# Kick-off Meeting of City-to-City Collaboration Programme in Davao City

**Date:** May 15th 2018 (Tuesday)  
**Time:** 9:30～12:00  
**Venue:** Function room at Grand Men Seng Hotel

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<th>No</th>
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<td>9:30～9:35</td>
<td>Opening remarks</td>
<td>Atty. Tristan Dwight P. Domingo, Asst. City Administrator, Davao City</td>
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| 2   | 9:35～9:40    | Opening remarks                                                                            | Ms. Emiko Murakami  
Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu |
| 3   | 9:40～9:50    | Photo session                                                                              |                                                                          |
| 4   | 9:50～10:10   | Background of a cooperation between Davao City and City of Kitakyushu                      | Ms. Emiko Murakami  
Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu |
| 5   | 10:10～10:30  | Low-carbon policy of Davao City and the progress of Local Climate Change Action Plan (LCCAP) (tentative) | Ms. Marivic L. Reyes  
Officer-In-Charge, City Environment & Natural Resources Office (CENRO) of Davao City (t.b.c.) |
| 6   | 10:30～10:50  | A framework of City-to-City Collaboration Programme between Davao City and City of Kitakyushu on low carbon development | Mr. Shiko Hayashi  
Programme Director, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES) |
| 7   | 10:50～11:10  | Support for a development of Local Climate Change Action Plan (LCCAP) of Davao City         | Dr. Junko Akagi  
Research Manager, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES) |
| 8   | 11:10～11:40  | Q&A and discussions on possible low-carbon project applying to JCM fund                     |                                                                          |
| 9   | 11:40～11:50  | Closing Remarks                                                                            | Japan side                                                               |
| 10  | 11:50～12:00  | Closing Remarks                                                                            | Atty. Tristan Dwight P. Domingo, Asst. City Administrator, Davao City     |

*The kick-off meeting will be held in English (A consecutive translator between English and Japanese will be available)*
Tentative list of participants

- Atty. Tristan Dwight P. Domingo, Asst. City Administrator, Davao City
- Ms. Marvic L. Reyes, Officer-In-Charge, City Environment & Natural Resources Office (CENRO) of Davao City
- Related departments and CENRO staffs
  - Dr. Doris B. Montecastro, Chairperson, Environmental Science Department, Ateneo de Davao University
  - Consular Office of Japan in Davao (t.b.c.)
  - Ms. Emiko Murakami, Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu
  - Mr. Noboru Kawai, Project Development Manager (Waste to Energy), Nippon Steel & Sumikin Engineering Co., Ltd. (NSENGI)
  - Engr. Archelez G. Dumandan, Managing Director, PNS Construction, Inc.
  - Ms. Lea-Chris Tan, Nippon Steel & Sumikin Engineering Co., Ltd. (NSENGI)
  - Mr. Rudy Q. Corro Jr. VP for Business Development, Carbon Footprint Solutions Inc.
  - Mr. Shiko Hayashi, Programme Director, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES)
  - Ms. Junko Akagi, Research Manager, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES)
  - An interpreter

- Fr. Daniel Menamara, SJ, University Research Council, Ateneo de Davao University
- Dr. Doris B. Montecastro, Chairperson, Environmental Science Department, Ateneo de Davao University
Background of a cooperation between City of Davao and City of Kitakyushu

Kitakyushu Asian Center for Low Carbon Society
Environment Bureau, City of Kitakyushu
Director, Emiko MURAKAMI

May 15th, 2018

City located near to other Asian nations, rich in nature, and developed as a manufacturing area

Kitakyushu City

Rich nature and branded food materials
- Karst Plateau Hiraodai
- Wakamatsuhoku Beach
- Ouma Bamboo Shoots
- Kanmon Straits Octopuses
- Kokura Beef
- Buzen-Sea Oysters
- Wakamatsu Special Tomatoes

