FY 2018
City-to-City Collaboration for Low-Carbon Society
(Project to Create a Low-Carbon Society in Davao City through Support for the Development of a Local Climate Change Action Plan)
Report

February 2019

Institute for Global Environmental Strategies

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I. Background and Purpose of Project

1. Overview of Davao City

Davao City, the third largest city in the Philippines, is located in the Davao region of Mindanao Island in the southern part of the country. With an area of 2,400 km^2 and a population of about 1.5 million (urban population of about 1 million), Davao is a political, economic and culture centre in the southern Philippines. The population of Davao city is growing at a rate of 2.3% per year and there is a heightened risk of deterioration to the living environment that accompanies an escalation in environmental impacts, such as increases in the volume of municipal waste and traffic.

To address the environmental impacts that continue to surface in Davao City, Mayor Sara Duterte has raised sustainable waste management as one of her ten public commitments. Currently, waste-to-energy projects that are being developed by Japan for export overseas have taken on significant meaning in light of achieving the mayor's pledge. Davao City has also recently positioned the implementation of waste-to-energy projects in its "10-Year Solid Waste Management Plan (master plan for the waste sector)", which can lead to the concrete implementation of administrative plans.

Japan's low-carbon technologies (energy-saving and renewable-energy technologies, etc.) and the local governments' know-how on environmental management, as well as waste-to-energy, have created a foundation for planning and implementing measures to mitigate climate change. Davao has shown considerable interest in growth as a sustainable city aiming at the integrated development of the economy, environment and society.

2. Climate change legislation of the Philippine government

All municipalities in the Philippines are required to formulate Local Climate Change Action Plans (LCCAP), in line with the country's Climate Change Act of 2009 (Republic Act No. 9729). The Act calls for the development of plans for adaptation measures, in particular, although Intended Nationally Determined Contributions (INDC) submitted by the Philippines under the Paris Agreement also emphasise the promotion of mitigation measures, setting out a goal of "undertaking emissions reduction of about 70% by 2030 relative to its BAU scenario of 2000 to 2030".[1]

The LCCAP guidelines published by the Philippines Climate Change Commission (CCC) also recommend the inclusion of mitigation measures in such plans. The CCC also provides support in the country for the formulation of LCCAPs that contain mitigation measures,

[1] The Philippine government is currently reviewing its INDC. As of February 2019, it has yet to clarify its Nationally Determined Contributions (NDC).

including the publication of a manual on GHG inventories, which are required as basic information for mitigation measures, and the organisation of training workshops for local governments upon request.

3. Cooperative relationship between Davao and Kitakyushu

City-to-city (C2C) cooperation between the cities of Kitakyushu and Davao is promoted under the "Strategic Environmental Partnership Agreement" (concluded on 15 November 2016) and a "Memorandum of Understanding on Green Sister City Cooperation" (concluded on 28 November 2017), exchanged between Mayor Kenji Kitahashi of Kitakyushu City and Mayor Sara Duterte of Davao City. C2C cooperation is being promoted in the waste management sector, in particular, in projects by the Ministry of the Environment of Japan (MOE) and the Japan International Cooperation Agency (JICA).

Examples of support provided to Davao City in the waste management sector from Kitakyushu City and related organisations

- "Preparatory study and examination of feasibility for commercialisation of waste-to-energy projects in Davao City, Philippines" (MOE): Support for reduction of CO_2 emissions overseas through strategic international development of Japanese recycling industries (FY 2017)
- "Project to support the improvement of waste management capacity in Davao City, Republic of the Philippines" (JICA Partnership Program) (FY 2017 to FY 2019)
- "Project to promote the spread of power generation technologies utilising waste in Davao City" (JICA): Project to promote the spread of technology from the private sector for social and economic development in developing countries (FY 2014)

Under the new memorandum of agreement concluded in 2017, the two cities have decided to expand areas of cooperation to create a low-carbon society. Through past projects, a trusting relationship has been developed between Kitakyushu City and the executives of Davao City, in particular, which makes it possible for both cities to work together efficiently with the executives in Davao City acting as contacts.

II. Objective and Implementation System for Feasibility Studies on the Development of Promising JCM Model Projects

1. Overview of project

This project has been designed to provide support for the formulation of the LCCAP based on a request from Davao City under C2C cooperation between Kitakyushu and Davao. Concrete mitigation measures are positioned in this action plan and the use of the financing programme for JCM model projects is being considered as a resource to implement mitigation measures. Specific areas of support are as follows. Each area will be described in detail below.

