photo 3-1: 1st-floor lobby of the Hotel

3.1.2. The degree of interest the local owner showed in the introduction of EMS technology, and the results of consultations with local officials

The study team consulted with the management of the Hotel Group, which runs Hotel A, and briefed them on the JCM system and a DC power supply system, one of Japan's low-carbon technologies. They showed interest in the introduction of this technology.

The consultations with the Hotel Group proceeded in the direction of introducing a DC power supply system into hotel lobby sections on the first floor. The specific proposal was to connect ten air-conditioners (with 8hp each) that were mounted in the reception, the reception office, multi-purpose meeting rooms, a lobby hall, and a restaurant adjacent to the reception with a DC power supply system (with a battery capacity of 90 kWh), which would receive power supply from a solar power generation unit (with a generation capacity of 30 kW) on the rooftop of the hotel in a manner to minimize power losses, thereby substituting for the portion that had been bought from the existing commercial grid.

Photo 3-2: Consultations with the Hotel Group

Photo 3-3: An air-conditioner mounted in the Hotel

Originally, the group sounded out the idea of replacing the conventional lighting with LED lighting and introducing a DC power supply system for such LED lighting. The mission team learned that this idea would have only a limited impact on reducing power consumption and GHG emissions and entail an extremely long depreciation period. For this reason, the Japanese side offered a counterproposal to introduce a DC power supply system for the air-conditioners in lobby sections on the first floor and mount a solar power generation unit on the rooftop to support the system.

The consultations failed to reach an agreement on the investment cost to be borne by the Hotel Group side as well as the number of years for depreciation under the legal durable years.

The study team therefore decided not to opt for project implementation based on this study as is. After the study completes, efforts will continue to find other ways for project implementation.

An agreement could not be reached with the Hotel Group on investment costs and depreciation period determined by the legal durable years and therefore this building will not be subject to implementation. After this research is completed other funding measures will be sought.

3.1.3. The envisioned framework for project implementation, including the division of labor

The study team coordinated with the Hotel Group on the optimal implementation framework for a JCM project aimed at introducing a DC power supply system to the hotel A. They roughly agreed that Kowa Company, Ltd., which participates in the study, would supply a DC power supply system while a Japanese leasing company would lease necessary equipment to Hotel A.

3.1.4. Potential reduction in GHG emissions from the establishment in question

GHG emissions from the establishment in question, i.e. the hotel A can be reduced by completely substituting the grid power consumption of the air-conditions in lobby sections on the first floor with the power supplied with the introduction of a DC power supply system, which includes a solar power generation unit.

As the table below shows, the monthly power consumption of the establishment stands at 14,743 kWh. The potential annual reduction in GHG emissions can be calculated as follows:

$$14.743\ (\text{MWh/month}) \times 12 \times 0.814\ (\text{t-}CO_2\text{/MWh}) \approx 144\ (\text{t-}CO_2\text{/year})$$

In calculating the potential reduction in GHG emissions in this report, the study team has employed, as the emission factor for the relevant power grid, the figure for "Java-Madura-Bali (Jamali)" for 2012 (ex-ante) in the IGES List of Grid Emission Factors.

Table 3-1: Power Consumption of Each Air-conditioner Mounted in the Lobby Sections on the First Floor of the Hotel A

NO	Name of the section	Brand name	Power supply voltage	Hourly power consumption	Daily operating hours	Daily power consumption	Monthly power consumption
1	Reception main office	Midea	220V	1,000W	12	12,000W	360,000W
2	Manager's room of the reception main office	Midea	220V	1,200W	12	14,400W	432,000W
3	Reception office 1	Midea	220V	1,200W	10	12,000W	360,000W
4	Reception office 2	Midea	220V	1,200W	8	9,600W	288,000W
5	Reception office 3	Midea	220V	1,200W	8	9,600W	288,000W
6	Multi-purpose meeting room Tulipe 1	Midea	380V	6,000W	4	24,000W	720,000W
7	Multi-purpose meeting room Tulipe 2	Midea	380V	6,000W	4	24,000W	720,000W
8	Lobby hall	Midea	380V	6,000W	16	96,000W	2,880,000W
9	Lobby restaurant 1	Midea	380V	9,000W	6	54,000W	1,620,000W
10	Lobby restaurant 2	Midea	380V	9,000W	6	54,000W	1,620,000W

Source: Material provided by the Hotel Group

3.1.5. Challenges for project implementation, and large-scale replicability

In its process, this study has identified three challenges for project implementation: (i) how to secure the site for mounting solar panels; (ii) how to solidify such a site, and (iii) how to avoid risks for having the mounting of a solar power unit on the rooftop create a leak.

Photo 3-4: Rooftop of the Hotel

The study team decided not to opt for project implementation based on this study. For the purpose of project implementation, the three challenges need to be addressed. To this end, it is necessary to ascertain the following two aspects by examining the drawings and specifications of the Hotel:

- Whether the rooftop of the Hotel can bear the weight of the solar power generation unit, i.e. 2.4 ton (20 kg per panel, excluding stands, etc.) in terms of thickness and structural strength
- Whether the rooftop has been made to avoid leaks

Bandung City has many hotels for tourists from DKI Jakarta and elsewhere. If a DC power supply system is successfully introduced to the Hotel, such introduction can serve as a model to be replicated at 328 hotels in Bandung City.

3.2. Case 2: Factory B

3.2.1. Overview of the establishment

Factory B is a textile company that has a factory in the suburbs of Bandung City. It has close relations with Japan as it has business relationships with some Japanese companies in the textile and related industries. Founded in 1960, the company is headquartered in DKI Jakarta. Factory B, which manufactures and dyes fabrics, constructed the Bandung plant in Sumedang Regency in the eastern suburb of Bandung City in 1990. It has a ground area of 50,000 m^2, (of which 12,000 m^2 are the area for buildings).

Photo 3-5: The premises of the Bandung plant

This plant is made up of a number of plant lines for two processes--textile manufacturing and dyeing-- and a plant office. The plant lines are operational 24 hours a day, 365 day a year, with the lighting running at 80% of its capacity. The office section is operational for 10 hours during the weekdays and six hours on Saturday. It closes on Sunday. The proposal is two-fold. The first part is to introduce a DC power supply system (without batteries) to this plant office section, replacing the conventional lighting with LED lighting, and making the air-conditioning more efficient. The second part is to substitute part of power consumption for the plant lines with the power that is generated by a solar power unit (with a generation capacity of 1 MW) mounted within the plant site. The overall idea is to substitute for power consumption during the day out of total power that is bought from the existing commercial grid.

The plant consumes a total of 2.5 MW of electricity per month. Of the total, production machinery accounts for 65%, air-conditioning for 25% and the office section for 10%.

3.2.2. The degree of interest the local owner showed in the introduction of EMS technology, and the results of consultations with local officials

The study team consulted with local officials at Factory B and briefed them on the JCM system and the DC power supply system, one of Japan's low-carbon technologies. They showed strong interest in the introduction of this technology.

The consultations proceeded in the direction of implementing the following measures to substitute for part of grid power consumption of the plant during the day, thereby reducing GHG emissions:

- Replacing the 15 lighting units (36 W per unit) with LED units, and then, connecting these lightening units and five air-conditioners (two units are of a 1,500W type with 2 hp, and the remaining three units are of a 800 W type with 1 hp) with a DC power supply system, substituting part of grid-derived power consumption at the office.
- Replacing the 1,202 lighting units (36 W per unit) for the production and dyeing lines with LED units, and providing them with power supply from solar panels (with a total generation capacity of 1.0 MW), thereby substituting for part of grid-derived power consumption.

The Bandung plant of Factory B as a whole consumes 2.5 MW of electricity per month at the total cost of about 150,000 US dollars.

The consultations failed to reach an agreement with Factory B on some of the conditions for project implementation, including the number of years for depreciation. The study team therefore gave up the idea of implementing such a project.

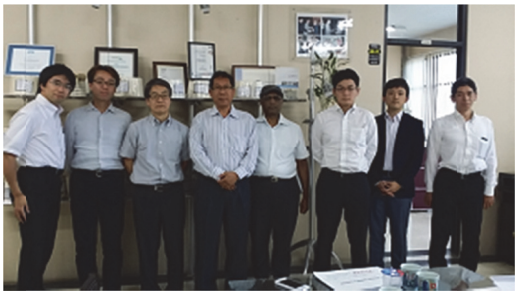


Photo 3-6: Consultations with PT. Natatex Prima

Photo 3-7: An air-conditioner mounted in the plant office

3.2.3. The envisioned framework for project implementation, including the division of labor

The study team is now studying the optimal implementation framework for a JCM project aimed at introducing a DC power supply system to the Bandung plant of Factory B, including the possibility that Kowa Company, Ltd., which participates in the study team, will supply a DC power supply system while a Japanese leasing company would lease necessary equipment

to Factory B. How the rules that deny transactions with benefits within international consortium members is key for the Japanese leasing company who will be a member.

In addition, the study team is also considering a scheme whereby such a leasing company will receive annual electricity payments from Factory B as the compensation for the supply of power it buys from PLN to Factory B.

3.2.4. Potential reduction in GHG emissions from the establishment in question

The potential reduction in power consumption at the plant office by introducing 15 LED lighting units and five high-efficiency air-conditioners and connecting them with a DC power supply system is estimated at 60 kWh.[11] Therefore, the potential annual reduction in the consumption of grid-derived power with the measures described in 3.2.2 can be calculated as follows:

$$60 \text{ (kWh/day)} \times 365 \text{ (days)} = 21{,}900 \text{ (kWh/year)}$$

As the operating duration at the plant office during the day is 10 hours, the above measures will also substitute for 25% of the consumption of grid-derived power at the production and dyeing lines during the same period of time.

As annual power generation in Bandung (located at a latitude of 6.6 degrees and a longitude of 107.3 degree) is 1,282 kWh per kW, the potential reduction in the consumption of grid-derived power with the introduction of solar power generation is estimated at 1,282,000 kWh per year.

From the above, the potential reduction in GHG emissions from the Bandung plant is calculated as follows:

$$(21{,}900 + 1{,}282{,}000) \text{ (kWh/year)} / 1{,}000 \times 0.814 \text{ (t-CO}_2\text{/MWh)} \approx \underline{1{,}061 \text{ (t-CO}_2\text{/year)}}$$

Note that the above calculation does not consider changes in the amount of solar radiation during the rainy season that will affect solar power generation.

3.2.5. Challenges for project implementation, and large-scale replicability

A major challenge for project implementation is how to secure a site for mounting solar panels. The study team will procure the map of the site of the Bandung plant to find such a site.

The company has another plant in the western suburbs of Bandung City in addition to the Bandung plant. If a DC power supply system is successfully introduced to the Bandung plant, such introduction can serve as a model to be replicated at other plants in and around Bandung City.

[11] This daily figure is calculated based on the potential reduction during the operating hours on the weekdays and Saturday (by Tokyo Rectifier Co., Ltd.).

3.3. Case 3: Bank C Branch Office

3.3.1 Overview of the Facility to Introduce EMS

The Bank C is a state-owned bank of Indonesia, and has the largest amount of the net assets among the banks in the country.

Among 51 branches of the bank in Bandung City, one branch was selected as a candidate this time. The branch is located on the main road running from east to west in the southern part of the city, having a building with consulting counters and a building with ATM.

3.3.2 The level of the interest of the local owners in the introduction of EMS technologies and the situation of the conference with relevant parties, etc.

We held a conference with the branch office of the Bank C to explain the Joint Crediting Mechanism (JCM) and a DC power supply system using low-carbon technology of Japan. The bank was strongly interested in the introduction of the Japan's DC power supply system, in order to reduce the power consumption in the power grid and secure the continuity of the project in the event of a disaster.

Photo 3-8: A conference with representative of the PT. Bank Mandiri (Persero) Tbk. KCP

We started to negotiate with the bank on the introduction of the DC power supply system using the private funds instead of the government-controlled ones from the funds owned by Bank C for the commercialization of the project. However, the Bank C showed the intention to conduct a feasibility study of the commercialization after the signing ceremony for the MoU in cooperation with Kawasaki City, which was scheduled on February 18, 2016. Thus, we could not examine the feasibility during the study period of this fiscal year. We will conduct another examination after the end of this study.

3.3.3 Possible business methods and the implementation system for the commercialization

Since the feasibility study was not conducted due to the reason stated in the paragraph 3.3.2, possible business methods and the implementation system was not examined.

3.3.4 Estimated amount of the GHG emissions reduction in the target facility

Since the feasibility study was not conducted due to the reason stated in the paragraph 3.3.2, the implementation system was not examined and the amount of the GHG emissions reduction was not estimated.

3.3.5 Challenges for the commercialization and the potential for the large-scale dissemination

Among the challenges for the commercialization, securing the land for the installation of solar PV panels is one of the technical challenges.

The Bank C has 5,000 branches nationwide, and 51 of those are located in Bandung City. Even though the adjustment of the system according to the scale of the branch is required, the introduction of the DC power supply system can be expanded to the other branches of the bank by promoting the introduction utilizing the project at the branch office as a model case.

3.4. Case 4: University D School Compound

3.4.1 Overview of the Facility to Introduce EMS

The University D is the most prominent national university of science and engineering program in Indonesia; its forerunner is Indonesia's first technological institution of higher education, which was founded in 1920.

Photo 3-9: Campus of the School of Electrical Engineering and Information, Institut Teknologi Bandung

University D consists of 12 faculties and schools: Faculty of Mathematics and Natural Sciences; Faculty of Industrial Technology; School of Agriculture; School of Architecture, Planning, and Policy Development; Faculty of Earth Sciences and Technology; Faculty of Mining and Petroleum Engineering; School of Business and Management; Faculty of Art and Design; School of Electrical Engineering and Informatics; Faculty of Mechanical and Aerospace Engineering; School of Life Sciences and Technology; and Faculty of Civil and Environmental Engineering.

The introduction of the DC power supply system will be examined on the 2nd floor of a building on the main campus .

3.4.2 The level of the interest of the local owners in the introduction of EMS technologies and the results of the conference with relevant parties, etc.

We conducted a conference with the School of Electrical Engineering and Informatics to explain the Joint Crediting Mechanism (JCM) and a DC power supply system using low-carbon technology of Japan. The school was strongly interested in the introduction of Japan’s DC power supply system.

The person in charge of the School is an expert on energy-saving systems for buildings and is working on the construction of energy-saving type buildings based on the concept of the Zero Emission Building (ZEB) of the another university, as well as the formulation of SNI in Indonesia.

In this study, we proposed a project plan focusing on the management of the facilities in cooperation with the faculty members and students of University D in order to utilize the DC power supply apparatus and related facilities for advanced personnel training in the university.

During the conference, University D commented that the DC power supply system was a great technology, and it welcomed the introduction and also expected to expand the introduction of the system in collaboration with the project members of Japan and University D in the future. University D also requested that in addition to the provision of the facility to be introduced the system, technical transfer and capacity enhancement of university personnel, as well as the possibility of further expansion of the system in cooperation with University D.

For the commercialization in the future, the possibility was examined while considering the implementation of additional study and verification using a Japanese government financing scheme other than the JCM, according to the indication of the person in charge of the Ministry of Environment during the study period of this fiscal year. Regarding the commercialization using the JICA scheme, a final agreement was reached between the study team and University D during the study period of this fiscal year.

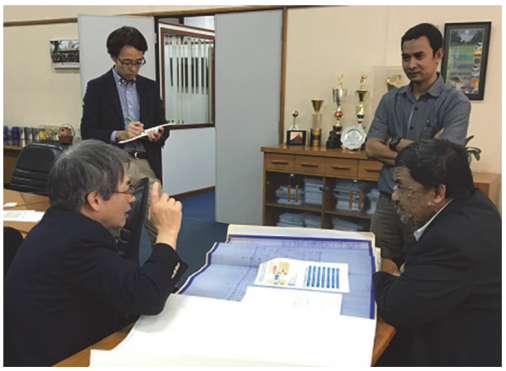


Photo 3-10: A conference with UNIVERSITY D

Corresponding to the above-mentioned agreement, the study team visited Japanese Government's Jakarta Office and explained the summary of the University D proposal and the results of the conference, received advice from the appropriate person on the subject matter. Apparently, Indonesia is currently trying to increase and ease shortage of its power supply by introducing solar power generation (renewable energy); thus, it is recommendable to emphasize the contribution of the DC power supply system combined with a solar power system.

Based on the study results, we will advance the project plan (including consultation with JICA Headquarters) with due consideration for the JICA scheme. From now on, to commercial the system, we will conduct additional research on possible business models and costs, how to move forward to the validation phase, and the sales system in Indonesia.

Even though University D is a national university and subject to government funding in general, funds for commercializing the technology can also be raised using the budget for a private consulting company 100% owned by the university.

3.4.3 Possible business methods and the implementation system for commercialization

As mentioned in paragraph 2.4.2, commercialization of the technology using a funding scheme other than the JCM will be considered for the project pertaining to the introduction of DC power supply system to the University D.

At the time of commercial deployment of the system, Kowa Company, Ltd. will market and sell the DC power supply system manufactured by Tokyo Rectifier Co., Ltd. Maintenance will be conducted by both companies and University D will monitor the amount of reduced power consumption. Kowa views as a possibility a Memorandum of Understanding (MoU)

with the private consulting company. The details of the system will be examined in the conference with Kowa Company, Tokyo Rectifier, and the private consulting company.

3.4.4 Estimated amount of the GHG emissions reduction in the target facility

The estimated annual amount of the power consumption reduction in the power grid due to the implementation of the efforts described in paragraph 3.4.2 is 134,730 kWh/year. The estimated amount of the GHG emissions reduction is calculated in the following:

$$134{,}730 \text{ (kWh/year)} / 1{,}000 \times 0.814 \text{ (t-CO}_2\text{/MWh)} \approx \underline{120.6 \text{ (t-CO}_2\text{/year)}}$$

In the above estimation, the variations in the amount of insolation caused by the matters that may affect the amount of power generation by solar PV, such as the rainy season, are not considered.

3.4.5 Challenges for commercialization and the potential for the large-scale dissemination

Among the challenges for commercialization, securing the land for the installation of solar PV panels is one of the technical challenges.

There are approximately 50 universities in Bandung and the DC power supply system can be distributed to universities inside and around the city, by promoting the pilot project at University D, the most prominent science and engineering university in Indonesia. Moreover, more effective expansion of the introduction of the system will be expected in the collaboration with the related parties of the University in Indonesia.