Major companies in Kitakyushu area
- Nippon Steel Corporation
- Yaskawa Electric Corporation
- TOTO Ltd.
- Mitsubishi Chemical Corporation
- Toyota Motor Corporation
- Nissan Motor Co., Ltd.
- Mitsubishi Materials Corporation
Overcoming Severe Pollution: Kitakyushu’s Experience

1960s

Today

Key Factors: Partnerships among Multi-Stakeholders

Residents

Residents observing a private company

Study session on air pollution measures with university professors

Partnership

Local Government

Private Enterprises

Environmental supervision & environmental infrastructure

Cleaner Production & pollution control equipment
Low-Carbon Technologies in Kitakyushu

- **Mitsubishi Materials**
  15 types of waste treatment and recycling, such as metal waste and sludge

- **Nippon Coke & Engineering**
  CDQ (Coke Dry Quenching Process)
  Supply power and steam to neighboring factories
  Power generation capacity: 27,900kW

- **Mitsubishi Chemical**
  Processable organic photovoltaics
  Next-generation flexible and lightweight photovoltaic modules

- **Yaskawa Electric**
  Energy saving, inverters

**Eco-Techno**
Western Japan's largest eco-technology expo that displays the latest eco-technologies, products and information

Low-Carbon Activities in Kitakyushu - 1

- **Solar Panel**
- **Lighting**

- **JR Kokura Station North Pedestrian Deck**

- **Katsuyama Bridge Solar Powered Roof**

- **Uomachi Eco-Roof**
Bicycles in Use
(Front of City Hall)

Bicycle Station
(Kokura Kita-ku Ward Office)

Introduction of Eco-Cars
such as Electric Vehicles

Low-Carbon Activities in Kitakyushu - 2

Peak cut activity of electric power consumed
Turn off the light during afternoon break

Water Sprinkling

Low-Carbon Activities in Kitakyushu - 3
Energy Policy in Kitakyushu (Kitakyushu Power)–1

Make Hibikinada Area a Base for Energy ~Invitation of Solar Photovoltaics, Biomass Power Generation and Offshore Wind Power Generation

Centralization for Energy

Energy Policy in Kitakyushu (Kitakyushu Power)–2

Utilizing local low-carbon power source starting in Waste-to-Energy. Expand procurement power supply in conjunction with status of inviting power generation facilities and expansion of supply scale.

Step 1 Waste to Energy

Step 2 Biomass Power Generation

Step 3 Offshore Wind Power Generation and so on
Kitakyushu Asian Center for Low Carbon Society opened in June 2010.

Utilization of the environmental technologies developed through the solution of pollution problems and manufacturing processes, and the inter-city network established by international cooperation in the past

Accumulating environmental technologies in Kitakyushu City and throughout Japan, for building low carbon societies in Asia through environmental business skills

Diverse Project Development Map

We have carried out 143 projects in close cooperation with 106 Japanese companies in 57 Asian cities.
Cooperation for E-Waste Recycling with Cebu City in the Philippines

Supporting Cebu City’s Ordinance since 2014 (supported by METI, Japan)

Ordinance No. 2450

“AN ORDINANCE PROVIDING FOR THE MANAGEMENT OF SPECIAL WASTES IN THE CITY OF CEBU, PROVIDING FEES AND IMPOSING PENALTIES FOR NON-COMPLIANCE THEREOF” in 2016.

- This ordinance obligates household and commercial facilities to bring special wastes including E-waste to collection points designated by Barangay.
- All transporter and TSD facilities operating within the City must register with the Cebu City Solid Waste Management Board with requirement of DENR-EMB accreditation, Business permit.
- Any person found guilty of violating any prohibited Acts should be imposed fine for first and second offence. For the third business license shall be suspended.

Memorandum of Understanding for Environmental Technical Cooperation in February 9th in 2017

Article 1 Objective
The objective of this MoU is to establish an Environmental Technical Cooperation in order to promote and expand effective and mutually beneficial cooperation in the development of the two cities.