1） Support for the formulation of the LCCAP promoted by Davao City
   - Support for the development of a GHG inventory
   - Support for examining mitigation measures
   - Support for considering adaptation measures

2） Studies on the possible application of JCM model projects for waste-to-energy projects promoted by Davao City

3） Potential for the implementation of other low-carbon development projects in Davao City

1) Support for the formulation of the LCCAP promoted by Davao City

Davao City has formulated the LCCAP with a focus on adaptation measures with support from UNHABITAT in 2013. However, mitigation measures and the establishment of a system to develop the LCCAP has not yet begun. For this reason, a decision was reached to provide support through this project for the formulation of the LCCAP, including support for the creation of an implementation system and consideration of the development of a GHG inventory and mitigation measures, in response to a request by Davao City. As part of this support, a decision was reached to use the LCCAP preparation manual published by the Philippine CCC and GHG inventory manual jointly created by CCC and USAID for local governments in the Philippines as reference in order to formulate a LCCAP that is fully rooted on the policies and local conditions of the Philippines.

In addition, using opportunities for training in Japan and sharing Kitakyushu's knowledge on calculating GHG emissions within the city area (creation of GHG inventory), formulating

and implementing plans for mitigation measures, evaluating GHG reduction effects, and implementing stakeholder and intra-/inter-departmental coordination based on Kitakyushu's experiences in creating the "Kitakyushu City Implementation Plan for Global Warming Countermeasures and Eco-Model City Action Plan: Kitakyushu New Green Frontier Plan" may encourage staff in Davao to improve their capacity to formulate the LCCAP. This support was mainly carried out by IGES and Kitakyushu, as well as in coordination with Ateneo de Davao University. A point to note in promoting this type of support is to provide appropriate information and act as intermediaries between experts, while also encouraging independent action as much as possible to allow Davao to develop a sustainable implementation system themselves for the implementation of promising measures, rather than IGES and Kitakyushu providing data and developing a plan to hand over to Davao.

2) Studies on the possible application of JCM model projects for waste-to-energy projects promoted by Davao City

As part of studies to identify promising projects, team members visited the Mindanao Japanese Chamber of Commerce and Industry (counterparts: President, Vice President, Secretary General) and the Mindanao Chamber of Commerce and Industry (counterparts: President, Vice President, other), where participants exchanged concrete ideas about potential leads that could be financed under the JCM, following an explanation about JCM model projects.

The Mindanao Japanese Chamber of Commerce and Industry suggested projects that could be applicable for financial support under the JCM in the areas of solar power generation, biomass power generation, cold chain in relation to transport, shipping, electric vehicles and waste heat recovery systems for the production of cement. A proposal was also made to organise a seminar on the JCM in conjunction with meetings at the Chamber of Commerce and Industry in order to disseminate this information to a wider audience. All participants agreed to maintain contact as needed.

Fig. 1 Discussions with the Mindanao Japanese Chamber of Commerce and Industry

The Davao Chamber of Commerce and Industry suggested that there is a need to finance projects in local companies as well. These discussions were followed by responses, including a request from a local company regarding a biomass project, although this did not lead to a concrete study on the commercialisation of such a project.

Fig. 2 Discussions with the Davao Chamber of Commerce and Industry

In addition, several discussions were held with Davao City on public works projects that could be connected with JCM model projects. Of these proposals, the team looked at the installation of a solar power generation system on the roof of a public market in Davao but shelved a detailed study because four projects on the installation of solar power generation systems have already been adopted as JCM model projects in the Philippines and it is not larger than 1MW in scale due to the size of the roof.

Fig. 3 Public market in Davao (Toril district)

2. Target sectors and applicable technologies

Based on discussions with Davao City and other stakeholders, a decision was reached to examine the following two projects for possible application as JCM model projects.

・Conversion of street lights to LED lighting

・Waste-to-energy (generators, boilers, transformer facilities, etc.)

3. Implementation system

Under C2C collaboration between the cities of Kitakyushu and Davao, IGES oversaw a joint study with Kitakyushu as the organisation responsible for the conduct of studies. IGES and Ateneo de Davao University collaborated to provide support to Davao City for the formulation of the LCCAP. A study related to the financing programme for JCM model projects was conducted in collaboration with Nippon Steel & Sumikin Engineering Co., Ltd. and local companies in Kitakyushu.