3.5. Case 5: Company E

3.5.1 Outline of the facility for introduction

Business feasibility was examined for the factory in the eastern suburb of Bandung City which is operated by the local subsidiary of Company E based in Jakarta. This factory was completed in 2014, and it manufactures and stores medicine.

Photo 3-11: Appearance of the factory of Mitsubishi Tanabe Pharma Corporation

The factory needs stable power supply for its manufacturing line and in the storage warehouse for the manufactured medicine and other hardware. From the necessity of manufacturing medicines that require a few hours per each process, and storing the medicine in specific temperature according to the property of medicines, this factory has installed a private diesel power generator as standby power supply, and established a system to prepare for a power failure of about three days.

3.5.2 Local owner's level of interest in the introduction of EMS technology, and the progress of discussion with local parties concerned, etc.

When a discussion was held with the responsible people of the factory run by the local subsidiary of Company E in Indonesia to provide an explanation of the JCM system and the DC power supply system, which is Japanese low carbon technology, the local people showed strong interest in the reduction of the consumption for grid electricity by making use of the DC power supply system, and the securement of business continuity at the time of a power failure.

Considering the technical restriction in connecting with the DC power supply device, the idea of connecting the device after changing the office lighting of the factory to 880 straight 40-watt LED lamps was pursued.

Photo 3-12: Discussion with Mitsubishi Tanabe Pharma Corporation

For commercialization, the study team conducted a study with the factory at the initial stage, and the idea that the factory would bear half of the expenses of the project using the JCM project facility subsidy was pursued. Saving time making adjustments between the Headquarters in Japan and the local subsidiary, and from the perspective that the local subsidiary can facilitate the commercialization within the range of funds which can be injected at their own discretion, the above-mentioned discussion method was selected.

However, as a result of the interview with the concerned parties in Japan during the examination period, issues were found, which were: 1) the business scale including the estimated amount of GHG emission reduction is small (the investment value on the basis of the subsidy is less than 10 million yen): and 2) the performance in terms of the size and economics required for utilizing the said subsidy is not adequately secured. Therefore, the immediate application for the JCM project facility subsidy was put off.

After the examination period is finished, a review will be conducted on the proposal details for this company, which include an overhaul of the system involving other factories in Indonesia by involving their Headquarters in Japan, in order to expand the business scale for commercialization making use of the JCM scheme.

3.5.3 Assumed business method and implementation system for commercialization

The project with respect to the introduction of the DC power supply system to Company E was supposed to be commercialization utilizing the JCM project facility subsidy at first as described in the preceding paragraph 3.5.2.

The implementation system for commercialization was at first supposed to be a system where Kowa Company, Ltd. would introduce the DC power supply device that Tokyo Rectifier Co., Ltd. produced to Company E, and both Tokyo Rectifier and Kowa would provide repair and maintenance.

According to the circumstances stated in the preceding paragraph, the implementation system will be reviewed in the future reviewing process.

3.5.4 Expected GHG emission reduction in the targeted facility

The expected reduction of annual use of grid electricity by the approach mentioned in 2.5.2 is 100,800 kWh/year, and the expected GHG emission reduction in the targeted facility is calculated as below:

$$100,800 \text{ (kWh/year)} / 1,000 \times 0.814 \text{ (t-CO}_2\text{/MWh)} \approx \underline{82 \text{ (t-CO}_2\text{/year)}}$$

In the trial calculation above, the variation of the amount of solar radiation in the rainy season, etc. which influences the amount of power generated by solar power, is not considered.

3.5.5 Issues for commercialization and potential for large-scale dissemination

Issues for commercialization include cost problems.

Since cost-performance on reductions to GHG emissions by small-scale businesses cannot adequately be expected in the existing conditions as described in the preceding paragraph 3.5.2, the possibility for improvement, etc. through increasing the size of the business will be discussed by reviewing the business implementation system including the Headquarters of Company E in Tokyo in the future.

As there are 10 factories of local subsidiaries of Japanese pharmaceutical companies in Bandung City including Company E and Company F. indicated in 3.6, promoting a pursuit of a case with the introduction of the DC power supply system to a site including the targeted facility of this investigation as a model case would create the potential for horizontal development to other pharmaceutical factories in Bandung City and those all over Indonesia.

3.6. Case 6: Company F

3.6.1 Outline of the facility for introduction

Business feasibility was examined for a factory in the western suburbs of Bandung City that the local subsidiary of Company F. in Indonesia runs. This factory has installed a 24-hour production line, and also stores medicine.

Power supply is largely consumed by air conditioning to maintain the temperature and the humidity in three factory buildings and a clean room. According to the interview with the factory personnel, it seems that the air conditioning cannot be stopped during manufacturing, and in case the line stops during manufacturing, it takes one or two weeks to resume.

Photo 3-13: Appearance of the factory of ROHTO Pharmaceutical Co., Ltd.

3.6.2 Local owner's level of interest in the introduction of EMS technology, and the progress of discussion with local parties concerned, etc.

When a discussion was held with the factory of Company F to provide explanation of the JCM system and the DC power supply system, which is Japanese low carbon technology, the local people showed a strong interest in the reduction of the consumption of grid electricity making use of the DC power supply system, and the securement of business continuity at the time of a power failure.

Considering the technical restriction in connecting with the DC power supply device, the idea of connecting 313 LED lamps (straight tube 40-watt, with dimmer control) with the device for the lighting of the targeted facility was pursued.

For commercialization, as in the same method mentioned in 3.5.2, the study team conducted a study with the factory at the initial stage, bear half of the expenses of the project using the JCM project facility subsidy was pursued.

However, as a result of the interview with the concerned parties in Japan during the examination period, issues were found, which were: 1) the business scale including the estimated amount of GHG emission reduction is small (the investment value on the basis of the subsidy is at the 10 million yen level): and 2) the performance in terms of the size and economics required for utilizing said subsidy is not adequately secured. Therefore, the immediate application for the JCM project facility subsidy was put off.

After the examination period is finished, a review will be conducted on the proposal details for this company, which include an overhaul of the system involving their Headquarters in Japan, in order to expand the business scale including the introduction to a new factory in Indonesia for commercialization making use of the JCM scheme.

3.6.3 Assumed business method and implementation system for commercialization

The project with respect to the introduction of the DC power supply system to Company F was supposed to be commercialization utilizing the JCM project facility subsidy at first as described in the previous paragraph 3.5.2.

The implementation system for commercialization was at first supposed to be a system where Kowa Company, Ltd. would introduce the DC power supply device that Tokyo Rectifier Co., Ltd. produced to Company F, and both Tokyo Rectifier and Kowa would provide repair and maintenance.

According to the circumstances stated in the preceding paragraph, the implementation system will be reviewed in the future reviewing process.

3.6.4 Expected GHG emission reduction in the targeted facility

The expected reduction of annual use of grid electricity by the approach mentioned in 2.6.2 is 100,800 kWh/year, and the expected GHG emission reduction in the targeted facility is calculated as below:

$$100,800\ (\text{kWh/year}) / 1,000 \times 0.814\ (\text{t-CO}_2/\text{MWh}) \approx \underline{82\ (\text{t-CO}_2/\text{year})}$$

In the trial calculation above, the variation of the amount of solar radiation in the rainy season, etc. which influences the power generation amount by solar power generation, is not considered.

3.6.5 Issues for commercialization and potential for large-scale dissemination

Issues for commercialization include cost problems, as is the case with Company E in 3.5.

Since the cost-performance on GHG emission reduction by a small-scale business cannot adequately be expected in the existing conditions as described in the previous paragraph 3.5.2, the possibility for improvement, etc. through increasing the size of the business will be discussed by reviewing the business implementation system including the Headquarters of Company F. in Tokyo in the future.

3.7. Consideration of a JCM methodology in relation to GHG emission reduction making use of the DC power supply technology

3.7.1 Policy for developing an MRV methodology (draft)

In this project, an MRV methodology (draft) was developed to evaluate the GHG emission reduction by introducing EMS using the DC power supply system to office buildings and offices in factories in Indonesia.

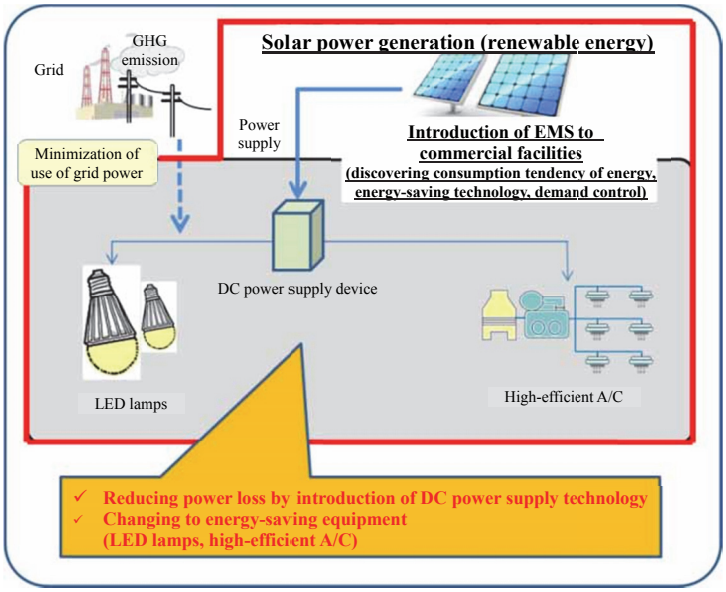


Figure3-1: Image of the business activities for MRV

3.7.2 Applicability of Existing JCM-related Methodologies

In formulating the MRV methodologies (draft) for this program, we referred to the following methodologies after examining past JCM registering methodologies as well as the outcomes of programs implemented by the Ministry of the Environment and the Ministry of Economy, Trade and Industry as well as JCM feasibility studies (FS) programs implemented by the New Energy and Industrial Technology Development Organization - all of which were implemented no earlier than May 2013.

- DC power supply: MN_AM001- methodology approved through the Mongolia-Japan Joint Crediting Mechanism (JCM); Installation of Energy-Saving Transmission Lines in the Mongolian Grid (Ver 1.0)

- LED lighting: approved methodology ID_AM005; Installation of LED Lighting for Grocery Store (Ver. 1.0)
- High efficiency air conditioning: approved methodology ID_AM004; Installation of Inverter-Type Air Conditioning System for Cooling for Grocery Store (Ver. 1.0)

We referred to recording methods for these existing and approved methodologies which have potential applications in this program. Based on these methods, we drafted the MRV Methodology (draft) by referring to the Joint Crediting Mechanism Guidelines for Developing Proposed Methodology (JCM_ID_GL_PM_ver01.0), which was approved by the Indonesia-Japan JCM Joint Committee. The proposal concerned an energy management system that utilizes a DC power supply (which would be used in this program) and how it would be effective in reducing GHG emissions.

3.7.3 Setting Reference Emission Levels

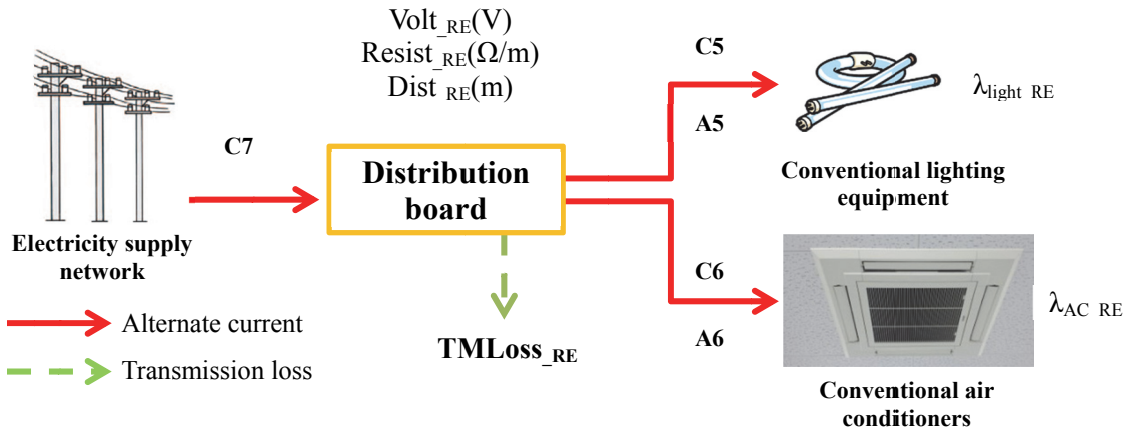
The reference emission level refers to the amount of carbon dioxide that would be emitted if this program is not implemented, given that electricity of an amount that is consumed by lighting fixtures and air conditioners is generated at power plants that are interconnected with grids. The reference emission level is calculated by multiplying the amount of purchased electricity from grids (if this program is not implemented) by the grid CO_2 emission factor.

As for the amount of electricity purchased from grids if this program is not implemented, we first estimated the amount of electricity that would be consumed by conventional lighting fixtures and air conditioners if this program is not implemented. To do this, when examining the amount of electricity consumed by LED lighting and high-efficiency air conditioners - which is monitored once the program is implemented - we took into account the ratio between the power factor for conventional lighting fixtures and air conditioners (which would be used if this program is not implemented) and the power factor for LED lighting and high-efficiency air conditioners (which would be adopted if this program is implemented). We then calculated the amount of electricity purchased from grids for the estimated amount of electricity consumed by conventional lighting fixtures and air conditioners. To do this, we took into account the amount of electricity (supplied through the AC feeding method) that would be lost if this program is not implemented.

Moreover, in an effort to achieve a net reduction to ensure the reduction of global GHG emissions, we will consider the following points when setting reference emission levels in the future.

- The amount of electrical power loss for electricity supplied through the AC feeding method (which would be used if this program is not implemented) will be set at the minimum estimated level.
- The power factor for conventional lighting fixtures and air conditioners (which would be used if this program is not implemented) will be set at the maximum estimated level when conventional technology is used.

Reference Case



Project Case

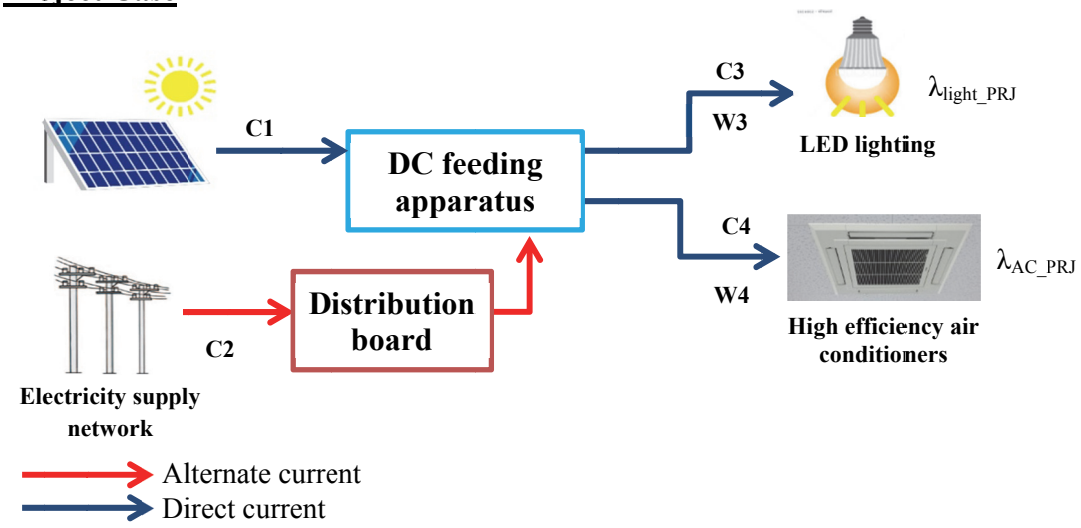


Figure 3-2: Basic information for the reference emission levels and the program emission levels

Below is the formula for calculating the reference emission level.

$$RE_y = C7 * EFgrid$$

$$C5 = C3 * \lambda_{light\_PRJ} / \lambda_{light\_RE} \quad (1)$$

$$C6 = C4 * \lambda_{AC\_PRJ} / \lambda_{AC\_RE} \quad (2)$$

$$C7 = C5 + C6 + TMLoss\_RE \quad (3)$$

$$TM_{Loss\_RE} = (A5+A6) * (A5+A6) * Resist_{\_RE} * Dist_{\_RE} / 1000 * 24 * 365 \quad (4)$$

$$A5 = W3 * (\lambda_{light\_PRJ} / \lambda_{light\_RE}) / Volt_{\_RE} \quad (5)$$

$$A6 = W4 * (\lambda_{AC\_PRJ} / R_{AC\_RE}) / Volt_{\_RE} / \sqrt{3} \quad (6)$$

Thus,

RE_y: Reference emission level (tCO_2/y) for year y

EF_{grid}: Grid CO_2 emission factor (tCO_2/kWh)

λ_{light_PRJ}:	Power factor for LED lighting (1.0)
λ_{light_RE}:	Power factor for conventional lighting fixtures (Example: 0.5 to 0.8)
λ_{AC_PRJ}:	Power factor for high efficiency air conditioners (1.0)
λ_{AC_RE}:	Power factor for conventional air conditioners (Example: 0.6)
C3:	Power consumed by LED lighting (kWh/y)
C5:	Power consumed by conventional lighting fixtures (kWh/y)
C4:	Power consumed by high-efficiency air conditioners (kWh/y)
C6:	Power consumed by conventional air conditioners (kWh/y)
C7:	Amount of electricity purchased from grids if this program is not implemented (kWh/y)
W3:	Wattage of LED lighting (W)
A5:	Amperage of conventional lighting fixtures (A)
W4:	Wattage of high-efficiency air conditioners (W)
A6:	Amperage of conventional air conditioners (A)
$Dist_{\_RE}$:	Wiring length of AC feeder cables (m)
$Resist_{\_RE}$:	The electrical resistance of the wiring for AC feeder cables (Ω/m)
$Volt_{\_RE}$:	Voltage of AC feeder cables (V)
$TMLoss_{\_RE}$:	Transmission loss of AC feeder cables (kWh/y)
EF_{grid}:	CO_2 emission factor for electricity supply network (tCO_2/kWh)

3.7.4 Setting the Emission Levels for this Program

If this program is implemented, electricity generated at a solar power plant will be supplied for LED lighting and for operating high-efficiency air conditioners. If the amount of electricity generated at a solar power plant is less than the amount required by the LED lighting and high-efficiency air conditioners, electricity will be purchased from a grid to compensate for the shortage. The emission levels for this program are calculated by multiplying that shortage amount by the CO_2 emission factor for the grid.