Article 2 Scope
Promotion of resource recycling by proceeding with the management of special waste
Development of a green economy and environment conservation with pollution control of water, air and soil.

Investigation for Installation of Waste-to-Energy Facility in Davao City

JICA, MoEJ (FY 2015 - up to present)

<Project Overview>
Davao is the central city in the south section of the Philippines and is facing issues of increased waste generation due to the expansion of economic activities and reducing pressure on final disposal sites. Therefore, this project aims to implement a “waste-to-power project” with the aims of both achieving significant reductions of waste and using this energy. Surveys will also be carried out on waste treatment situations and related legal systems.

<Project Implementation System and Main Role>

[Nippon Steel & Sumikin Engineering]
- Business Entity
- City of Kitakyushu
- City to City Cooperation

[KITA]
- Technology Transfer of Solid Waste Management
- Kitakyushu Environmental Preservation Association

[Waste Analysis]
- Japanese govt
- IGES
- Hold the Public Consultation

Stoker-incineration furnace
- Can respond to large-scale waste treatment needs (minimization)
- Large-scale, high-efficiency power generation is possible with the use of waste.
Solid Waste Management in Davao for JICA Grassroots Project

**Project Output**
1. Establishing a system for waste analysis in CENRO
2. Setting up preparatory body to develop an organization to promote waste reduction
3. Pilot activities on waste reduction in business sector and barangay to be conducted

**Solid Waste Reduction Mechanism**
- Cutting of waste disposal cost by waste reduction
  - DAVAO: Strengthen the existing capacity of the SWM organization
    - Waste reduction plan
    - Research and development on waste reduction, employing, junkshops
  - Waste Reduction Practices
    - Environmental education to children, Citizens
    - Home and center composting
    - Waste sorting and increase of circular volume of recyclables
    - Promotion of garbage dewatering
    - Plastics collection at SLF and its use for fuel of WtE
  - Residue
  - Incentive
  - WtE-SPC: Waste treatment and CSR
  - Increase of power generation
  - Utilizing collected plastics as high calorific fuel for WtE, Employing waste pickers

**JCM City-to-city Cooperation Project between City of Kitakyushu and Davao City**

Project to realize low carbon society in Davao City through a support for a development of Local Climate Action Plan (MoEJ : FY 2018)

City of Kitakyushu

Institute for Global Environmental Strategies (IGES)

Davao City

Ateneo De Davao University

Green Sister City Agreement (November, 28th, 2017)
Expanding the cooperation area to a development of low carbon society

Support for a development of Local Climate Change Action Plan of Davao City

- A development of GHG inventory (supported by IGES)
- A development of mitigation measures (supported by Kitakyushu City and IGES)
- A development of adaptation measures (supported by Ateneo De Davao Uni.)

An implementation of concrete mitigation measures

- Study on a feasibility of renewable energy project (for JCM model project)
  - Waste-to-Energy (WtE) project (Nippon Steel & Sumikin Engineering Co., Ltd.)
  - Feasibility study on other low-carbon projects (renewable energy and energy saving projects)
  - Coordination with related stakeholders for an implementation, technical study, evaluation of the amount of CO2 reduction, etc.
  - Supporting for a preparation of applying JCM model project
Executives of Davao City Government Visit to Kitakyushu City

Atty. Domingo (March 2016)  
Atty. Ropez (May 2017)  
Mayor Sara (November 2017)  
Atty. Bantiding (February 2018)

Signing of a Memorandum of Understanding for a Green Sister City Relationship with Davao, The Republic of the Philippines

On November 28th, 2017, the City of Kitakyushu and the City of Davao, in the Republic of the Philippines, signed a Memorandum of Understanding creating a Green Sister City relationship between the cities that aims to create cooperative partnerships in the environmental field for the purpose of expanding mutual benefits and positively driving development through low-carbon societal initiatives, resource circulation projects, and development of local human resources.