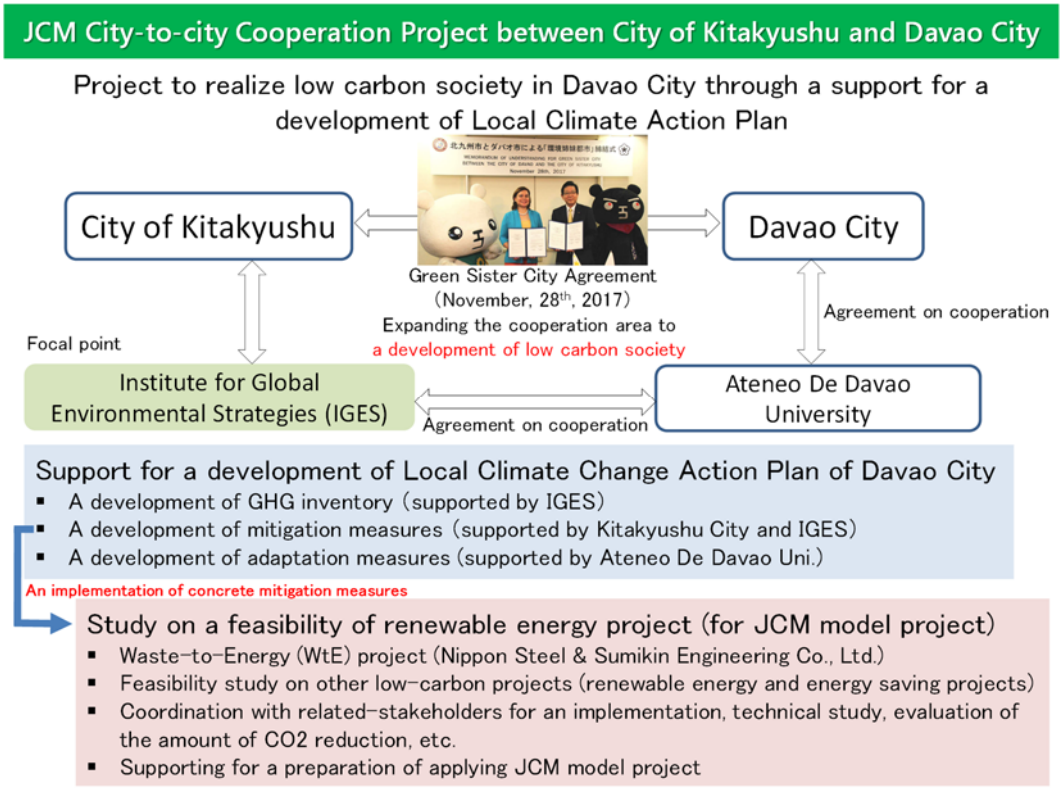


Fig. 4 Implementation system diagram

4. Methodology and schedule

The study team from Japan visited Davao City and conducted a survey in consultation with city officials and stakeholders. In studies to identify promising projects in particular, appropriate interventions by Davao City with local stakeholders made it possible to discuss points in more detail. The schedule (results) of these surveys is as follows.

	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb
1. Support for the formulation of a local climate change action plan (LCCAP)											
Consultations with Davao City (Site visit)											
Studies related to the development of a GHG inventory											
Training in Japan											
2. Studies on the possible application of JCM model projects for WtE projects											
Coordination with related organisations (MOE, GEC, etc.)											
Coordination of public tender period and methods with Davao City											
Selection of facility/equipment manufacturers and local contractors											
Examination of schedule for the introduction of facilities/equipment											
Preparation for application of JCM model projects											
3. Consideration of feasibility of other low-carbon projects											
Identification of renewable energy and energy-saving projects											
Adjustment of conditions for project implementation											
Selection of Japanese companies											
Field study with Japanese companies											
Preparation for application of JCM model projects											
4. Matters related to overall tasks											
Presentations at meetings designated by MOE											
Local workshops											
Creation of report											

Fig. 5 Schedule for implementation (Results)

III. Results of Feasibility Studies on the Development of Promising JCM Model Projects

1. Summary of field studies

Starting with the kick-off meeting in May 2018, several field surveys were carried out under C2C cooperation between Kitakyushu and Davao. Each time, information needed to provide support for the formulation of the LCCAP and identify promising projects was collected, with necessary consultations held with stakeholders in Davao City.

As a result of these field surveys, an implementation system for the formulation of the LCCAP was set up in December 2018. With the cooperation of the Philippine CCC, a foundation for the systematic formulation and implementation of the LCCAP was developed in Davao City under the same organisation. During surveys on the identification of promising projects, the possibility of applying the financing program for JCM model projects to the project of converting street lights to LED lighting, as positioned in local ordinances, was suggested, which resulted in expanded consultations with local companies in Kitakyushu towards the realisation of this project.

Details on each survey item are described below.

2. Activity 1: Support for the formulation of the Davao City Local Climate Change Action Plan

A kick-off meeting was held in Davao on 15 May 2018 where an agreement was reached by the stakeholders about the content of tasks to be carried out under C2C cooperation (Reference 1). Together with the kick-off meeting, discussions were conducted on ways to support the formulation of the LCCAP between CENRO, which has been considered to be the core organisation for the development of a GHG inventory, and Ateneo de Davao University, which has started to collaborate in the development of such an inventory. IGES introduced the LCCAP manual and GHG inventory guidelines published by the Philippines CCC and first requested that work start accordingly with the preparation of a GHG inventory with agreement reached by the stakeholders. At that time, the stakeholders received information that Ateneo de Davao University has been moving forward with the creation of an air quality inventory as of 2016 that includes GHG emissions. For this reason, the stakeholders agreed that the university will hold a training workshop on the GHG inventory for Davao City and

that the city will collect required information and cooperate in the preparation of the university's GHG inventory by the next field survey, bearing in mind that this will form the foundation for the city's GHG inventory. On the basis of this, the stakeholders decided that a GHG inventory for Davao City will be created with 2016 as the base year. Davao City has also agreed to consider a system to develop the inventory.