Below is the formula for calculating emission levels for this program.

$$PEy = C2 * EFgrid \quad (5)$$

Thus,

RE_y:	Emission levels for program in year y (tCO_2/y)
C2:	Amount of electricity purchased from grid if this program is implemented (kWh/y)

3.7.5 Calculating Emission Reduction

Emission reduction is calculated by determining the differential between the reference emission level and emission levels for this program.

$$ERy = REy - PEy \quad (6)$$

Thus,

ERy : *Emission reduction in year y (tCO_2/y)*

3.7.6 Setting the Eligibility Criteria

The eligibility criteria for the MRV methodologies (draft), which we will consider whether to draw up in this program, are as follows.

Table 3-2: Eligibility Criteria for MRV Methodologies (Draft)

1.	For this program, a DC power supply method as well as the use of a solar power plant must be adopted.
2.	For this program, some of the electricity purchased from grids must be replaced with electricity generated at a solar power plant.
3.	The amount of electricity purchased from a grid, the amount of electricity generated at a solar power plant, as well as the electricity consumption amount, wattage, amperage, and usage time by each lighting fixture and air conditioner must be able to be measured through an energy management system (EMS).
4.	For this program, after the electricity that is generated at a solar power plant is supplied directly to a lighting fixture or air conditioner, the remaining electricity must be stored in a storage battery and may not be sold to a grid.

3.7.7 Understanding the Parameters that Are Necessary in Calculating the Reduction Amount

In the MRV methodologies (draft), which will be formulated in this program, calculations for reducing GHG emissions resulting from this program will be performed after getting an accurate idea of the reference emission levels and emission levels resulting from this program. For this reason, we decided to grasp an understanding of the following ten parameter values based on information on the local conditions as well as the existing default values.

Table 3-3: Parameters Which Are Necessary to Understand for Calculating Emission Reduction in This Program

Parameter	Data Content	Setup Method
EF_{grid}	CO_2 emission factor for grid that will be replaced in this program (tCO_2/kWh)	We will refer to Emission Factors of Electricity Interconnection Systems (National Committee on Clean Development Mechanism Indonesian DNA for CDM unless otherwise instructed by the Joint Committee), which was released by the Indonesian government.
λ_{light_RE}	Power factor for conventional lighting fixtures	Will be measured and set in advance before implementing the program.

Parameter	Data Content	Setup Method
λ_{AC_RE}	Power factor for conventional air conditioners	Will be measured and set in advance before implementing the program.
C2	Amount of purchased electricity from grid if this program is implemented (kWh/y)	Will be measured through monitoring after program is implemented.
C3	Power consumed by LED lighting (kWh/y)	Will be measured through monitoring after program is implemented.
C4	Power consumed by high efficiency air conditioners (kWh/y)	Will be measured through monitoring after program is implemented.
W3	Wattage (W) for LED lighting	Set by manufacturers
W4	Wattage (W) for high efficiency air conditioners	Set by manufacturers
$Dist_{\_RE}$	Wiring length of AC feeder cable (m)	Will be set based on data from before the implementation of the program.
$Resist_{\_RE}$	Electrical resistance of the wiring (Ω/m)	Set by manufacturers
$Volt_{\_RE}$	Voltage of AC feeder cable (V)	Set based on terms of agreement from before the implementation of the program

Table 3-4: Results of Discussions with Each Candidate Facility for Implementing Technology (Updated February 4, 2016) (1/2)

Facility Name	Hotel A	Factory B Bandung plant	Bank C Branch office
Industry	Lodging	Spinning	Banking
Location	Northwest section of Bandung	Sumedang county in West Java province	Southern section of Bandung
Managing and operating body	Hotel Group (private company)	Factory B (private company)	Bank C (government-run bank)
Challenges faced by candidate facility and why they are interested in adopting the technology	The hotel would like to reduce its electric costs, as it has implemented a lights out policy inside the hotel and in the management office.	・ Would like to ensure that it can compete internationally by reducing energy costs, which amount to nearly 15% of the company's sales volume. ・ Would like to renovate its plant facilities, which have begun to age.	・ This branch has implemented energy-saving and environmental measures such as the installation of LED lighting in all its office buildings, reduction of the use of paper, and turning off the air conditioning after business hours. ・ Would like to implement energy-saving measures as well as reduce its electricity costs in a way that is suitable for the working environment.
Site where technology will be adopted	Air conditioners on first floor of hotel lobby	Factory office and assembly line	Lighting and air conditioning in stores and shops
Measures	・ Installation of DC feeding apparatus on first floor of hotel lobby ・ Enhancing the power supply efficiency of 10 air conditioners ・ Reducing the amount of electrical power loss by hooking up a DC feeding apparatus to air conditioners.	(1) Factory office ・ Installation of DC feeding apparatus ・ Switching to 15 lights to LED lighting and enhancing the power supply efficiency of 5 air conditioners ・ Reducing the amount of electrical power loss by hooking up a DC feeding apparatus with lighting/air conditioners. (2) Factory assembly line ・ Switching 1,202 lights along the factory assembly lines to LED lighting ・ Replacing use of power grid system utilizing solar power system by setting up a mega solar facility (1 MW) in the factory	・ Installation of DC feeding apparatuses ・ Switching to LED lighting and enhancing the power supply efficiency of air conditioners ・ Reducing the amount of electrical power loss by hooking up a DC feeding apparatus with lighting/air conditioners.
Breakdown of electrical power use inside facility	Air conditioning: 60%, Lighting: 20%, Other: 20%	Production machinery: 65%, Air conditioning: 25%, Office: 10%	N/A
Annual electricity consumption at site where technology will be adopted	111 MWh per year	12.5 GWh per year (entire plant) * The maximum momentary power consumption was 2.5 MW	N/A
Expected amount of annual power reduction	Roughly 177 MWh per year	(1) Factory office: 21.9 MWh per year (2) Factory assembly line: 1,282 MWh per year	N/A

Facility Name	Hotel A	Factory B Bandung plant	Bank C Branch office
Expected amount of annual carbon dioxide emissions	144 t-CO_2	1,061 t-CO_2 (Factory office: 18 t-CO_2, Factory assembly line: 1,043 t-CO_2)	N/A
Expected means of business	Lease	Lease	-
Currently envisioned implementation structure (draft)	・ Kowa Company, Ltd. (Installation and maintenance of DC feeding apparatuses) ・ Tokyo Rectifier Co., Ltd. (Manufacturing DC feeding apparatuses) ・ Hotel (Operation of apparatuses, monitoring of GHG emission reduction) ・ Locally-incorporated Japanese leasing companies (Lease and delivery of high-efficiency air conditioners, procuring funds) ・ Oriental Consultants Global Co., Ltd. (Assistance with MRV implementation, assistance with writing up program design documents (PDDs)).	・ Kowa Company, Ltd. (Installation and maintenance of DC feeding apparatuses) ・ Tokyo Rectifier Co., Ltd. (Manufacturing DC feeding apparatuses) ・ Factory B (Operation of apparatuses, monitoring of GHG emission reduction, procuring funds for covering particular expenses) ・ Locally-incorporated Japanese manufacturing companies (Delivery and maintenance of solar panel equipment) ・ Locally-incorporated Japanese leasing companies (Lease and delivery of high-efficiency air conditioners) ・ Oriental Consultants Global Co., Ltd. (Assistance with MRV implementation, assistance with writing up program design documents (PDDs)).	-
Total operating expenses (estimate, amount shown in Japanese yen)	Roughly 42.7 million yen (if not lease, excludes labor and other costs)	Roughly 350 million yen (DC power supply system: 50 billion yen, solar light: 300 billion yen)	-
Methods for procuring funds used by Indonesian side	-	Partner company utilized its own funds	Partner company utilized its nongovernmental funds
Expected number of payout years	14.4 years (No aid provided if no lease) 7.2 years (Aid is provided if no lease)	13.5 years (No aid provided for mega solar facilities) 6.8 years (Aid provided for mega solar facilities only.)	-
Challenges surrounding implementation of program	・ The investment value is extremely high ・ Issues such as the durability of the hotel rooftop (where the solar panel will be installed) have not been confirmed.	・ The long number of payout years ・ Securing sites for installing solar panels (Plan to use a site drawing when doing so.)	・ Bank C expressed its intention to consider implementing the program after Kawasaki City and Bandung sign a memorandum of understanding for intercity cooperation. Consequently, implementation of the program could not be considered during the investigation period for this fiscal year. ・ Securing sites for installing solar panels
Future plans	・ Will not implement the program under the conditions set forth in the investigation period for this fiscal year. ・ Will continue to consider implementing a different program after the completion of the investigation.	Will not implement the program.	Will consider implementing a different program after the completion of the investigation for this fiscal year.

Table 3-5: Results of Discussions with Each Candidate Facility for Implementing Technology
(Updated February 4, 2016) (2/2)

Facility Name	University D	Company E	Company F.
Industry	Universities	Pharmaceuticals	Pharmaceuticals
Location	Northeast section of Bandung	Eastern section of Bandung	Western section of Bandung
Managing and operating body	University D	Company E	Company F
Challenges faced by candidate facility and why they are interested in adopting the technology	・ A representative of our partner company was an expert on energy conservation in buildings and showed a strong interest in adopting DC power supply technology. ・ Promoting energy conservation is one of the department's aims as a measure that must be achieved.	・ Providing a stable supply of electricity is essential in carrying out production-related activities in the plant. The company would like to make an effort to conserve energy as well as reduce carbon dioxide emissions while also striving to achieve stable production.	
Site where technology will be adopted	Lighting and air conditioners on second floor of department building	Lighting in factory building	Lighting in factory building
Measures	・ Installation of DC feeding apparatuses ・ Switching to LED lighting (250 LED lights, 40 watts per light) ・ Enhancing the power supply efficiency of 9 air conditioners (Horsepower for each air conditioner: 8) ・ Reducing the amount of electrical power loss by hooking up a DC feeding apparatus to equipment listed above. ・ Setting up a video screen for educational purposes (Displays information on the operational status of the energy management system (EMS)). ・ Setting up motion sensors, and other measures	・ Installation of DC feeding apparatuses ・ Switching to LED lighting (880 LED lights, 40 watts per light)	・ Installation of DC feeding apparatuses ・ Switching to LED lighting (313 LED lights, 40 wats per light)
Breakdown of electrical power use inside facility	N/A	N/A (Electrical power use at night accounts for 80% of the total usage during the day.)	・ Electricity consumption from plant utilities (air conditioning) account for 70% of total electricity consumption. ・ Electricity consumption from the production line and lighting are just below 30% and 10%, respectively.
Annual electricity consumption at site where technology will be adopted	Roughly 144 MWh per year	Roughly 3,569 MWh per year	Roughly 4,200 MWh per year
Expected amount of annual power reduction	Roughly 135 MWh per year	Roughly 100.8 MWH per year	Roughly 100.8 MWh per year

Facility Name	University D	Company E	Company F.
Expected amount of annual carbon dioxide emissions	120.6 t-CO_2 per year	82 t-CO_2 per year	82t-CO_2 per year
Expected means of business	To be determined	Lease	Lease
Currently envisioned implementation structure (draft)	・ Kowa Company, Ltd. (Installation and maintenance of DC feeding apparatuses) ・ Tokyo Rectifier Co., Ltd. (Manufacturing DC feeding apparatuses) ・ University D (Operation of equipment, monitoring of GHG emission reduction) ・ Oriental Consultants Global Co., Ltd. (Assistance with MRV implementation, assistance with writing up program design documents (PDDs)).	Under reconsideration	Under reconsideration
Total operating expenses (estimate, amount shown in Japanese yen)	Roughly 59 million yen (not including labor and wiring costs)	Roughly 29.5 to 30.68 million yen (Under reconsideration)	Roughly 15 million yen (Under reconsideration)
Fundraising method used by Indonesian government or partner organizations	・ They do not anticipate the Indonesian government to cover the costs for additional investigations in the future. ・ They will consider the possibility for either the Japanese or Indonesian governments to cover the costs for measuring electricity consumption reduction levels.	Will use company's own funds.	Will use company's own funds.
Expected number of payout years	About 33 years (no aid provided)	About 22 to 23 years (no aid provided)	About 9 years (no aid provided)
Challenges surrounding implementation of program	A memorandum of understanding must be signed between Kowa Company, Ltd. and University D.	Efforts need to be made to ensure that there is a sufficient scale of operation and to improve cost effectiveness.	Efforts need to be made to ensure that there is a sufficient scale of operation and to improve cost effectiveness.
Future plans	・ After undergoing an additional investigation in FY 2016, equipment used for conducting studies will be set up at University D. In addition, technology will be transferred to University D and the capabilities will be enhanced. ・ Will continue to consider the implementation of programs aimed at the horizontal development of DC power supply technology in Indonesia through cooperation with University D, once experimental proof is provided.	・ Will not implement the program under the conditions set forth in the investigation period for this fiscal year. ・ Will continue to consider implementing a different program after the completion of the investigation (including reassessment of the implementation structure).	・ Will not implement the program under the conditions set forth in the investigation period for this fiscal year. ・ Will continue to consider implementing a different program after the completion of this investigation (including reassessment of the implementation structure).

4 Issues that Need to be Resolved with Respect to the Formation of JCM Projects to Promote Widespread Growth

The following two issues need to be resolved concerning the promotion of JCM program formation in Bandung City - particularly those projects implemented at government facilities or facilities that are operated entirely or partly by government funds.

- As it is set forth in President's Decree 70, 2012, when procuring funds for facility and equipment costs to carry out programs (implemented at government facilities) with a total cost of 200 million rupiahs (1.78 million yen) or more, a bidding procedure is required (government procurement regulation).
- If a program is implemented as a JCM equipment subsidy program, the Bandung Government can only accept a scheme in which the Japanese company temporarily puts up the total program cost (restriction on the use of equipment subsidy programs).

First, during the first and second trips of this program, we interviewed Bandung municipal government officials and explored resolution measures. The discussions focused on, among the issues that were pointed out, promoting the implementation of JCM programs by avoiding government procurement regulations. The resolution measures that came out of the discussions are described below.

4.1. Utilization of Non-Governmental Resources which belong to Government Facilities

As for the issue of government procurement regulations, Bank C and University D, which we mentioned in sections 3.3 and 3.4, are a government-run bank and a national university, respectively. The discussions which took place in this program revealed that avoiding government procurement regulations is possible for both of these institutions (according to the President's Decree indicated above) as long as funds can be procured through non-government resources that the partner facilities have access to.

4.2. Registry of Technology being Considered for Implementation into E-catalog - which is administered by the National Procurement Agency (which is controlled directly by the Presidential Office of Indonesia)

It was discovered that government procurement regulations can be avoided by registering DC power supply technology in E-catalog, an online procurement database governed and operated by Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP) - which is Indonesia's national procurement agency and is controlled directly by the president of Indonesia. In other words, registering the technology in E-catalog would allow government officials to select the goods and services they would like to procure, directly from the database, and purchase them.

The specific application procedures for registering the technology are as follows:

- Once the BAPPEDA verifies that the company applying is able to supply goods and services for the Indonesian central government as well as local governments in Indonesia, it issues a letter of recommendation to the national procurement agency.
- The company applying, once it receives the letter of recommendation, submits an application for registration to the national procurement agency. The company applying

submits an overview of the company as well as the technology at the time of registration. (This can be submitted via email.)

- The national procurement agency, after receiving the application, negotiates the procurement cost for the goods and services with the applicant.
- After the negotiations are completed, the agency registers the information in the E-catalog website (https://e-katalog.lkpp.go.id/).

4.3. Free Contract (Direct Appointment)

DC power supply technology can be set up at government facilities without going through a bidding process if Kowa Company, Ltd. (which has DC power supply technology) fulfills the criteria described below. However, we believe that adopting the technology through a direct appointment is extremely difficult, as the conditions are very strict.

- It can be proved that Kowa Company, Ltd. is the only business in Indonesia that offers services for DC power supply technology.
- Kowa Company, Ltd. has either an international patent or a patent in Indonesia for DC power supply technology.
- The technology is approved by the mayor (internal approval) after the two points listed above are confirmed by the Bandung municipal government.

Moreover, the following two requests were made by BAPPEDA - our counterpart in Bandung City for this project - with regards to restrictions on the use of equipment subsidy programs.

- Whether the system for JCM equipment subsidy programs can be changed so that subsidies for half of the project cost can be provided by the Ministry of the Environment in advance before the budget procurement process is completed (rather than after the equipment has been installed) by the Bandung municipal government, and allow the other half of the cost to be procured by the Bandung municipal government. These measures would offset restrictions on budget demands established the Bandung municipal government.
- We would like the Japanese and Indonesian governments to discuss the above issues in an intergovernmental conference.

Given that subsidies for JCM equipment subsidy programs are provided after the project cost is determined, we believe that resolving these issues pointed out by the Bandung side through this program, and implementing JCM programs by utilizing government resources government facilities have access to will be extremely difficult.

Therefore, when implementing JCM programs that utilize DC power supply technology for government facilities through this program, we will strive to place an emphasis on avoiding government procurement regulations without using government resources, which is the measure that is described in Section 4.1.

5 Policy Proposal for Adopting Energy Conservation Technology

5.1. Raising Awareness about the Eco Office Concept

The investigation from the last fiscal year reveals that since 2005, numerous plans aimed at raising awareness about energy conservation have been formulated in Indonesia as well - beginning with the National Energy Conservation Master Plan (Rencana Induk Konservasi Energi Nasional, or RIKEN) - and that the Bandung municipal government has begun to carry out energy conservation activities. It formulated energy conservation guidelines (eco office guidelines) for government buildings with the support of Green Building Council Indonesia, a local nongovernment organization. The guidelines have helped raise the awareness of their employees towards energy conservation. Furthermore, the Bandung municipal government has engaged in public awareness activities for energy conservation while getting an idea of the current conditions. For instance, it has conducted investigations on water and electricity conservation efforts carried out at 72 public corporations and identified the top four corporations.