The City of Davao is the City of Kitakyushu’s second Green Sister City, and its first since Surabaya in the Republic of Indonesia, in November of 2012. Through the signing of a Memorandum of Understanding, cooperation between the public and private sectors can strongly support the export of city infrastructure systems, create a path for regional revitalization, and drive national growth strategies.
On March 20th, 2018, Ambassador Koji Haneda, with Department of Foreign Affairs Secretary Mr. Alan Peter Cayetano, attended the signing ceremony of Exchanges of Notes. Exchange of Notes signed will provide a JPY 5.013 billion (PHP 2.5 billion) grant for the development of waste-to-energy facilities in Davao City. Japan’s grant will be used to construct and manage waste-to-energy facilities to significantly reduce solid wastes and convert it into usable energy. This project is expected to serve as an innovative example of sustainable waste management to other cities in the Philippines.

Priority Fields in Technological Transfer

**Energy management**
Regional management of energy by placing city and regional electricity plants at the core

- Yahata Higashida District, where an environmentally conscious town is under construction
- Kitakyushu Smart Community
- Kitakyushu Eco-Town

**Water recycling demonstration plant**
Combining sewage water membrane treatment and sea water desalination

- Water Plaza
- Water created from sewage: 1,000 m³/day
- Water created from seawater: 400 m³/day

**Water business**

**Recycling and waste treatment**

- Kitakyushu Eco-Town
- Home appliance recycling
- Bicycle recycling

**Most advanced facilities for waste treatment**
Shaft-gasification furnace

- Shin-Moji Plant
- Safe facilities that achieved recycling of waste and effective utilization of heat energy

**Cleaner production and prevention of pollution**

- Introduction of cleaner production (CP)

**End-of-Pipe (EOP) measures**

- Electric dust collector
- Flue-gas desulfurization facilities
- Waste water treatment facilities

**Economic effects (25 projects)**
- Direct investment: approx. 60 billion yen
- Generated employment: approx. 1,341 jobs
- CO₂ reduction: approx. 300,000 tons/year
My name is **Teitan**.
I came from North Pole.
Global warming causes melting ice there, and we have less and less places to live every day.
So I came to Environmental model city, Kitakyushu to protect my family and North Pole.
I am hoping that we all learn the importance of Environmental and ecology more, so that we will be able to stop the global warming together!

**Kitakyushu City Environmental Mascot Character**

*Teitan*

低炭素 (tei tanso) = Low Carbon
A framework of City-to-City Collaboration Programme on low carbon development between Davao City and City of Kitakyushu

May 15th, 2018

Shiko Hayashi
Programme Director, Kitakyushu Urban Centre

City-to-City Collaboration Programme on low carbon development

The Programme aims

- to conduct a feasibility study (FS) of possible introduction of low-carbon technologies as well as enhance the capacity of partner cities by drawing up a master plan and/or action plan and sharing expertise in project management in the cities in an effective and efficient manner under the partnership of Japanese cities and partner cities.

- Support to create low carbon project
- Support to design the local policies/plans to promote low carbon projects (ex: Local Climate Change Action Plan)
- Capacity building for the above mentioned activities

Source: Ministry of the Environment, Japan

JCM Model project

- When promising low-carbon projects are identified, the programme will move on to the project implementation stage with the submission of an application to the JCM Model Project.
- JCM Model Project is a financing programme provided by MOEJ.
- Normally, the open call for proposals to the JCM Model Project is made in late April and an application must be made within three months of the internal announcement of the adopted projects, which is in June.
Project to realize low carbon society in Davao City through a support for a development of Local Climate Action Plan

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- Coordination with related-stakeholders for an implementation, technical study, evaluation of the amount of CO2 reduction, etc.
- Supporting for a preparation of applying JCM model project

Basic Concept of Joint Crediting Mechanism (JCM)
- Facilitating 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.
- Appropriately evaluating contributions from Japan to GHG emission reductions or removals in a quantitative manner and use them to achieve Japan's emission reduction target.
- Contributing to the ultimate objective of the UNFCCC by facilitating global actions for GHG emission reductions or removals.