Fig. 6 Kick-off meeting

Fig. 7 Discussions between stakeholders involved in the formulation of the LCCAP

During the second field survey on 19 June 2018, the participants indicated and confirmed the departments that hold and maintain data, while checking a list of the data that will be collected and discovered that much of the data could be found in the Planning Department (Reference 2). Based on this information, the participants decided to consider the establishment of an implementation system between executives in Davao City and related departments. The participants agreed to collect data by the end of October.

During the third field survey on 5 September 2018, Davao City shared the provisional results from the GHG inventory that had been compiled in collaboration with Ateneo de Davao University. However, it became evident that there was an issue with the validity of boundary settings and the allocation of calculation results, which did not correspond to classifications in the GHG inventory guidelines, for example. Although a request had been made for data to be shared to confirm content, it became clear that sharing data from the university with the city is difficult due to internal procedures within the university. As discussions continued on these procedures, the stakeholders decided that Davao City should consider developing its own GHG inventory.

From 6-8 November 2018, five staff members from Davao City in charge of formulating the LCCAP, including the GHG inventory, were invited to Kitakyushu to take part in field training on developing a GHG inventory. The training programme and other information can be seen in Reference 3. Comprehensive support to improve capacity was provided using a combination of classroom lectures and site visits with exercises on methods to calculate GHG emissions and implement approaches ranging from the formulation of a low-carbon urban plan to its implementation based on Kitakyushu's policies. Although data on electricity and agriculture can be collected, Davao City shared that it has difficulty collecting data on fuel consumption from stationary emission sources. In addition, as Davao City shared that it is hard to understand data processing and calculation methods for emissions even when referencing the inventory guidelines, the stakeholders shared the common recognition that follow-up would be needed for this segment.

On 22 January 2019, at the final workshop on the project for this fiscal year, it was reported that the implementation system for the formulation of the LCCAP had been developed under the name of the mayor in December 2018, setting up the foundation for the future development and implementation of the LCCAP (Reference 4). This was the result of studies and discussions that had started with the kick-off meeting. Based on the situation in Davao City, IGES invited staff from the Philippines CCC, which provided support to local governments throughout the country to improve capacity, to discuss the types of support that could be provided. As a result, it was confirmed that Davao City itself invited staff members from the Philippines CCC to hold a training workshop and is continuing to work with an eye on completing the GHG inventory report for Davao City by the end of April.

If a budget for the activities in this project can be secured next year, support for the plan can proceed smoothly in stages, including the quality analysis/quality confirmation (QA/QC) of the GHG inventory and the positioning of candidate cases for JCM model projects that are being considered in the LCCAP.

Fig. 8 Final workshop for this fiscal year

Fig. 9 Group photo of stakeholders involved in the formulation of the LCCAP

3. Activity 2: Feasibility study on the application of WtE projects to JCM model project

The application of the financing programme for JCM model projects was examined for waste-to-energy (WtE) projects that Davao City is considering ordering. As the potential for implementation increases with the positioning of the implementation of WtE projects in the "Davao City Local Climate Change Action Plan" (LCCAP) that is supported through this C2C project, GHG emission reduction effects are expected to be evaluated and announced.

The team considered the installation of combustion gas cooling equipment (boilers, etc. with a statutory service life of 15 years) as target equipment. For the WtE project in Davao City, the Ministry of Foreign Affairs is separately planning to implement the "Davao City Improvement Plan for Energy Recovery-type Waste Treatment Facilities" as a grant-aid project using procurement guidelines through a procurement agency. Following the implementation of this plan, it is expected that a special purpose company (SPC), including Japanese companies, will acquire business operation rights.

This means that it is necessary to examine the potential for collaboration with the above-mentioned, grant-in-aid projects that offers business rights, rather than an independent study on financing projects as JCM model projects. Studies during this fiscal year were particularly focused on this point.

The structure of the implementation system for the WtE project is as follows. A study was organised based on the assumption that the private operator from Japan will be Nippon Steel & Sumikin Engineering Co., Ltd.

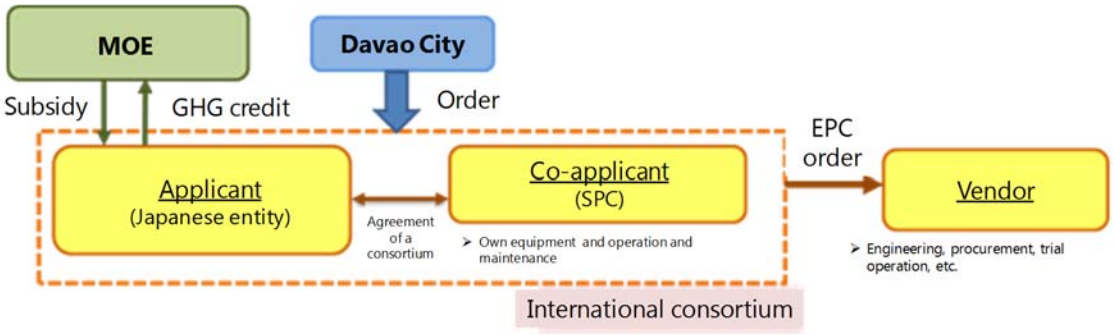


Fig. 10 Structure of implementation system for waste-to-energy (WtE) projects

The following items have been identified as tasks for the development of a WtE project as a JCM model project.