It became apparent in the interviews with Bandung municipal government officials that in order to raise awareness about the concept of eco office, the following measures need to be implemented:

- Improvements to the themes of training programs (particular emphasis on themes that stress economic and social benefits)
- Periodic announcements on the monitoring results for electricity consumption reduction levels.
- Build effective methods for raising public awareness (e.g., increasing number of staff members)

If the existing guidelines are upgraded and if public awareness activities take place in locations other than government buildings in Bandung City, the concept of eco office has the potential to spread widely. Such measures may eventually boost efforts to adopt the technology which is the aim of this program.

5.2. Relaxation of Investment Regulations

Furthermore, it has become apparent that some divisions in the Indonesian Department of Finance are considering relaxing their investment regulations. By relaxing regulations on assets which private companies will invest as security in the future, they have grasped an understanding of the circumstances through policies which promote monetary loans as well as through interviews. As for the impact of such developments on this program, we are planning to include that information in future reports.

6 Conferences and Training Programs for Local Authorities

6.1. Local Kick-off Conference

A kick-off gathering aimed at business matching was held, and we visited the facilities introduced by the Bandung municipal government which are feasibility study candidate sites. We also gathered information on electricity consumption as well as the need for upgrading facilities.

September 22 (Tue) Local Kick-off Gathering

Participants: About 20 people including Bandung municipal government officials, people in charge of facilities located inside buildings in Bandung City, Kawasaki City officials, as well as other Japanese officials involved with the feasibility studies.

Aims: To create an opportunity for matching the needs of owners of buildings located in Bandung City with technology that Japan has to offer by holding the gathering in cooperation with BAPPEDA (Regional Development Planning Board), City of Bandung.

Achievements: Commercial buildings (e.g., shopping malls and hotels), government buildings, government hospitals, and banks were presented by the City of Bandung as potential sites for feasibility studies. All of the facility owners agreed to accept field trips the following day or later, as the visits would cause a rise in electricity consumption.

Photo6-1: Kick-off gathering in session (potential site for feasibility study)

Photo 6-2: Kick-off gathering in session (BAPPEDA Regional Development Planning Board)

6.2. The Local Wrap-up Gathering

A report on the feasibility studies for this fiscal year was presented before the City of Bandung, the Indonesia JCM Secretariat, as well as other involved officials, and discussions took place on challenges surrounding this program as well as the JCM system, as well as its future direction.

January 27 (Wed.) The Local Wrap-up Gathering

Participants: About 25 people including Bandung municipal government officials, Indonesia JCM Secretariat officials, those in charge of the facilities which were the sites of feasibility studies, the City of Kawasaki, as well as other Japanese officials involved with the feasibility studies.

Aims: To present a report on feasibility studies which were conducted this fiscal year for six buildings by holding the gathering in cooperation with BAPPEDA (Regional Development Planning Board), City of Bandung. Handouts were distributed during the reports. We shared with the participants that one organization is actively considering implementing our program in the future.

Achievements:

- We shared the Issues that Need to be Resolved with Respect to the Formation of JCM Projects to Promote Widespread Growth in Bandung City and their Widespread Development (see Section 4) with Bandung municipal government officials. We were able to reiterate with Bandung municipal government officials how the subject of our investigations has shifted to private buildings from government buildings - which was what they had requested.
- Representatives of private companies stated that if improvements were made to 1) the long years of depreciation and 2) high investment cost, they would consider implementing the program.

Photo 6-3: Wrap-up Gathering in Session (BAPPEDA Regional Development Planning Board)

Photo 6-4: Wrap-up Gathering in Session (Indonesia JCM Secretariat)

January 27 (Wed.) Discussion on Framework for Cooperation between Kawasaki City and Bandung City in the next fiscal year and beyond

Participants: Bandung City (Regional Development Planning Board, International Cooperation Office, Environmental Management Committee)
Kawasaki City (Institute for Global Environmental Strategies; Oriental Consultants Global Co., Ltd. served supporting role)

Achievements:

- Shared necessary steps in signing memorandum of understanding for intercity cooperation.
- Presented a candidate program to Bandung City officials. The program is a feasibility study that would be implemented in the next fiscal year or beyond which the City of Kawasaki and cooperating organizations envision.

January 28 (Thurs.) Meeting with Indonesia JCM Secretariat

Participants: About 8 people consisting of Indonesia JCM Secretariat officials, Kawasaki City officials, as well as other Japanese officials involved with the feasibility studies.

Aims: To make a courtesy visit and exchange opinions on the JCM system.

Outcome: The Indonesia JCM Secretariat pointed out that adoption of the technology at government buildings is the aim of intercity cooperation. Kawasaki City study team shared lessons learned from this fiscal year's program.

6.3. Training Program in Kawasaki City (held in Japan)

February 17 (Wed.) Training with Kawasaki City

Participants： 2 Bandung City Officials

Training abstract：

- Information exchange on the municipalities' work on energy savings: The fact that over 60 percent of Bandung City's greenhouse gas originates from the transport sector was shared as well as the city's energy saving measures. In response, Kawasaki City's Climate Change related jurisdiction ("Basic Plan", "Action Plan", and "Priority Projects" etc.) were shared with Bandung.
- Hydrogen Energy Strategy and Public Private Partnerships: Experience from Kawasaki City's initiative "Kawasaki Hydrogen Strategy" and "Decentralized energy supply system utilizing renewable and hydrogen energy sources" were shared. Details on the public private partnership's stakeholder committee framework, as well as insights into developing a recycling society utilizing clean hydrogen energy was shared.

February 17 (Wed.) Site visit of the DC power supply technology

Participants: 2 Bandung city officials

Location： Yachio Bank, Noborito Branch

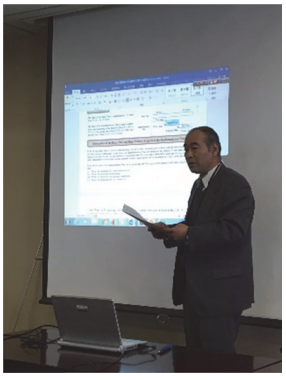


Photo 6-5
Training by Kawasaki City
(Kawasaki Environmental
Research Institute)

Photo 6-6
Training by Kawasaki City
(Smart City Strategy Office)

Photo 6-7
Electricity Saving Activities by the gov
(Bandung City Gov)

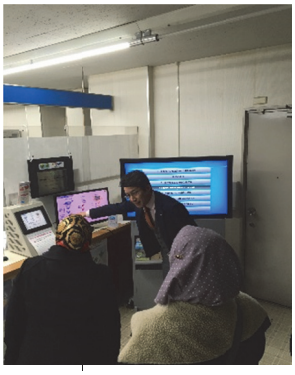


Photo 6-8
DC power supply
(Yachio Bank Noborito Branch)

February 18 (Thurs.) Kawasaki International Eco-Tech Fair

Participants： Bandung Mayor and his 8 government officials

Results： The Bandung City officials visited the booths of the exhibitors and shared the city's water, waste and energy issues and welcomed the companies to visit the city.

February 19th (Fri.) JFE Kankyo Cooperation Site Visit
（Mercury light recycling plan, plastic recycling plant）

Participants： 5 Bandung government officials

Results： Government officials visited waste recycling technology that would be beneficial as 3R activities in the city underway.

Photo 6-9
JFE Kankyo
Site visit 1

Photo 6-10
JFE Kankyo
Site visit 2

Photo 6-11
JFE Kankyo
Site visit 3

6.4. Signing Ceremony for the MoU

February 18 (Thurs.) Signing Ceremony for the Memorandum of Understanding (MoU) between Bandung City (Indonesia) and Kawasaki City on City to City Collaboration for Low Carbon and Sustainable City Development

Summary: The signing ceremony was held at an annual event "International Eco-Tech Fair" hosted by Kawasaki City every year to expand the relationship. After the ceremony, Bandung Mayor Mr. Kamil shared his vision for developing Bandung City into an Environmentally Friendly City with the audience.

Photo 6-12：Memorandum of Understanding Signing Ceremony

Appendix

< Appendix 1>

Inception meeting of
Project for Low Carbon Society Development
under Collaboration between Bandung City and City of Kawasaki:
Introduction of Energy Management System
Tentative

Date: September 22nd, 2015　8:30-12:00 Venue：Crowne Plaza Hotel, Bandung

Purpose	Information exchange among FS stakeholders
Speakers	Bandung City Government Bandung Institute of Technology Indonesia JCM secretariat Building owners of Bandung city (RS Al Islam, Mandiri Bank, Pasar Bahru) City of Kawasaki, Institute for Global Environmental Strategies (IGES), Oriental Consultants Global Co., Ltd., Kowa Company Ltd.
Moderator	IGES
Language 言語	Translation will be provided for Bahasa <-> Japanese

8:30- (15min)　Opening Remarks

- ✓ Dra. Kamalia Purbani, BAPPEDA, Bandung City Government

8:45-9:15(30 min) Overview of the Joint Crediting Mechanism <language: Bahasa>

- ✓ Ms Rini Setiawati, Indonesia JCM Secretariat

9:15-9:45 (30 min) Introduction to Bandung Policy, Plans on Smart City Development <language: Bahasa>

- ✓ Mr. Anton Sunarwibowo, ST. MT BAPPEDA

9:45-10:30 (45 min) Introduction to energy savings

1】Hospital

2】Bank

3】Commercial facility

10:30-10:40 (10 min) Q & A

10:40-11:10 (30min) Introduction to Feasibility Study on Energy Management System

- ✓ Ms. Ryoko Nakano, Institute for Global Environmental Strategies
- ✓ Mr. Kentaro Ofuji, Oriental Consultants Global Co., Ltd.
- ✓ Mr. Hiroaki Mandokoro, Kowa Company Ltd.

11:10-11:20 (10 min) Q & A

11:30-11:40(10 min) Closing Remarks

- ✓ Dr. Akira Ogihara, Kawasaki Environmental Research Institute, City of Kawasaki

12:00-13:00 (60 min) Lunch will be served

Questionnaire to building or facility owner in Bandung City

Date: ____/ ___/ 2015

1. Building/ facility name:_____
2. Location in Bandung:_____
3. Overview of your building/ facility:

Item	Sub-item	
I. Overview of your building/ facility	1) Information on business activities	e.g. type of tenant(s) in your building/ facility including book store, clothing store, bank
	2) Net floor area of the building/ facility	_____m^2
	3) Information on used electric lamps	1. Type (e.g. LED, fluorescent bulbs):_____ 2. Product name:_____ 3. Model number:_____ 4. Year of manufacture: _____ 5. Number of the lamps: _____ 6. Location of the lamps: _____ 7. Wattage of the lamps: _____W 8. Operation hours : Daily: : a.m - : p.m. Monthly:_____hours 9. Monthly electricity consumption amount: _____kWh 10. Monthly electricity bills: _____Rp.
	4) Information on used air conditioners	1. With/ without inverter:_____ 2. Use of air conditioners with central controlling system (Yes/No):_____ 3. Product name:_____ 4. Model number:_____ 5. Year of manufacture: _____ 6. Number: _____air conditioners 7. Location of the air conditioners: _____ 8. Wattage of the air conditioners: _____kW 9. Operation hours : Daily: : a.m - : p.m. Monthly:_____hours 10. Monthly Electricity consumption amount: _____kWh

Item	Sub-item	
		11. Monthly electricity bills _____Rp.
	5) Information on electricity source of the building/ facility	1. Electricity supply source (e.g. from PLN or generated by yourselves): _____ 2. Unit electricity price for your building/ factory: _____ 3. Private electricity generator (Yes/No):_____ If yes, please provide information on their number and power generation capacity: _____ 4. Solar power generation Yes/ No: If yes, please provide information on their power generation capacity and panel type: _____
	6) Other equipment in the building/ facility (if any)	e.g. On rooftop, solar power generation panel(s) exists?
II. Previous and ongoing energy efficiency improvement effort(s) in your building/ facility (If any)	-	If any, please provide brief summary of your efforts in a bulleted paragraph style: - - - - -
III. Plan for introduction of equipment with higher energy efficiency (If any)	-	If any, please describe specification of the equipment and time schedule for the equipment introduction.

Your name:

Company/ Organization name:

Position name:

Telephone number:

E-mail number:

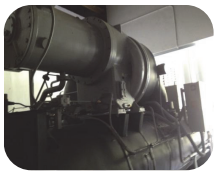
Terima kasih banyak atas kerjasama anda

Current Development of JCM Scheme in Indonesia

Indonesia JCM Secretariat

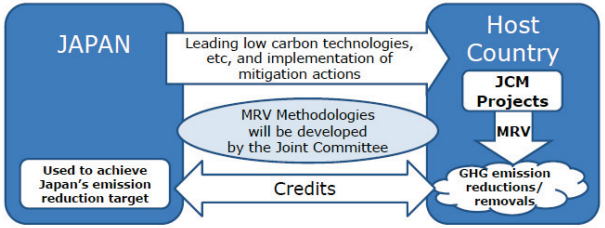
Coordinating Ministry for Economic Affairs
Republic of Indonesia

Outline of Presentation



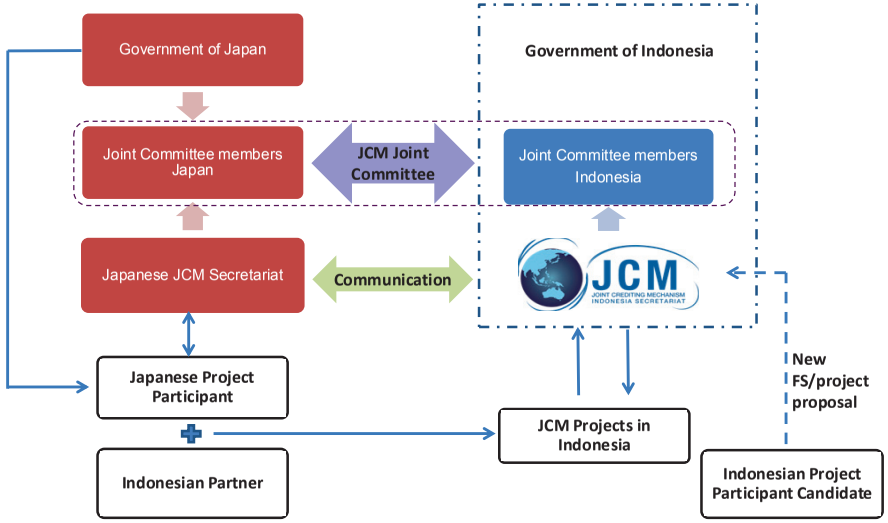
- Basic concept of JCM
- Current Development
- Financial Support Scheme in JCM
- City-to-city cooperation under JCM scheme

JCM Basic Concept

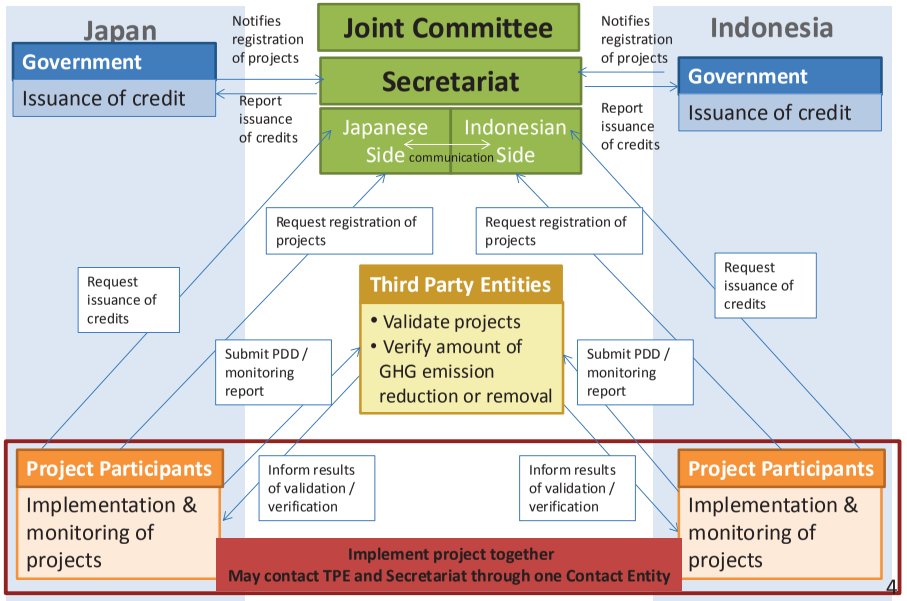


- **The Joint Crediting Mechanism** as a G-to-G scheme which encourages private sector organizations to invest in Low Carbon Development activities in Indonesia through incentive from the Government of Japan.
- **JCM cooperation is not only conducted by Japan and Indonesia, but also with other 13 developing countries.**
- **Bilateral Cooperation on the Joint Crediting Mechanism for the Low Carbon Growth Partnership between the Republic of Indonesia and Japan has been signed** by the Coordinating Minister for Economic Affairs of Indonesia and Minister for Foreign Affairs of Japan.
- **Objectives of the JCM:**
  1. Facilitate diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
  2. Evaluate contributions to GHG emission reductions/removals from developed countries in a quantitative manner, through mitigation actions implemented in developing countries and use those emission reductions or removals to achieve emission reduction targets of the developed countries.
  3. Contribute to the ultimate objective of the UNFCCC by facilitating global actions for emission reductions or removals.

Indonesia JCM Secretariat

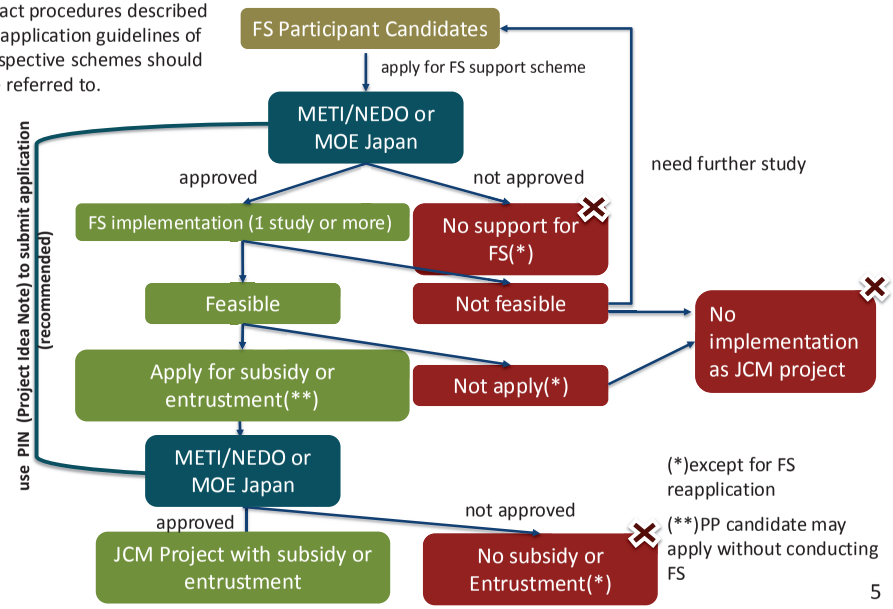


JCM Scheme



Steps in JCM Feasibility Studies

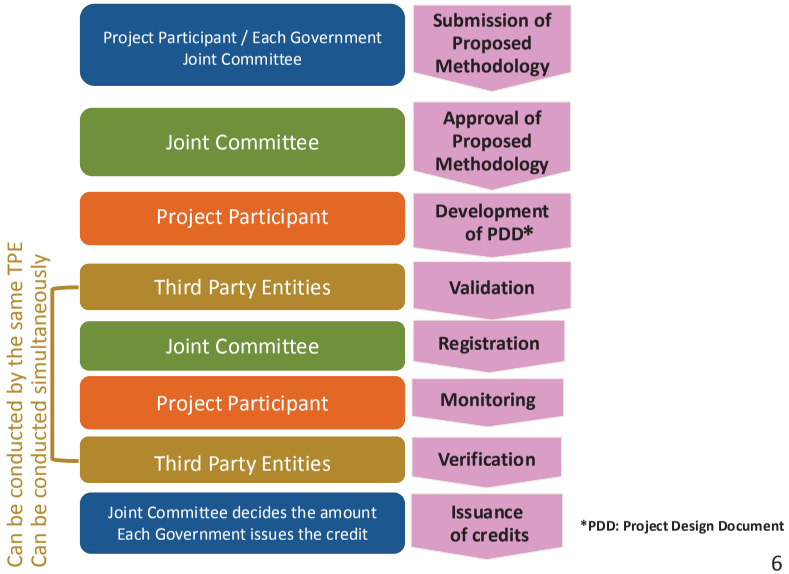
Exact procedures described in application guidelines of respective schemes should be referred to.



(*)except for FS reapplication

(**)PP candidate may apply without conducting FS

Steps in the JCM



*PDD: Project Design Document

FS in Indonesia (2010-2014)

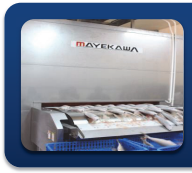
Registered Projects

Energy Saving for Air-Conditioning and Process Cooling by Introducing High-efficiency Centrifugal Chiller

- Ebara Equipment & Systems and PT Primatexco Indonesia
- Estimated total emissions reduction of **799 tCO_2 eq.** by 2020

Project of Introducing High Efficiency Refrigerator to a Food Industry Cold Storage in Indonesia

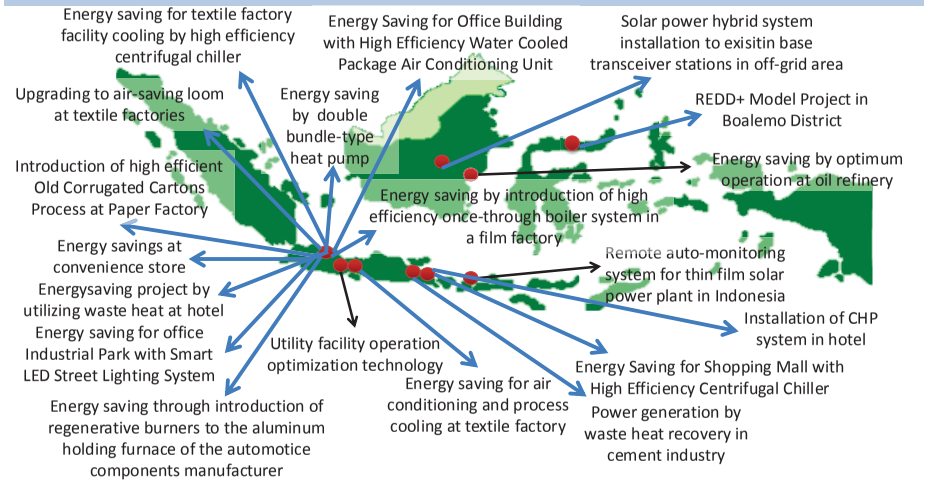
- Mayekawa MFG Co., Ltd and PT Adib Global Food Supplies
- Expected total emission reduction of 845 tCO_2 by 2020



Project of Introducing High Efficiency Refrigerator to a Frozen Food Processing Plant in Indonesia

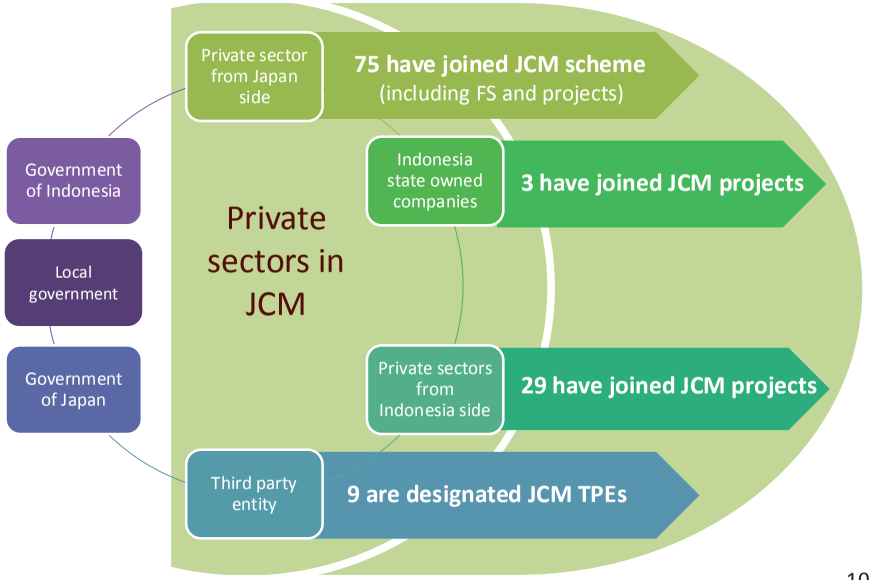
- Mayekawa MFG Co., Ltd and PT Adib Global Food Supplies
- Expected total emission reduction of 151 $tCO_{2\ by\ 2020}$

Projects in the Pipeline



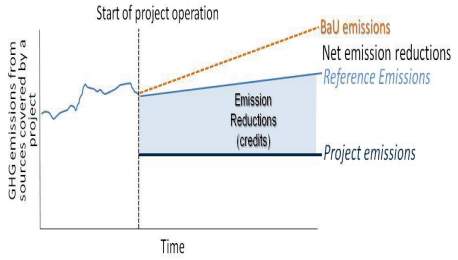
19 projects = 16 Energy efficiency + 2 Renewable energy + 1 REDD+

Actors in JCM



*as of August 2015

JCM Methodology in Indonesia



Reference emission:
Emission that are emitted from technology that has high share in the market

Indonesia JCM Secretariat in proposed methodologies:

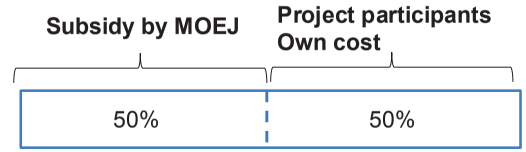
- Experts review
- Using methodology review form
- Discussion meetings between related ministries ministries
- Prepare website for public comment

JCM Methodologies in Indonesia

- **10 approved methodologies**
  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
  9. Replacement of conventional burners with regenerative buners for aluminum holding furnaces
  10. Introducing double-bundle modular electric heat pumps to a new building

JCM Financial Support by MOE

- Covering the half of cost for installing equipment which reduce CO_2 from fossil fuel combustion
- Need to formulate international consortium
- Delivering at least half of the credit issued to MOEJ



Initial cost for the installation of new equipment

Construction cost, cost for appurtenant work, equipment cost, costs for survey and test, administration cost, monitoring equipment

Technologies to reduce CO_2 emissions from energy-related sources

- Project participants

GEC: Global Environment Center Foundation, secretariat of the subsidy scheme by MOEJ

Japanese Entity(ies)
Host country Entity(ies)

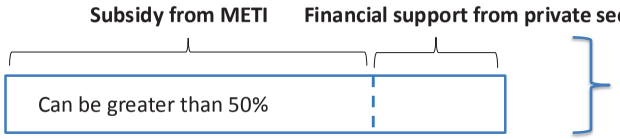
International consortium

Apply this subsidy scheme to the GEC

Coverage of financial support from MOE

Item	Detailed item
Construction cost	Cost of material Cost of labor Direct expenses (including electricity cost and water charge for construction and machinery costs etc) Administrative expenses
Ancillary work cost	—
Survey and measurement cost	Investigation cost Design cost Survey and measurement cost
Administrative cost	Salary of staffs Cost of service operation Cost of Travel Rental cost etc

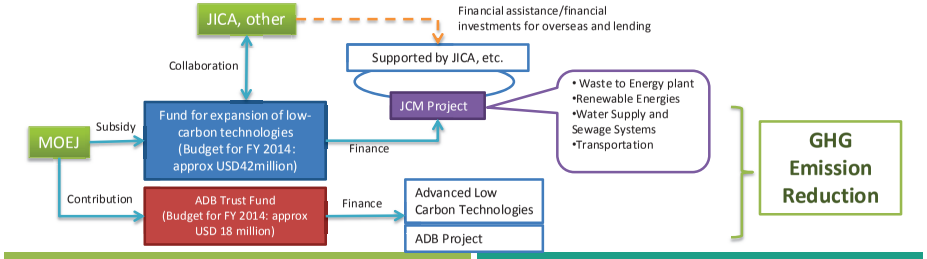
JCM Financial Support by METI



The amount of subsidy is based on the negotiation with METI

- For some while, the technology will be still owned by METI and will be transferred to the project participant
- Subsidy is given directly for technologies, facilities, capital, and capacity building of project recipient.
- International consortium is not needed.

Support Program Enabling "Leapfrog" Development by MOE



Financial Support for Expansion of Low-Carbon Technologies

Draft Budget for FY 2015
4.2 billion JPY

Scheme
To finance the projects which have better efficiency of reducing GHG emission in collaboration with other projects supported by JICA and givernmental affiliated financial institute.

Purpose
To expand superior and advanced low-carbon technologies for building the low carbon society as the whole city wise and area wise in the wider fields, and to acquire credits by the JCM

Trust Fund ADB

Draft Budget for FY 2015
1.8 billion JPY (18 million USD)

Scheme
To provide the financial incentives for the adoption of the advanced low-carbon technologies which are superiot in GHG emission reduction but expensive in ADB financed projects

Purpose
To develop ADB projects as the "Leapfrog" developments by the advanced technologies and to show the effectiveness of the JCM scheme by the acquisition of credits of the JCM

Pembiayaan dari ADB dengan program JFJCM

- JFJCM supports incremental cost of advanced low carbon technology for GHT emission reduction
- $ 16.6 M (1.8 billion Yen) for 2014 contribution
- Further contribution expected in subsequent years
- Maximum amount of grant: $10M

Sovereign Projects

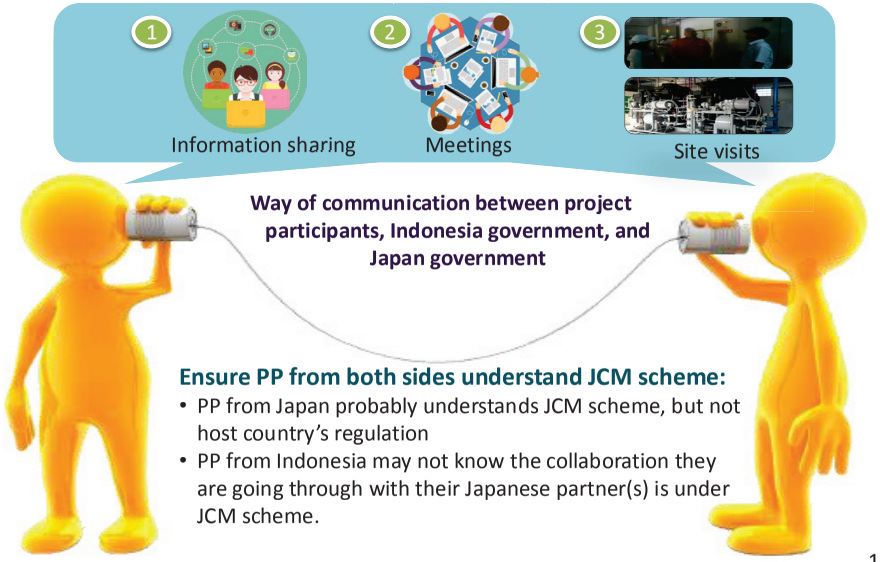
- Project(s) with entity from the government
- (i) Project cost < 50M USD : Around 5M USD
- (ii) Project cost> 50M USD : 10% total of project cost or 10M USD
- Grant for incremental cost of adopting advanced low carbon technologies from "business as usual"

Non-sovereign Projects

- Project(s) with non-government entity (private sector)
- Max: smaller of 10% of the project cost and $ 10M
- Support margin component of the interest rate of the ADB loan

Contact Ryozo Sugimoto (rsugimoto@adb.org) for further information on ADB fund for JCM

Communication and M&E activities



Ensure PP from both sides understand JCM scheme:

- PP from Japan probably understands JCM scheme, but not host country's regulation
- PP from Indonesia may not know the collaboration they are going through with their Japanese partner(s) is under JCM scheme.

Current development of city-to-city cooperation

Role of stakeholders in city-to-city cooperation under JCM scheme

Local Government	• Prepare annual local government budget (APBD) • Regulation on direct appointment? • Tender?
Company owned by the local government (BUMD)	• Regulation on direct appointment? • Tender? • Commitment in managerial level
Private Sector	• More flexible • Commitment in managerial level

20

Communication and capacity building

Brochure

Booklet

Business Forum

Participating in Indonesia Pavilion
COP 20 Peru, Lima

21

Coordinating Ministry for Economic Affairs
Republic of Indonesia

Thank you! Terima kasih!

Our website: www.jcmindonesia.com
Contact us at secretariat@jcmindonesia.com
Sekretariat JCM Indonesia
Gedung Kementerian BUMN lantai 18
Jl. Medan Merdeka Selatan 13, Jakarta 10110

Smart Government and Development of Bandung Smart City

BANDUNG CITY GOVERNMENT
SEPT 2015

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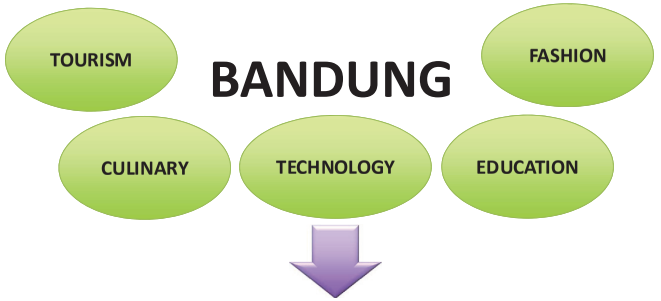
e-Indonesia Initiatives

Preliminary



It takes planning and management aspects of urban well, including the utilization of Information Communication Technology (ICT)

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INFORMATION AND COMMUNICATION TECHNOLOGY

Utilization of ICT

=

city urban development means growth that is supported by the use of information technology and communication (ICT) to connect, monitor, and control a variety of existing resources so that more effective and efficient

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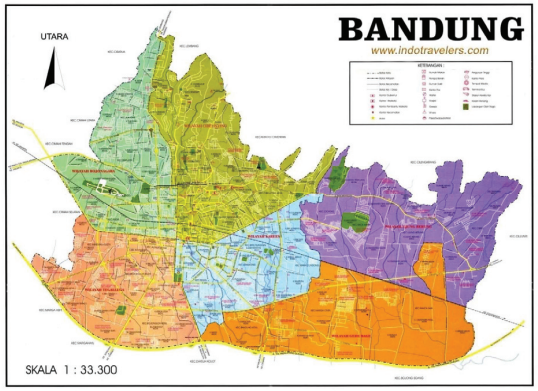
e-Indonesia Initiatives

BANDUNG

Phase Metropolitan

POPULATION> 5 Million inhabitants

Utilization of ICT will facilitate the setting population



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e-Indonesia Initiatives

Ecosystem smart city

Ecosystem Smart City sector consists of several components that are integrated with ICT as its backbone, the image on the right shows how a Smart City is composed of technical components, which consist of : Smart Economy; Smart People; Smart Governance; Smart Government; Smart Mobility; Smart Environment; and Smart Living.