- Timing of order for WtE project by Davao City

  The timing of the order for the WtE project by Davao City must correspond with the schedule for public tender and decision on adopted JCM model projects. In other words, the contractor for the WtE project (company that will form the SPC, mentioned later) must be decided by Davao City and target equipment ordered from the relevant SPC within the three-month period following the internal announcement of adopted JCM model projects and upon receipt of the decision for delivery of the subsidy for the model project. When bidding for the WtE project by Davao City, an application will be submitted for the JCM model project before bidding by Davao City for the WtE project starts, but it should be clarified that the order has been placed before the provisional adoption of the project. Based on current application requirements, these tasks may be difficult to address unless the schedule for bidding for the project is in line with the public tender schedule for the JCM.
- Timing for establishing SPC

  If the above timing meshes, an SPC will be established after an order for the project is received. With regard to the composition of the international consortium, it will be necessary to organize how the joint venture will be positioned prior to the receipt of the project order.
- Engineering work related to target facilities/equipment

  Subsidies are not available for costs related to engineering work for target

facilities/equipment prior to the decision on grants. Delaying engineering work until the decision on the grant is made will slow down the process and certain costs will be excluded from the subsidized project, which means that it will be necessary to coordinate with the timing of orders for the WtE project.

- Electrical system connections
  It is necessary to clarify the applicable scope of expenses required to connect to the grid with respect to costs related to electrical system connections.
- Ordering method for target facilities/equipment
  In cases of selective bidding or negotiated contracts, it is necessary to consider conditions (supporting materials), such as when it is difficult or inappropriate to open up bidding to general competition.
- Expected responsibilities for the representative operator
  In addition to the obligation to operate the facility within the statutory service life and submit reports on GHG emission reductions, the company that becomes the representative operator is expected to detail and clarify the conditions under which the subsidy can be returned.

4. Activity 3: Feasibility study on the implementation of low-carbon projects in other sectors

Davao City has decided to convert all street lights in the city's jurisdiction from high-pressure sodium (HPS) to light-emitting diodes (LED) under an ordinance that requires Davao Light and Power Company (DLPC) to comply with the Davao City Street Light Efficiency Program to install light-emitting diodes (LED) for street lighting in areas under the jurisdiction of Davao City (Ordinance No. 0409-18/2018) (hereinafter referred to as the LED ordinance. Please refer to Reference 5).

Over the next five years, Davao plans to upgrade all 40,000 street lights in the city to LED lighting and has already started to convert HPS lights in the central business district (CDB) to LED. To date, 1,000 street lights have been converted to LED lighting. DLPC will bear all costs related to the installation of LED lighting under this ordinance. However, DLPC will also regain its initial investment with the conversion to LED lighting from Davao City in the form of electricity fees in the future.

Requirements for LED street lights to be installed to replace existing street lights (minimum specifications, excerpt from LED ordinance).

a. Lighting fixtures may be specially designed for the use of a light source based on semiconductor technology (LED). Products designed for other types of light sources or those adapted or modified for LED light sources are not acceptable.
b. Sealants for lights and control equipment compartments should be a minimum of IP66.
c. The minimum level of shock resistance against disruption shall be IK08 (based on a 10-grade evaluation).
d. The lifetime of lighting performance should satisfy L80B10 at a minimum with a burn time of 100,000 hours (90% of lamps maintain 80% of lumens at 100,000 hours). This will prevent a rapid decay of light output by lighting fixtures.
e. Electrical safety classification: Class 1, installation of double insulation wires
f. Power factor: >90 at 100% load
g. Ambient temperature during use (Ta): 45℃ or higher
h. Main voltage tolerance: 120V to 227V
i. Correlated Colour Temperature (CCT): 3000k
j. Colour Rendering Index (CRI): >70
k. Lumens per watt: Minimum value of 85
l. Casings should be made from a die-cast aluminium alloy with transparent and flat-tempered glass (polycarbonate or similar materials are not acceptable).
m. Surge protection device: 10kV
n. Light-fixture angle system: Minimum of +5 to -10 degrees
o. Manufacturer's warranty: 6 or more years
p. IEC complaint authentication must be provided for the following: IP, IK, fragmentation, EMC, LM80 tests
q. All measurement work should be carried out using equipment with ISO17025 certification.
r. The outward appearance of objects captured by CCTV securing monitoring equipment shall not be disturbed or damaged by the use of these lights.

Based on the above conditions, the following results were identified during a visit to Davao City and DLPC in December 2018 and in discussions in January 2019 (See Reference 6). As can be seen in the following table, the stakeholders decided to conduct a study targeting the

conversion of a total of 23,900 lights, shifting over from the existing 70W, 150W, and 250W high-pressure sodium (HPS) lights to 60W (13,000 lights), 80W (3,600 lights), 110W (4,900 lights) and 212W (2,400 lights).