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Ecosystem smart city

SMART CITY

components of an integrated sector with ICT as its backbone,

- SMART LIVING
- SMART ENVIRONMENT
- SMART MOBILITY
- SMART GOVERNMENT
- SMART GOVERNANCE
- SMART PEOPLE
- SMART ECONOMY

Smart City composed of technical components SMART CITY

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Benefits smart city for the government and society

- The efficiency and effectiveness of resource allocation area
- Reducing inequality in society
- Reduction of congestion for road users
- Reduce pollution and emissions (carbon footprint)

- **Bandung raised its rating to investment ahead**
- **Improving the quality of the environment (air, water, and soil)**
- **Increase the transparency and accountability of government**

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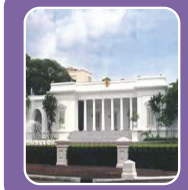
e-Indonesia Initiatives

Basic Function Smart Government



Internal (G2G)

- management jobs
- Management of urban development
- Financial management
- Inventory management

Eksternal (G2C & G2B)

- Basic needs services (Health, Education, Social)
- Public facilities
- licensing
- Population management

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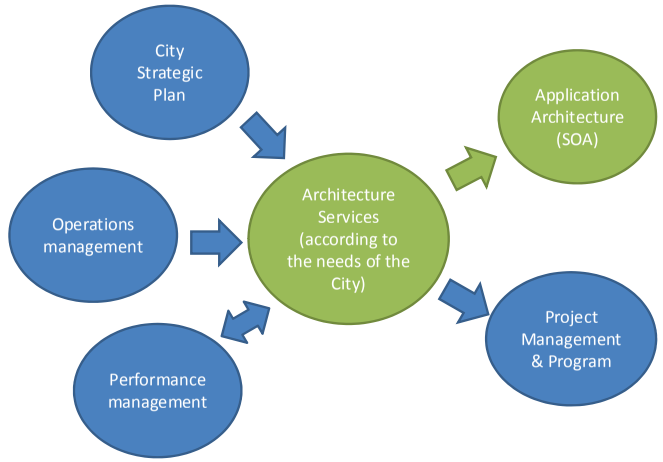
Context Application Architecture



Passport Bandung

People imagine Bandung

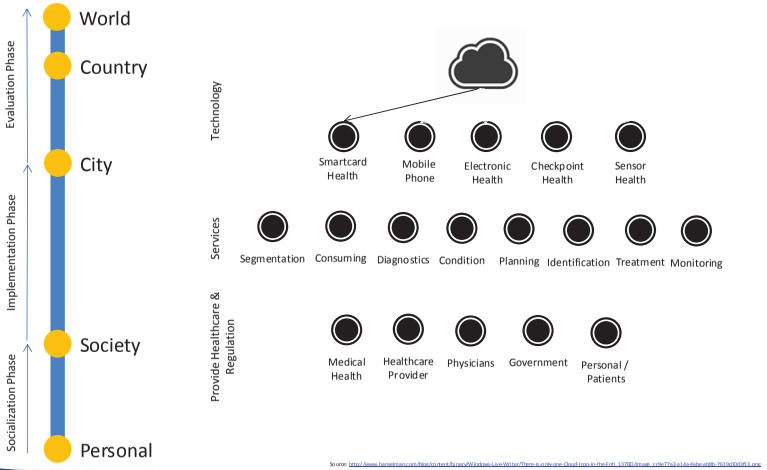
- Payment instruments that can have rapid, practical, and safe
- Transportation
- Health
- Entertainment, etc.
- Can have a card that stores all of his or her identity.
- Can actually become society 'Green' by reducing the amount of paper used

Passport bandung

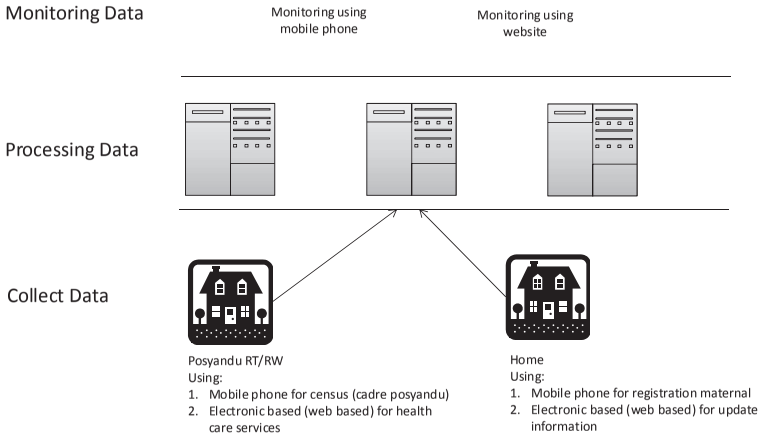
- Imagine the Government of Bandung
- Can have a fast and accurate data during an emergency response,
- Can record economic transactions in Bandung in more detail,
- Can speed up the administrative process in all areas of government services, utilities (PLN, taps, Telkom).

Passport CARD

Envisioning Healthcare in Bandung



Neonatal and Maternal Health Monitoring



Health Smart card

Health Care Provider
-Medical Record Resume
-Medical Record Update
-Payment & Deposit Transaction

Pharmacy (Vending Machine / Hospitals)
- Resume medicine
- Suggestion / Check medicine
- Payment medicine

Insurance
- Integrated insurance services
- Transaction payment

Health Smart card

Health Care Planning
-Set up assistant / reminder for culinary (check point like "TAP")
-Set up assistant / reminder for exercise (check point like "TAP")
-Integrated with mobile phone for scheduling and update information

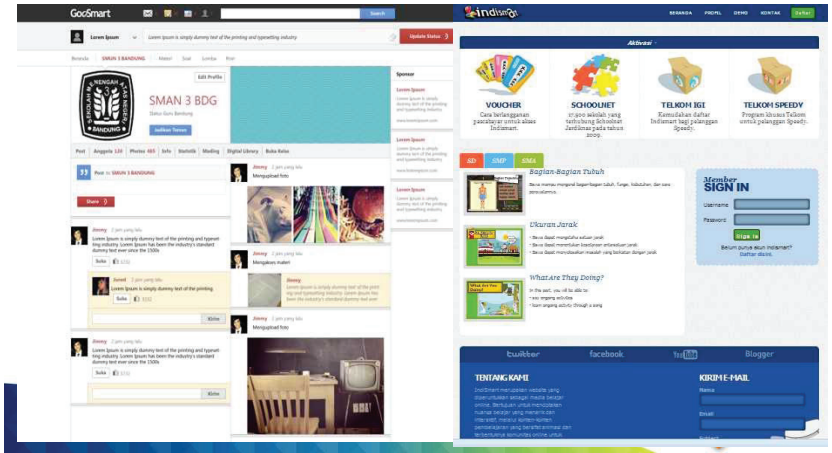
Health Care Identity
- Register health event (donor darah, Blood Transfer)
- Reservation health service or deposit payment to check up

Learning everywhere, every time

Smart education benefits for society :
- Assist teachers in providing classrooms outside the school schedule
- Assist students in understanding the subject matter through the available content
- Teachers an opportunity to earn extra income or principal

e-Indonesia Initiatives

Virtual Learning Education



OVERVIEW SMART EDUCATION BANDUNG

Social Media Platform development as a medium of instruction

Workshop for teachers with the results in 1000 of content that can be accessed in a variety of media

Procurement of cloud-based school information system for schools in the city

Procurement of equipment for the digital content creation for each school in the city

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e-Indonesia Initiatives

ITS mission in Indonesia

ITS Goal / Misi	Objectives	Performance Measures
1. Improve the traffic safety	1. Lowering the frequency of accidents. 2. Decrease or minimize the impact of traffic accidents.	1. Number of accidents by type of vehicle.
2. Reducing the impact of pollution and environmental degradation around the transport system	1. Lowering the level of air pollution. 2. Lowering greenhouse gas emissions. 3. Lowering the level of noise pollution. 4. Lowering energy consumption. 5. Reduce the need for the construction of transport facilities.	1. The percentage of air pollution. 2. The percentage of greenhouse gas emissions. 3. The percentage of noise pollution. 4. The amount of energy used (fuel, electricity, etc.) 5. The amount of construction that was built and importance.
3. Improving the efficiency of the road transport system	1. Reduced levels of traffic congestion. 2. Increase the capacity of the transportation system. 3. Lowering the operating costs of the transport system.	1. The percentage of traffic jams. 2. The number of users of transport. 3. Operating expenses operating system.

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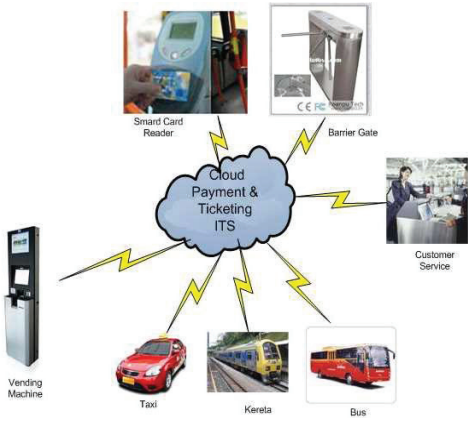
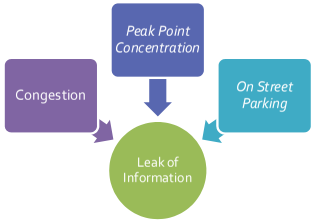
Road User Information System

Electronic Payment



Smart parking



Urban transportation system that is managed in an integrated manner to provide ease of transportation services to the citizens effectively and efficiently

Smart Navigation

- The navigation system can provide travel information such as direction of travel, object location information, and other information

Smart Surveilance

The monitoring system resources and urban environment to increase safety awareness and handling of city residents

Benefit

- Improve safety community
- Real time alert
- Digital forensic video based content
- Help raise awareness

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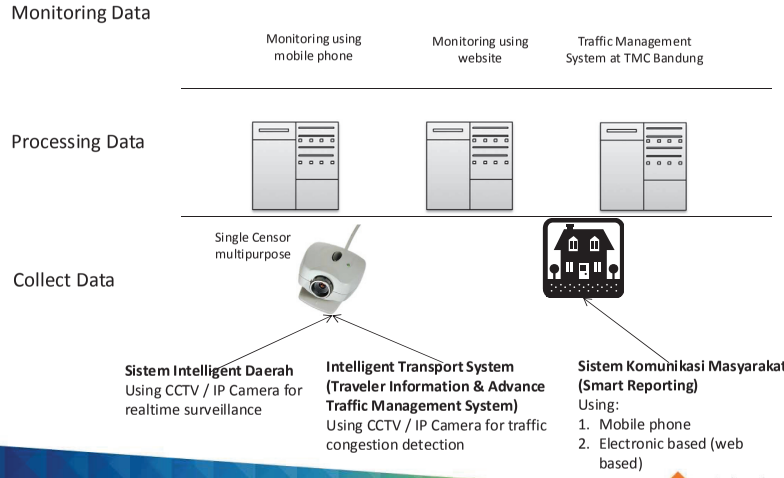
e-Indonesia Initiatives

Traffic & Area Monitoring



smartIndonesia

e-Indonesia Initiatives

Smart Home

Smart Home is a house that has the ability to work with intelligent that can monitor, control, anticipate and make decisions based on the specific situation so as to provide comfort, safety, security and energy savings as well as access to information

Smart home service features:

- Lights control house
- Monitor and Control Doors home
- Monitoring environmental conditions / security at home
- Controlling home electronic devices (air conditioner, refrigerator, TV, etc.)
- Monitor health conditions
- Education and entertainment content services

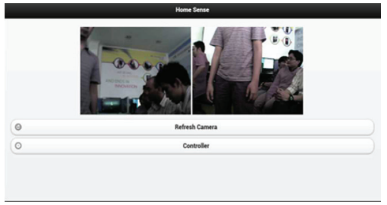
Smart home benefits for society:

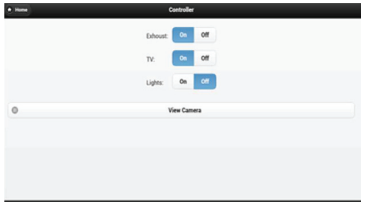
- Ease of monitoring and controlling existing equipment at home
- Efficient use of energy and water
- Improve security and comfort at home
- Facilitate the monitoring of health
- Facilitate access to educational content and entertainment

smartIndonesia

e-Indonesia Initiatives

Features Smart Home – Security Monitoring & Controlling





- The camera can be accessed by streaming mode (Live View) or capture
  Motion detection
- Applications turning on and off lights, exhaust, air conditioning
- Applications can be accessed using mobile devices or the Web
- Data storage can be a local server or in the center (cloud)

smartIndonesia

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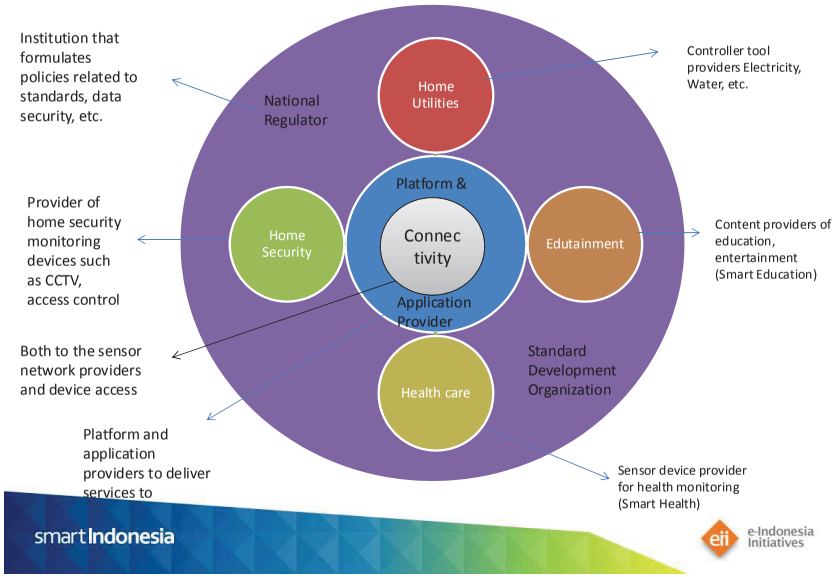
Ecosystem Smart Home



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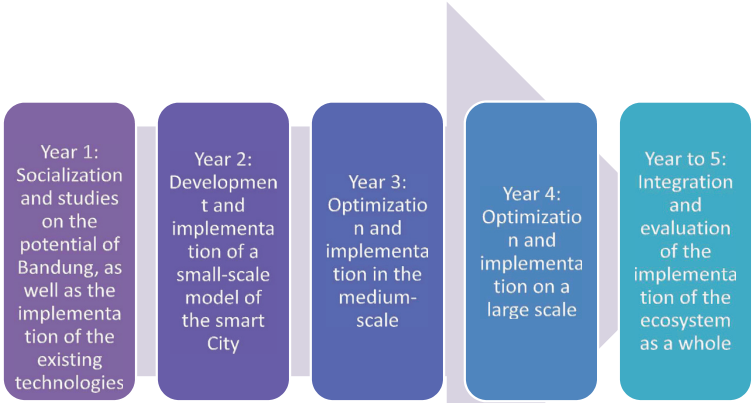
Stages of Development



smartIndonesia

e-Indonesia Initiatives

Thank you

smartIndonesia

e-Indonesia Initiatives

The Project for Low Carbon Society Development under Collaboration between Bandung City and City of Kawasaki

- Introduction of Energy Management System (EMS) in facilities/buildings under the JCM -

September, 2015

Institute for Global Environmental Strategies (IGES)
City of Kawasaki
Oriental Consultants Global Co., Ltd.
Kowa Company Ltd.

1. Project background

Previous efforts under city-to-city collaboration

City-to-city collaboration between Bandung City and City of Kawasaki since 2006
e.g. - UNEP-IETC Ecotown Project (organized by UNEP-IETC)
- Asia-Pacific Eco Business Forum (hosted by City of Kawasaki)

First stage of project formulation in JFY2014

Evaluation of feasibility on pilot projects under F/S titled "Developing a low carbon Society under Collaboration between Bandung and Kawasaki" in JFY2014
- Project implementation plan development (e.g. financial arrangement)
- Site visit for estimation of potential for electricity consumption reduction

Project field 1: Energy efficiency improvement

Evaluation of CO2 emission reduction potential at shopping malls

Project field 2: Transportation

Project field 3: Waste management

Evaluation on project potential for bio digester introduction

F/S in JFY2015 for further project formulation

Project for Low Carbon Society Development under Collaboration between Bandung City and City of Kawasaki

F/S on EMS introduction in commercial facilities under the JCM (This project)

Further consideration for project formulation in progress

Targeting Project implementation in JFY2016 and after

Low carbon city project(s) implementation in Bandung and whole Indonesia
Consultation and cooperation between city government to companies in City of Kawasaki under Kawasaki Green Innovation Cluster framework

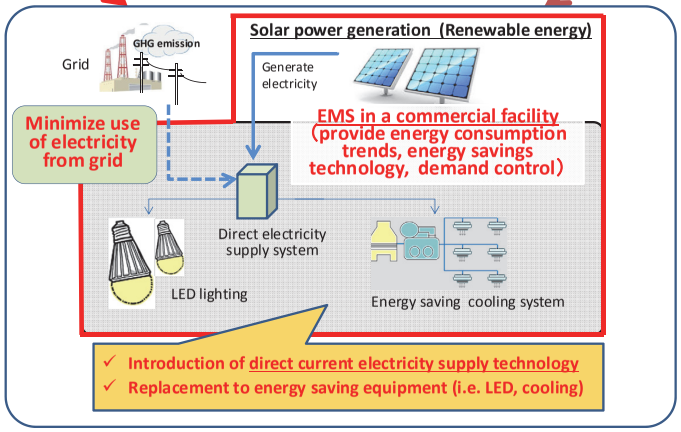
2

2. Project overview

City of Kawasaki
City-to-city collaboration with low carbon technologies from Kawasaki City

Joint project implementation by Japan and Bandung sides under city-to-city collaboration between City of Kawasaki and Bandung City

Bandung City
Energy efficiency improvement in buildings under the city's climate change action plan



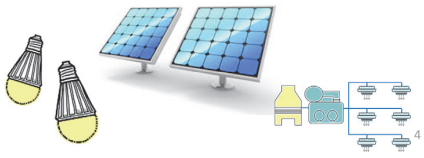
3. Applied technology for proposed project

Direct current (DC) electricity supply technology

1. Consumption of electricity with renewable energy origin (i.e. solar) generated at the site of each facility/ building with minimized electricity loss
   →Minimize consumption of electricity from grid

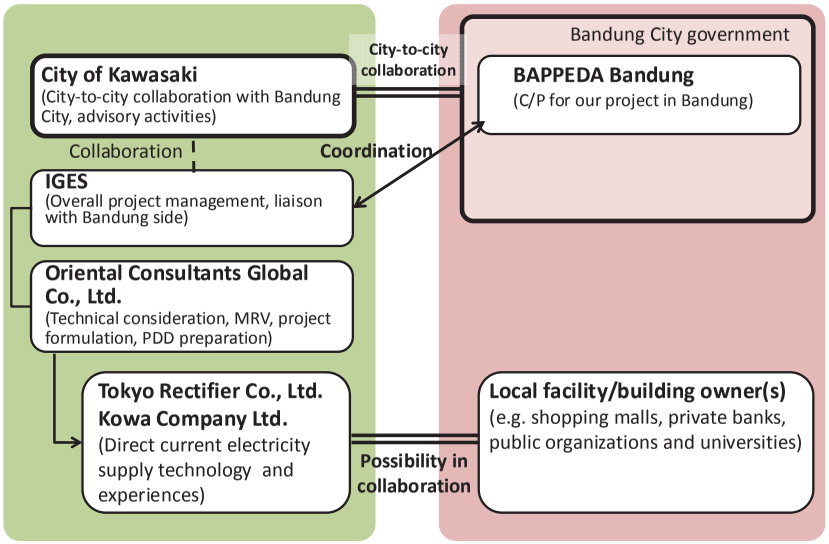
2. Daily energy saving
   →You can save energy in everyday use.

3. Disaster control (continuous business operation)
   →Secure operation of specific machineries for 72 hours



4

6. F/S implementation structure



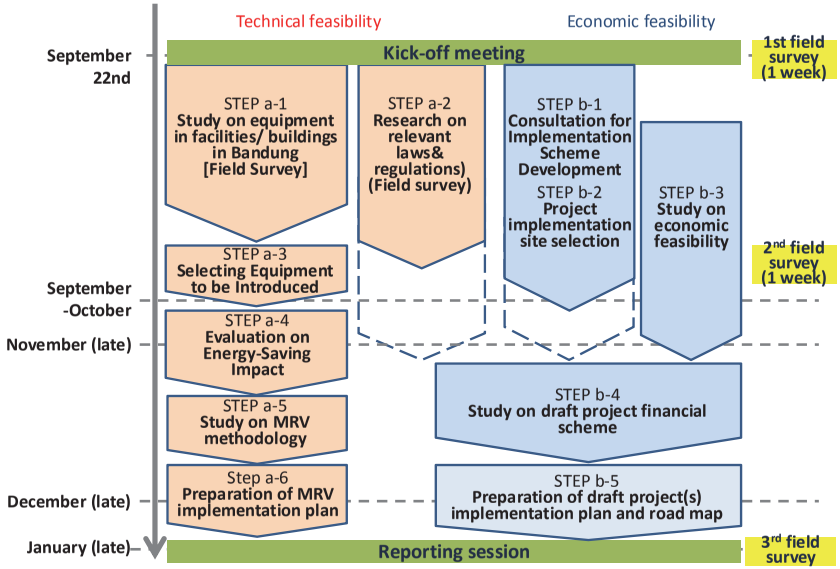
5

7. Items for interview to facility/ building owners in Bandung

i. Current situation of your facilities/ buildings	• General information on business activities in your facilities/ buildings • Net floor area of your facilities/ buildings [sqm] • Information on used electric lamps and cooling systems (air conditioners) in your facilities/ buildings e.g. - type - model number and year of manufacture - wattage - operation hours - electricity consumption - monthly electricity bills • Electricity source of your facilities/ buildings e.g. - electricity supply source (PLN or IPPs) - unit electricity price for the facilities/ buildings ,etc.
ii. Previous and ongoing energy efficiency improvement effort(s) at your facilities/ buildings	e.g. cooling system (air conditioner) with central control
iii. Plan for introduction of equipment with higher energy efficiency for your facilities/ buildings	e.g. - high efficient cooling system (air conditioner) with inverter - LED

6

7. Feasibility Study Schedule



10. Outreach and goal of the F/S

- Project formulation in Bandung under JCM demonstration project scheme under initiative by MOEJ in JFY2016
- Preparation for draft of applicable financial scheme for the project formulation under the abovementioned scheme
- Consideration for project(s) in Bandung City under the Indonesia-Japan JCM scheme based on city-to-city collaboration between Bandung City and City of Kawasaki for low carbon city development in Bandung

8

DC power supply system

Kowa Company Ltd.
Building Materials Dept.

Next-generation power generation and storage system of by DC power supply system.

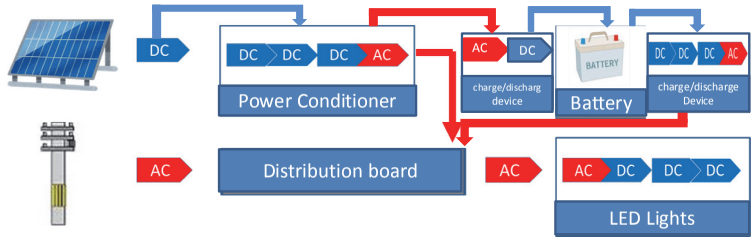
Concept

①Local production for local consumption with renewable energy.

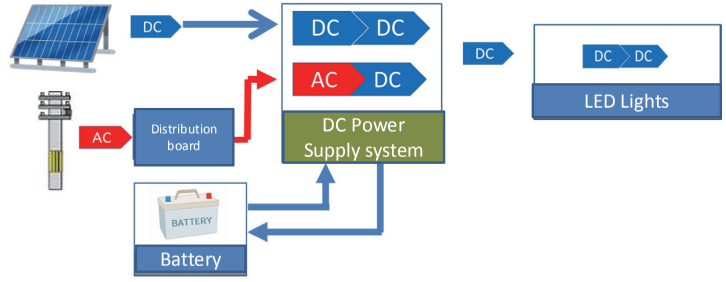
②Disaster control
→It can be enabled specific machinery 72 hours

③Energy saving in everyday
→You can save energy in everyday use.

< AC > Existing power supply method



< DC > KOWA concurrent DC Power Supply method



Advantage of KOWA DC power supply system

① No energy loss in process of AC/DC (inverter/converter)

② Enable power generation even in small power condition
→ minimum sunlight from sunrise to sunset

③ Dimming function up to 1/1000 on each LED Light → adjustment of power depending on area/time.

④ No flicker

⑤ Best mixture of power sources; battery supply in insufficient solar power supply condition. For further requirement, commercial power source is also available.

⑥ Concurrent execution of "Power supply to LED Lights" and "Power charge to battery" (solar power generation > LED power consumption)

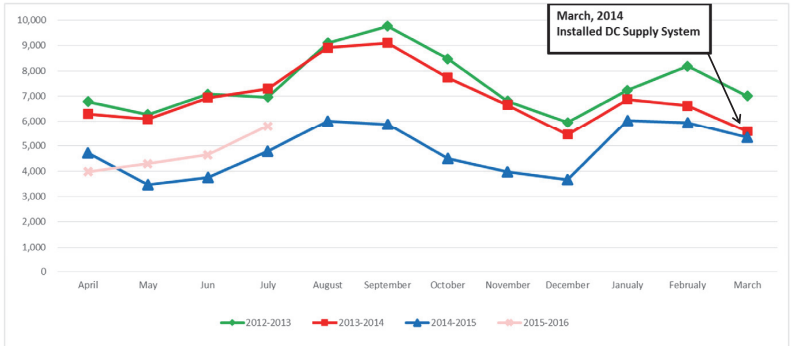
⑦ Independent source from system power supply in case of any emergency or natural disaster.

Project reference <BANK OFFICE>

Project : YACHIYO BANK, NOBORITO BRANCH
Locatioon: Kawasaki, Kanagawa pref.
Detail : (110W)66 LED Light, 5kW PV Panel , 4.32kWh battery

Remark : Electrical charge for Light : (before) ¥2500/day → (after)¥200/day
Electical consumption : (before) 80kW/day → (after)2～3kW/day
Achievement of "ZERO Energy bldg." in sunny or cloudy day

YACHIYO BANK, NOBORITO BRANCH
Comparison of Annual Electric Consumption



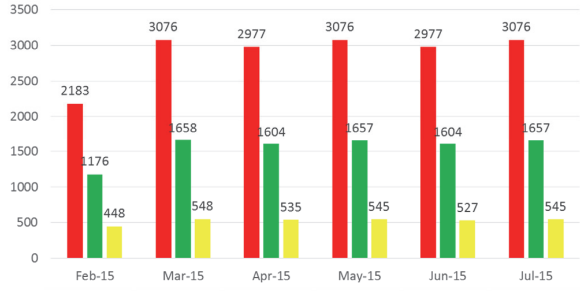
Electricity consumption	April	May	Jun	July	August	September	October	November	December	January	February	March	Total	Last Year Comparison
2012 – 2013	6,780	6,269	7,077	6,962	9,104	9,768	8,474	6,804	5,949	7,230	8,179	7,006	89,602	
2013 – 2014	6,294	6,089	6,936	7,285	8,915	9,104	7,727	6,654	5,453	6,871	6,622	5,590	83,540	7%
2014 – 2015	4,731	3,462	3,759	4,788	6,014	5,880	4,494	3,977	3,667	6,032	5,930	5,342	58,076	30%
2015 – 2016	3973	4195	4655	5794										

Installed DC Supply System

Project reference <NURSING HOME>

Project : Well care SHIN-YOSHIDA (nursing home)
location : Yokohama, Kanagawa pref.
Scale : 54 rooms (main bldg. 3FLs、new bldg. 2Fs)
Detail : 77 LED lights,
Remark : Ave. 25% of LED dimming rate
first project in more than 3,500 of nursing homes.

NURSING HOME
Comparison of Electric Consumption



	February-15	March-15	April-15	May-15	June-15	July-15
Fluorescent Lamp	2183	3076	2977	3076	2977	3076
LED(No illumination Control)	1176	1658	1604	1657	1604	1657
DC Supply System + LED(with illumination Control)	448	548	535	545	527	545

Fluorescent Lamp LED(No illumination Control) DC Supply System + LED(with illumination Control)

※The February data is 1 to 2 for 22 days

Fluorescent Lamp→LED : About 46% reduction
LED→DC Supply System + LED : About 67% reduction

Project reference <ROAD STATION>

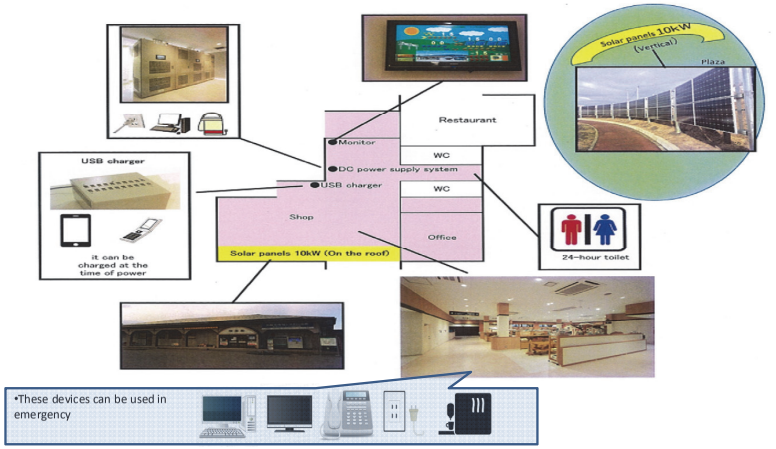
Project : Roadside station SHICHINOHE
Location : Shichinohe, Aomori pref.
Detail : 148 LED Lights, 20kwh PV panel, 30kwh Li-battery
Remark : first DC supply project in roadside station in Japan
approx. 1,040 stations in Japan

9

ROAD STAITION

At the time of the disaster, and is supplied from solar and storage battery to a specific. (72-hour supply)

Overview Figure



ROAD STAITION

～Function as a disaster prevention base～

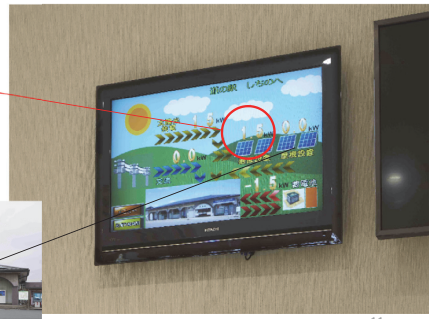
Effect of installing the solar panels vertically

●It is possible to continue the power generation, even in the snow.

●It can also be used as a power source in emergency.

vertically

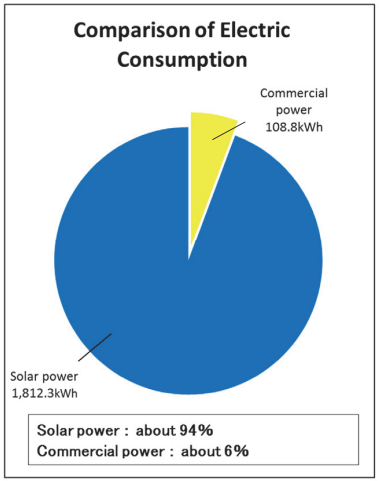
horizontal

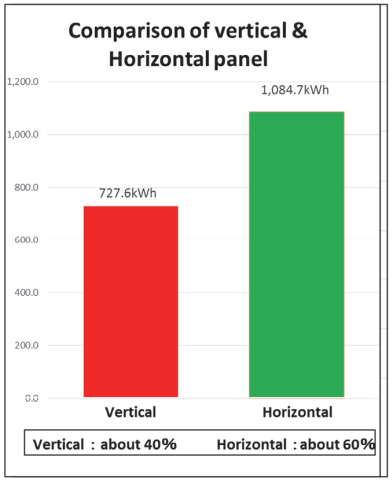


11

ROAD STATION

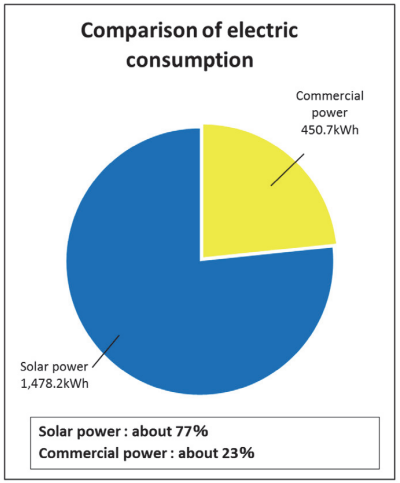
①Various comparison of May

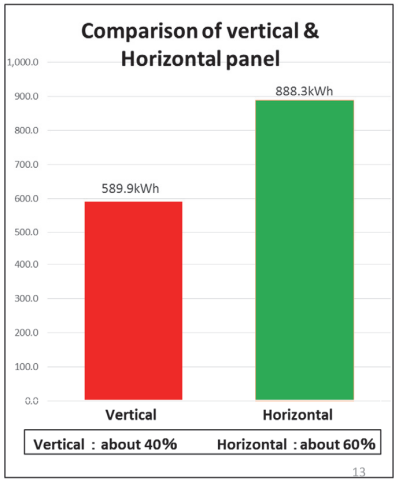




ROAD STATION

②Various comparison of June





13

TOPICs of electric power environment

◆Possibility of Power shortage

- Shutdown and unclear restart schedule of nuclear power plants after Tohoku Earthquake 2011.3.11.

◆Instability of renewable energy

- 2012 : Freed-in Tariff (FiT) for renewable energy started.
  2014 : Suppression for purchase of renewable energy due to its instability.
  Under drastic reconsideration for policy of renewable energy procurement in the authority

◆Increase of electricity rate

- Increased cost of power generation due to shift to coal fired power plan and depreciation of Japanese Yen.
- Heavier burden to consumers by assessment system for renewable energy tariff.

Accelerating interest to

<Local production for Local consumption>

14

Reporting session for
Project for Low Carbon Society Development
under Collaboration between Bandung City and City of Kawasaki:
Introduction of Energy Management System

Date: January 27th 2016 9:00-11:10 Venue：Luxton Hotel, Bandung Conference Room Riviera 1

Purpose	Information sharing on FS outcome among stakeholders
Participants	Bandung City Government, BAPPEDA Bandung City Government, International Cooperation Agency Bandung City Government, Environment Management Agency Indonesia JCM Secretariat Institute of Technology Bandung Bank Hotel Commercial Commercial Factory City of Kawasaki (Japan) Institute for Global Environmental Strategies (Japan) Oriental Consultants Global Co., Ltd. (Japan) Kowa Company Ltd. (Japan) Tokyo Rectifier Co., Ltd. (Japan)
Moderator	Mr. Anton Sunarwibowo, ST. MT., BAPPEDA
Language	Translation may be provided for Bahasa <-> Japanese

9:00- (10min) Opening Remarks

- ✓ Bandung City Government <language: Bahasa>

  Dra. Kamalia Purbani,MT, BAPPEDA (TBD)

9:10-9:20 (10min) Recent Developments in the JCM scheme

- ✓ Indonesia JCM Secretariat <language: Bahasa>

  Ms Rini Setiawati

9:20-9:50(30min) Overview of the results of this year's feasibility study <language: Japanese>

- ✓ Institute for Global Environmental Strategies - Ms. Ryoko Nakano
- ✓ Oriental Consultants Global Co., Ltd. – Mr. Masahiko Fujimoto

9:50-10:30 (30min) Q & A <language: Bahasa, Japanese>

Coffee Break

Building owners to depart after the coffee break

10:30-11:00(30min) Discussions for future steps <language: Bahasa, Japanese>

- ✓ Follow up steps for the JCM FS
- ✓ Framework for collaboration after MOU is signed in February
- ✓ About the MOU and signing ceremony in February and Mayor Kamil's schedule
- ✓ About the possible training scheduled for Feb 17th 2016

11:05-11:10(5min) Closing remarks

- ✓ Kawasaki Environmental Research Institute, City of Kawasaki <language: Japanese>

  Mr. Akira Ogihara

Introduction of Energy Management System (EMS) in facilities/buildings under the JCM

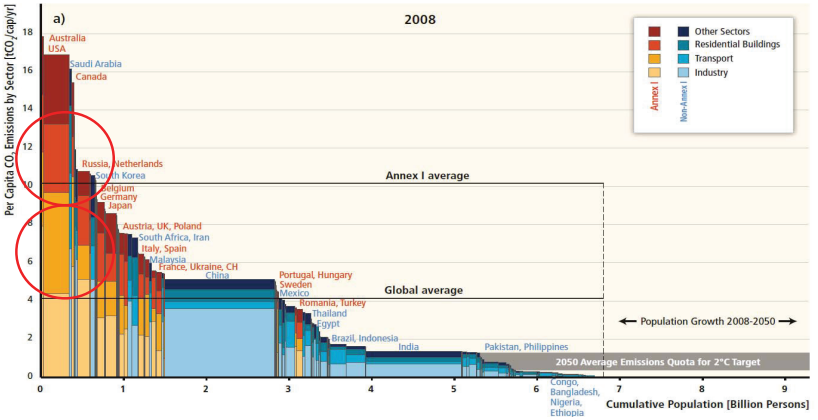
For reporting to Bandung City on Jan 27th 2016

Institute for Global Environmental Strategies (IGES)
City of Kawasaki
Oriental Consultants Global Co., Ltd.
Kowa Company Ltd.
Tokyo Rectifier Company Ltd.