Table 1 Overview of DLPC project to convert HPS to LED

HPS (W)		LED (W)	Number of units to be replaced
70	→	60	13,000
150	→	80	3,600
250	→	110	4,900
	→	212	2,400
		Total	23,900

Based on these conditions, Japanese companies have been selected with Kitakyushu City, with Dhowa Technos Co., Ltd. selected as the representative company and Join Planning Co., Ltd. selected as the facility manufacturer. Discussions were held with executives at DLPC when the team visited Davao in February 2019 about the implementation of the financing programme for JCM model projects by positioning the proposed project in this C2C cooperation project. The following figure is a proposed implementation system for JCM model projects.

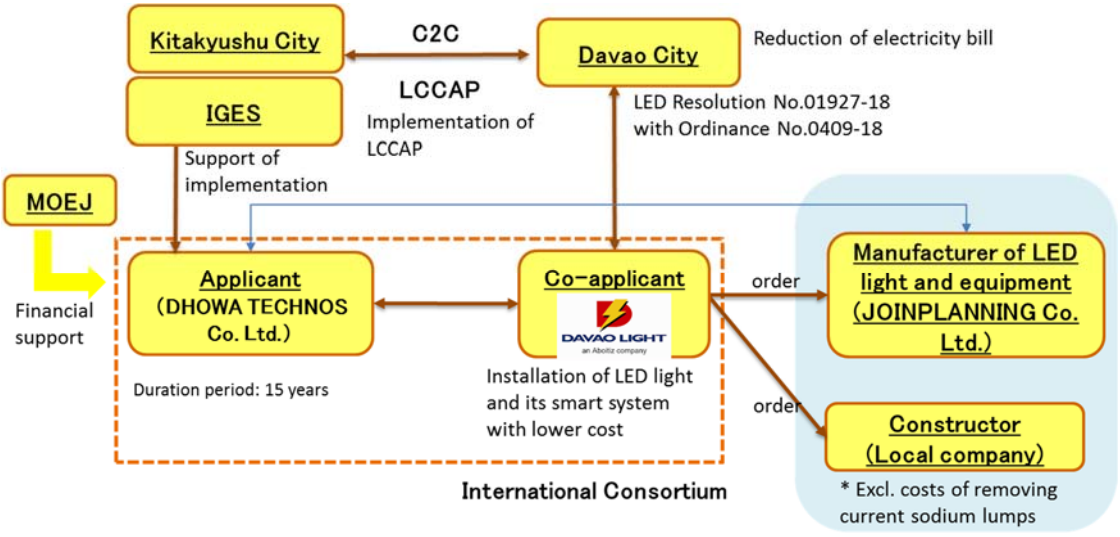
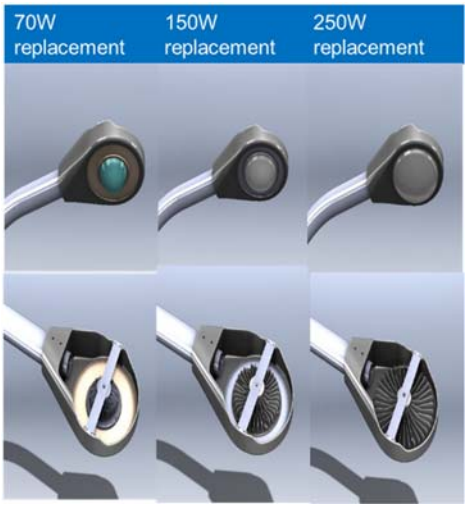


Fig. 11 Proposed implementation system for the LED project for street lights in Davao City

During the visit in February 2019, the following two proposals were submitted to DLPC together with the Japanese companies.

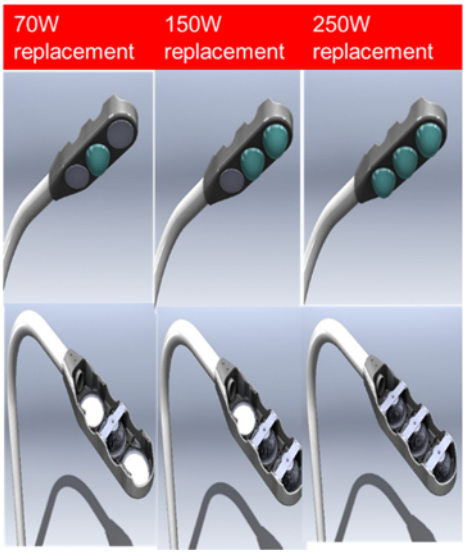
Proposal A

HPS (W)		LED (W)	Number of units to be replaced		luminance	Number of lights	W/pcs	actual power consumption (W)	Luminaire efficiency (lm/W)
70	→	60	13,000		7000	1	50	50	140
150	→	80	3,600		13000	1	90	90	144.4
250	→	110	4,900		21400	1	150	150	142.7
	→	212	2,400						