Outline / Roadmap

- General overview of cities and climate change
- Structure of the feasibility study and the technology
- Summary of feasibility study outcome
- Discussion points

Much of the difference in GHG emissions comes from sharply higher figures in the transport and building sectors (see the length of the yellow and orange bands).



Source: IPCC, 2014, p. 950

For "city climate action plans", the emphasis is clearly on "buildings" and "transport".

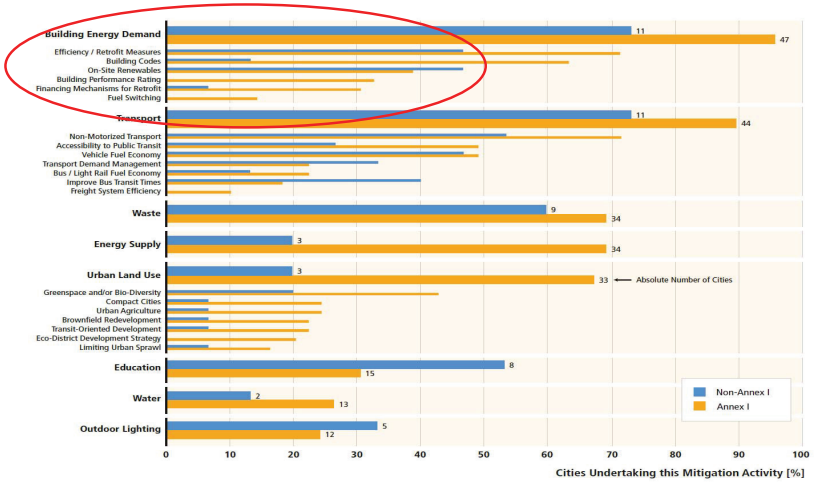


Figure 12.22 | Mitigation measures in climate action plans. Sources: Compiled for this assessment from self-reported data submitted to Carbon Disclosure Project (2013).

Source: IPCC, 2014, p. 972

the level (percentage), magnitude (overall amount), and time period (year) for city level emission targets – where is Bandung?

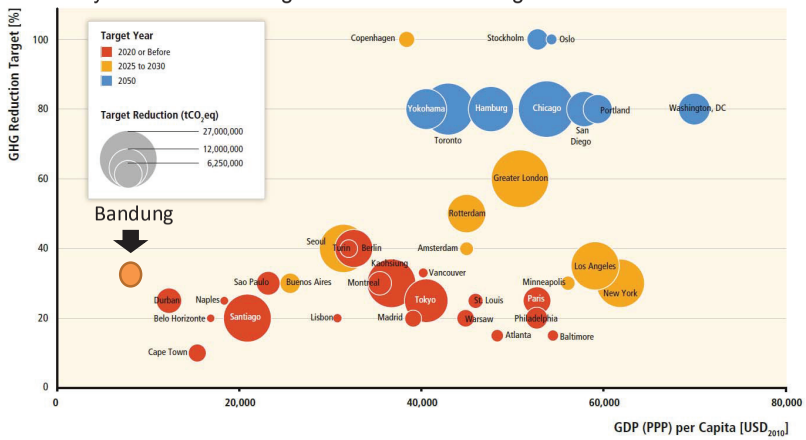


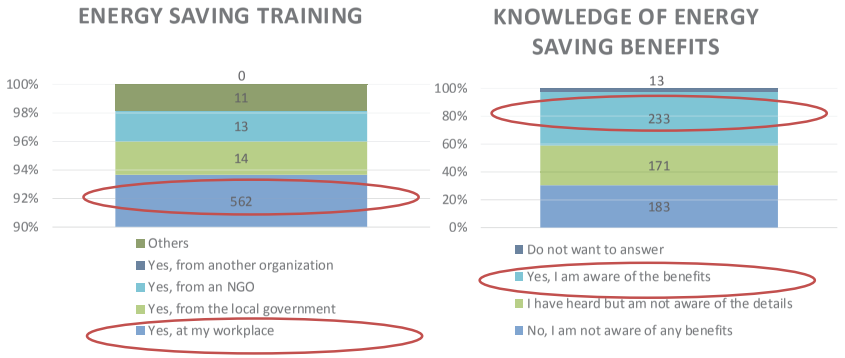
Figure 12.21 | Mitigation targets for 42 cities. Sources: Baseline emissions, reduction targets, and population from self-reported data submitted to Carbon Disclosure Project (2013). GDP data from Istrate & Nadeau (2012). Note that the figure is illustrative only; data are not representative, and physical boundaries, emissions accounting methods and baseline years vary between cities. Many cities have targets for intermediate years (not shown).

Source: IPCC, 2014, p. 972

Country	Actions	Type
Netherlands	Energy Efficiency Target	Policy target
	Labelling of vehicle energy efficiency	Label
Norway	Energy performance of buildings	Code, standards
	Incentives for Low Energy Housing	Financial incentive
	Standards and Labeling for Energy Related Appliances	Code, standards
	Information and Advice on Energy Efficiency and Renewable Energy	Campaign
Sweden	Building energy performance certificates	Code, standards
	Environmental Vehicle Premium	Financial incentive
	Energy efficiency home consumer campaign	Campaign
UK	Green Deal	Financial incentives
	Codes for Sustainable Homes	Codes, standards
Canada	Energy Efficiency Regulations	Code, standards
US	Energy Efficiency Enforcement Regulations	Code, standards
	Building America	
	Home Performance with EnergyStar	
Australia	Community Energy Efficiency Programs	Financial incentive
	Low Income Energy Efficiency Programs	Financial incentive
	6 Star NatHERS ratings for Buildings	Code, standards
Japan	Mandatory Construction Material Standards– Top Runner Program	Code, standards
	Promotion of Zero Energy Housing, Zero Energy Buildings	Financial incentives
	Eco-car tax breaks and subsidies for vehicles	Financial incentives
	Promotion of Transport Demand Management (TDM)	Financial incentives
	Promotion of HEMS (Home Management Systems) BEMS (Building Management Systems)	Codes, standards
	Energy Efficiency Labelling Law	
China	Vehicle tax reduction for energy savings	Financial incentives
	Energy Conservation in Buildings	Codes, standards
	Differential energy pricing by utilities (DSM)	Regulation
South Korea	Greenhouse Gas Target Management System (building)	Code, standards
	Tire Efficiency Standards and Labeling (transport)	Codes, Standards, Label
Indonesia	Jakarta Regulations on Green Buildings	Code
	Energy Efficiency Labelling Program	Labels
Mexico	FIDE Labels	Labels
Brazil	PROCEL Build (lightings, buildings)	Training

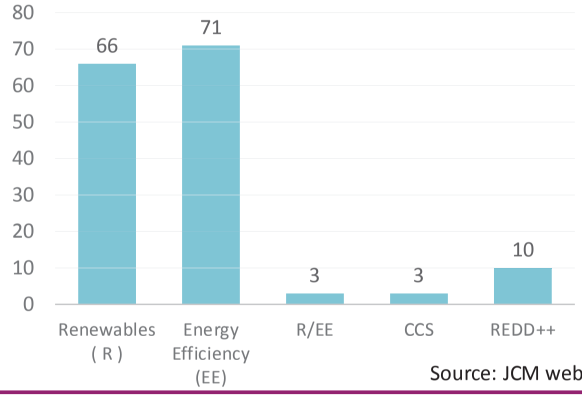
Energy Saving Knowledge in West Java

38.3 % of the respondents have knowledge on the benefits of energy savings.



What about the JCM FS?

Renewable and energy efficiency is the focus



Source: JCM website, 2014-2015

Project background

Previous efforts under city-to-city collaboration

City-to-city collaboration between Bandung City and City of Kawasaki since 2006
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- Site visit for estimation of potential for electricity consumption reduction

Project field 1: Energy efficiency improvement

Evaluation of CO2 emission reduction potential at shopping malls

Project field 2: Waste management

Evaluation on project potential for bio digester introduction

F/S in JFY2015 for further project formulation

Project for Low Carbon Society Development under Collaboration between Bandung City and City of Kawasaki

F/S on EMS introduction in commercial facilities under the JCM (*Ongoing)

City of Kawasaki and BAPPEDA Bandung signed agreement for F/S implementation in JFY2015, in August 2015.

Further consideration for project formulation in progress

Further effort for implementation of formulated project in JFY2016

Demonstration at ITB for dissemination of proposed technology under JICA partnership scheme

9

Overview of project activities

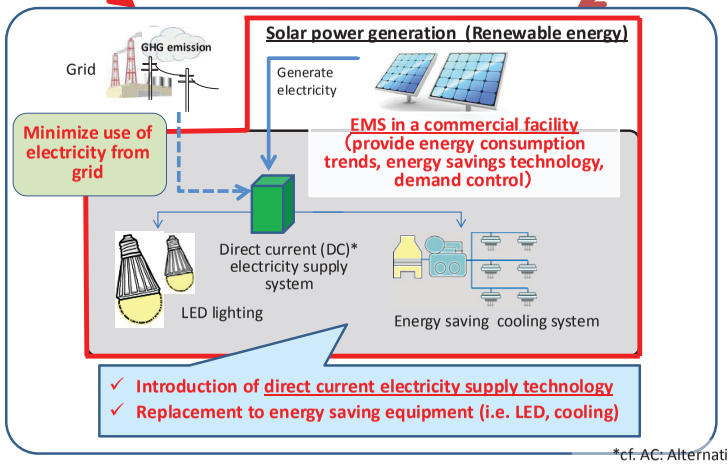
City of Kawasaki

City-to-city collaboration with low carbon technologies from Kawasaki City

Joint project implementation by Japan and Bandung sides under city-to-city collaboration between City of Kawasaki and Bandung City

Bandung City

Energy efficiency improvement in buildings under the city's climate change action plan



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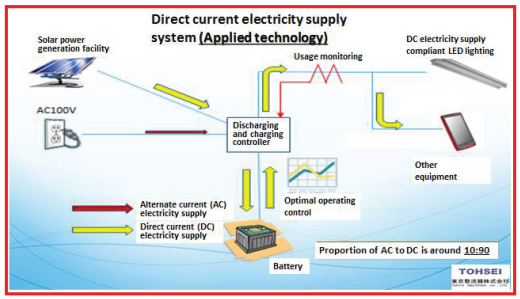
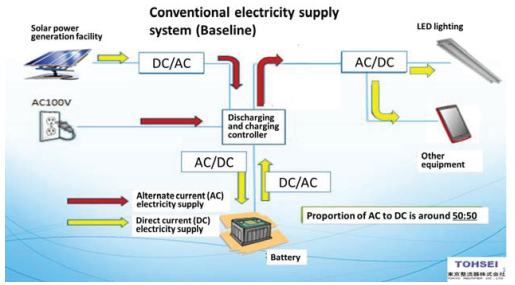
*cf. AC: Alternative current

Overview of Direct current electricity supply technology





Direct current electricity supply system with EMS and solar power generation

i.e. Electricity supply from solar power generation panels to energy saving equipment with minimized number of DC/AC and AC/DC conversion in system (Electricity supply with minimized electricity loss)

- LED lighting
- Cooling system
- Battery

→ Overall energy saving both at individual equipment and electricity supply system levels

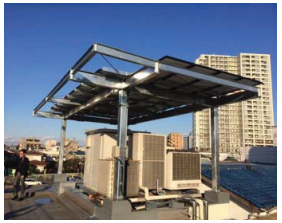
Projects on direct current electricity supply in Japan

Project example <BANK OFFICE>

Project : YACHIYO BANK, NOBORITO BRANCH
Location : Kawasaki, Kanagawa pref.
Detail : (110W)66 LED Light, 5kW PV Panel , 4.32kWh battery

Remark : Electricity bills for lighting equipment at the bank :
(before) 250,000Rp./day → (after)20,000Rp./day
Electricity consumption at the bank:
(before) 80kW/day → (after)2～3kW/day

Achievement of "ZERO Energy bldg." in sunny or cloudy days



Between 2015.9.21 ～ 2016.1.27

Commercial

Gov Bldg

Factory

Factory

Factory

Bank

Commercial

University

University

Result of consultation with building/ facility owners in Bandung in 2015 JFY

Site name	Consultation result	Challenges for project formulation for project formulation under MOEJ subsidy scheme	1) Investment cost 2) Estimated electricity consumption reduction amount 3) Estimated GHG emissions reduction amount	Payout period (Payout period with support under MOEJ subsidy scheme)
Site A	Site did not agreed on investment for project formulation.	Necessity in investment by BTC side	1) Around 362 thousand USD 2) 176,916kWh/year 3) 144t-CO2/year	Around 14.4 years (7.2 years)
Site B	Site and MOEJ study team sides did not agreed on condition for project formulation including payout period.	a. Long project payout period b. Difficulty in acquiring financial documents	1) Around 2,966 thousand USD 2) 1,303,900kWh/year 3) 1,061t-CO2/year	Around 13.5 years (6.8 years)
Site C	Site is expected to be started after MoU between City of Kawasaki and Bandung City is signed in February 2016.			

Result of consultation with building/ facility owners in Bandung in 2015 JFY

Site name	Consultation result	Challenges for project formulation for project formulation under MOEJ subsidy scheme	1) Investment cost 2) Estimated electricity consumption reduction amount 3) Estimated GHG emissions reduction amount	Payout period (Payout period with support under MOEJ subsidy scheme)
Site D	MOEJ study team and Site will elaborate to formulate project.		1) Around 500 thousand USD 2) 134,730kWh/year 3) 120.6t-CO2/year	Around 33 years
Site E	MOEJ study team will elaborate to formulate project with Site	Small amount of investment cost	1) Around 250-260 thousand USD 2) 100,800kWh/year (Provisional) 3) 82t-CO2/year (Provisional)	Around 22-23 years (11-11.5 years)
Site F	MOEJ study team will elaborate to formulate project with site .	Small amount of investment cost	1) Around 100 or 127 thousand USD 2) 89,740 or 100,800 kWh/year 3) 73 or 82 t-CO2/year	Around 8-9 years (4-4.5 years)

Discussion Points

Q1. Which is more interesting to you?

- ✓ Renewable technology
- ✓ Energy efficiency technology
- ✓ Direct current electricity technology + Renewable
- ✓ Energy management system + energy efficiency
- ✓ Energy management system + renewable + energy efficiency

Q2. What is the most important criteria to choose new technology?

- ✓ Price
- ✓ Easy operability
- ✓ Maintenance service
- ✓ City government regulation
- ✓ Others

Q3. If you were to change your building appliance with more energy efficient technology in the near future, what would you choose first?

- ✓ Chiller
- ✓ Air-conditioner
- ✓ Data-server

Discussion Points

Q4. In order for you to implement this energy savings technology do you feel your technical engineers would have the skills to do this?

Q5. Kindly offer us some other suggestions that you think would be important to obtain a wide market for this technology

Q6. Do you see there is potential in Bandung City for this technology, if yes your kind suggestions would be welcome.

Terima kasih banyak!

Advantages of direct current electricity supply technology

1. **No energy loss as result of AC/DC conversion process (inverter/ converter)**
2. **Power generation even in small power condition**
   - ✓ **minimum sunlight from sunrise to sunset**
3. **Dimming function up to 1/1000 on each LED light → power adjustment for different time period and location**
4. **No flicker**
5. **Best mixture of power sources;**
   - ✓ **electricity supply from battery in insufficient solar power supply condition**
   - ✓ **For further requirement, commercial power source (AC) is also available.**
6. **Simultaneous implementation of process of "Power supply to LED lights" and "Power charge to battery" (*Possible in situation that solar power generation amount exceeds LED power consumption amount.)**
7. **Independent power source from commercial electricity supply system in case of emergency or natural disaster.**

バンドン・ミッション団
平成28年2月17日研修案

（公財）地球環境戦略研究機関

バンドン市政府職員
アユ・スケンジャ（バンドン市　環境運営委員会　部長）
ヌヌン・ヤヌアティ（バンドン市　地域開発企画庁　部長）

9:00	川崎日航ホテルロビー　出発　　担当：中野（IGES）
10:00～11:00	IGES本部にて　IGESのご紹介
	地球環境戦略研究所　上級研究員　エリック・ザスマン
11:10	IGES本部を出発
12:00～13:00	昼食
13:20	多摩区役所に到着
	川崎市多摩区登戸1775－1　会議室 1104 (11F)
	電話：044－935－3113
	（青木課長、尾藤様が合流）
13:30（2分）	研修開始のご挨拶：
	川崎市　環境総合研究所　都市環境課　課長　青木　和昭
13:32（3分）	ご挨拶および本日の段取りのご説明
	地球環境戦略研究所　主任研究員　中野綾子
13:35（40分）	「自治体の省エネの取り組み」
（20分）	発表1：環境総合研究所　青木課長
（10分）	発表2：アユ・スケンジャ
（10分）	質疑応答および議論　モデレータ：中野
14:15（10分）	休憩
14:25（60分）	「水素エネルギー事業における官民連携」
（30分）	発表1：総合企画局　スマートシティ戦略室
	スマートコミュニティ推進担当課長　高橋友弘
（10分）	発表2：ヌヌン・ヤヌアティ
（20分）	質疑応答および議論　モデレータ：中野
15:30～	多摩区役所を出発
	（東京整流器　川股様が玄関前から自動車で誘導）
	（八千代銀行の駐車場を利用）
15:40（30分）	八千代銀行　登戸支店視察
	神奈川県川崎市多摩区登戸1874
	TEL: 044-933-5111
	案内役：東京整流器（株）　川股　敦史

16:10　　八千代銀行　出発
17:00　　宿泊先に到着
18:00　　川崎日航ホテルロビー　出発　（市長一団と合流）
　　（徒歩10分）

18:15（90分）　　ディナー・レセプション
　　音音 ラゾーナ川崎プラザ店
　　川崎市幸区堀川町 72-1 ラゾーナ川崎プラザ 4F
　　電話：050-5799-1869

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Mr. Kazuaki Aoki, Director, Kawasaki Environment Research Institute

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Mr. Kentaro Ofuji,

Japan Environmental Research Center (2)

Mr. Akio Okumura, Chairman

Mr. Shigenobu Ohbayashi, International Department

（了）

Feasibility Study on FY2015 JCM Large-Scale Project for Development of Low-Carbon Societies in Asia
- Low Carbon Society Development under Collaboration between Bandung City and City of Kawasaki:
Introduction of EMS to Commercial Facilities under the JCM

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