Proposal B

HPS (W)		LED (W)	Number of units to be replaced		luminance	Number of lights	W/pcs	actual power consumption (W)	Luminaire efficiency (lm/W)
70	→	60	13,000		7000	1	50	50	140
150	→	80	3,600		14000	2	50	100	140
250	→	110	4,900		21000	3	50	150	140
	→	212	2,400						



With regard to GHG reduction effects from the conversion of street lights to LED lighting, Cambodia's conversion project from sodium lamps to LED light were used as reference (Methodology No.KH_AM001).

$$ER_p = RE_p - PE_p$$

Criterion 1	The project installs LED street lighting system utilizing wireless network control, which is connected to an electricity grid system.
Criterion 2	All lighting equipment in one lighting system has the same specifications.
Criterion 3	Wireless network technology enables controlling of the volume of lighting.

$$RE_p = \sum_i P_i \times \left(\boldsymbol{\eta}_{PJ,i} \div \boldsymbol{\eta}_{RE}\right) \times PO_{i,p} \times EF_{grid} \times 10^{-6}$$

PE_p	Project emissions during the period p (tCO_2/p)
$PEC_{i,p}$	Total amount of electricity consumed in the project lighting system i during the period p (Wh/p)
EF_{grid}	Grid emission factor of Mindanao grid (tCO_2/MWh)
i	Identification number of the lighting system

$$PE_p = \sum_i PEC_{i,p} \times EF_{grid} \times 10^{-6}$$

RE_p	Reference emissions during the period p (tCO_2/p)
P_i	Rated power consumption of a lighting equipment used in the project lighting system i (W)
$\eta^{PJ,i}$	Luminaire efficiency of a lighting equipment used in the project lighting system i (lm/W)
η^{RE}	Luminaire efficiency of the reference lighting system (lm/W)
$PO_{i,p}$	Total operating hours of project lighting system i during the period p (hrs/p)
EF_{grid}	Grid emission factor of Mindanao grid (tCO_2/MWh)
i	Identification number of the lighting system

Source: https://www.jcm.go.jp/kh-jp/methodologies/34

As a result of referring to the above methodology, it is expected that the GHG reduction effect for Proposal A will be 3,260.65 t-CO_2e/year and 3,317.38 t-CO_2e/year for Project B.

The following items must be examined as part of future actions towards the application as a JCM model project.

- Consistency between standards in the Philippines and Japan (IEC and JIS, PSE and PS, etc.)
- Consideration on the utilisation of existing street lamp covers
- Other technical considerations
- Composition of the international consortium, coordination for signing of contracts between the representative business operator and partner company

IV. Participation in Seminar

1. City-to-City Collaboration Programme Seminar

A City-to-City Collaboration Programme Seminar, sponsored by the Ministry of the Environment, Japan, was held in Yokohama City on 25 and 26 October 2018. Two staff members from Davao City were also invited to attend the seminar. One staff member delivered a presentation at the seminar on low-carbon policies in Davao City (Reference 7). This seminar aimed to strengthen partnerships between cities by providing an opportunity for participants to learn from one another through the introduction of studies implemented in 2018 and allowing participants to visit partner cities in Japan to learn about policies and measures in other partner cities and hold discussions with stakeholders.

Municipalities engaged in collaboration with Kitakyushu were invited to the city, including the two participants from Davao City, prior to the seminar to deepen understanding about global warming countermeasures and efforts to create a low-carbon society in Kitakyushu and local companies.

a. Itinerary and invitees

Two city staff from Davao, Ms. Marissa Gallo and Mr. Lakandiwa Orcullo were invited to visit Kitakyushu. After arriving at Fukuoka Airport on 22 October, the two municipal officers took part in the following itinerary. Mr. Lakandiwa travelled to Yokohama City on 23 October as he was asked to attend the 3R local governmental meeting organised by the Ministry of the Environment, Japan. Ms. Marissa took part in the C2C Programme Seminar on 24 October, the following day.

A total of 10 people took part in the seminar from municipalities with which Kitakyushu has a cooperative relationship, including Chiang Mai Province, Hai Phong City, Mandalay City, and Phnom Penh City, as well as Davao City. Site visits were also carried out mainly in Kitakyushu City. Detailed information about the destinations of these site visits is below.

22 October (Monday)	13:00-14:30	(1) Kitakyushu Eco-Town Center
	15:30-16:30	(2) Kogasaki Incineration Plant
23 October (Tuesday)	10:20-12:00	(3) Usa Biogas Power Station, Price Management of Japan Co., Ltd.

b. Record of inspections

(1) Eco-Town Center

At the Eco-Town Center located in the Hibikinada district of Wakamatsu ward in Kitakyushu City, staff from Kitakyushu Eco-Town Center explained about the history of Kitakyushu City, Hibikinada Industrial Area, and the Kitakyushu Eco-Town project. In Kitakyushu City's strategy to revive its environmental industry, comprehensive development is carried out in collaboration with industries,

academia and the government, ranging anywhere from education and basic research to technical and empirical research and commercialisation.

After the explanation at the Eco-Town Center, the participants toured the recycling factory of a company called Recycle Tech which recycles OA equipment. Copy machines are dismantled and gold, silver, lead, aluminium, copper, iron, and plastic are separated to achieve an overall recycling rate of 99%. The participants received an explanation on urban mining and observed the actual situation at the factory (no photos permitted inside the factory).

Fig. 12 Explanation at Eco-Town Center

Fig. 13 Tour of factory recycling OA equipment

(2) Kogasaki Incineration Plant

The Kogasaki Incineration Plant was designed with a waste treatment capacity of 810 tonnes per day. A tour of the facilities was carried out after an explanation of the Kogasaki Incineration Plant was offered through a DVD screening and the use of models.

The volume of waste can be reduced by 1/20 through incineration. The incinerator at the Kogasaki Incineration Plant is a stoker furnace manufactured by Takuma, which completely incinerates waste at a temperature of 800 degrees. Although the plant also has equipment for gas engines, they are currently not in operation because the price of city gas is high, leaving electricity to be only generated using steam turbines. The scale of power generation is 17,200kW, which is sold to Kitakyushu Power.

Fig. 14 Explanation on Kogasaki Incineration Plant

Fig. 15 Facility tour (model of stoker furnace)

(3) Usa Biogas Power Station, Price Management of Japan Co., Ltd.

The participants toured the Usa Biogas Power Station that has been operated by Mirai Power Corporation, a total energy company, since July 2018. The facility is a biogas power generation facility that uses shochu distillery by-product and business waste from the surrounding area. Price Management of Japan provides EPC cooperation. In general, shochu gas is not appropriate for solubilisation but can be solubilised with the company's special engineers.

【Facility overview】

- Total project cost: Approximately JPY 1 billion
- Built on the former site of a mandarin orchard. Site of about 8,000km^2
- Output of 600kW (200kW x 3 turbines) (2 turbines installed as of 23 October 2018)
- With the exception of electric power used in the plant, all power is sold to Kyushu Electric Power using feed-in tariffs (FIT)
- Aims at annual sales of JPY 120 million
- After fermentation, digestive liquid is utilised in a citrus plantation managed by an affiliate company as liquid fertiliser.
- Construction began in November 2017. Plant installation and trial operation period was from March to August. Construction finished on 27 July and sales of electricity began in October 2018.

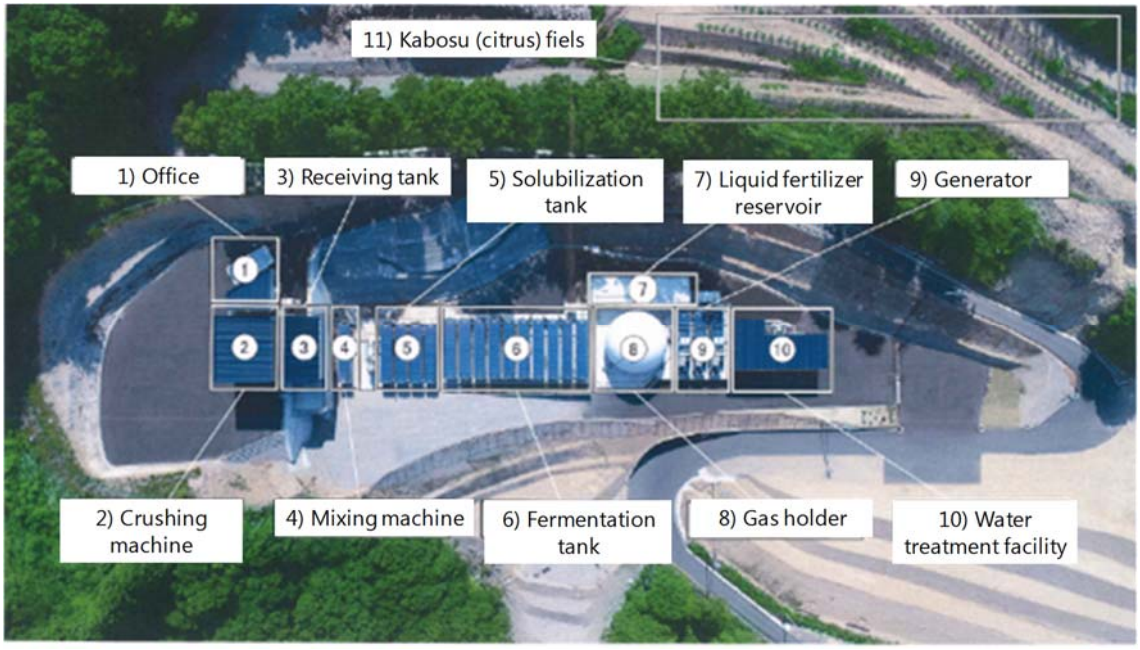


Fig. 16 Overview of plant facilities