Source: Ministry of the Environment, Japan
Study on possible application of JCM Model Project

Possible low-carbon projects in Davao City:
1) Study on a possible application of the WtE project to JCM Model Project
2) Feasibility study on other low-carbon projects in Davao City

Components will be checked for a feasibility study on low-carbon projects:
- Forming an international consortium
- Coordination on a timing and condition of a procurement of a low-carbon project in Davao City with related organizations, etc.
- Coordination with manufacturers of renewable energy equipment as well as contractors
- Selection of equipment, calculate the amount CO2 reduction, support for a preparation to apply for JCM Model Project

Typical Project Structure

Possible public projects:
- Solar panel on a roof of a public market located in Toril, Davao City
  ✔ need to consult with MOEJ if it is regarded as a leading low-carbon technologies
  ✔ The rate of a subsidy on an installation costs provided from MOEJ would be less than 50% (30 projects approved (2 in the Philippines) among 106)
- Exchange of street lights to LED lights
  ✔ need to further consult with Davao City and Davao lights
  ✔ If it is a public project, need a open tender (matters of schedule & selection)
- Introduction of a few electronic buses for the High Priority Bus System
  ✔ There is a case introduced an electronic bus and electronic charging station under a C2C Collaboration Programme under Kitakyushu and Hai Phong, VN.

Possible private projects:
- Waste heat recovery-system to a cement facility
- High-efficiency chiller for air-conditioning to hotel or shopping mall, etc.
- High-efficiency boiler system to factories, etc.

Note: You can check the past approved JCM Model Projects at  http://gec.jp/jcm/projects/
Schedule for the City-to-City Collaboration Programme

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Reference: Some conditions for JCM Model Project

- Finance rate will be determined based on the number of already selected JCM Model Projects using a similar technology in each country. The scope of the similar technology will be defined by MOEJ, as appropriately.
- Regardless of the finance rate, selected entities in JCM Model Project are expected to deliver at least half of JCM credits issued to Government of Japan.

<table>
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<th>Number of already selected projects using a similar technology in each partner country</th>
<th>None (0)</th>
<th>Up to 3 (&gt;3, except 0)</th>
<th>More than 3 (&gt;3)</th>
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<td>Maximum finance rate</td>
<td>50%</td>
<td>40%</td>
<td>30%</td>
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Cost effectiveness (JPY/t-CO₂)

- Dividing “the amount of proposed subsidy” by “the accumulated emission reduction” achieved during “the legal durable years” (under Japanese tax law).
- 5,000 JPY/t-CO₂ if the subsidy is more than 500mJPY (5mUSD) and 10,000 JPY-t-CO₂ if the subsidy is less than 500mJPY (5mUSD)

Payback period (year) = \frac{(Total initial cost) – (Amount of subsidy)}{(Reduction for annual operation cost)}

- Payback period of a proposed project should be more than 3 years.

Source: Ministry of the Environment, Japan
Support for a Development of Local Climate Change Action Plan (LCCAP) of Davao City

Junko Akagi
Kitakyushu Urban Centre
Institute for Global Environmental Strategies (IGES)

15.05.2018, Davao City

Paris Agreement & SDGs

- Paris Agreement:
  - All Parties agreed to commit to suppress the temperature rise well below 2 °C and realize so-called “de-carbonized” society.

- INDCs of the Philippines:
  - 70% from the BAU scenario by 2030 (conditional) (Relative emission reduction)
  - Note that the Philippines government will declare NDCs by 2020.
National Policy for Local Climate Actions

- Section 14 of The Climate Change Act specifically recognizes the role that LGUs play in mainstreaming climate change efforts within the government and requires them to formulate and implement local climate change action plans (LCCAP) that is consistent with local and national policies and frameworks.

- Section 3.3.5 of the Guidelines for the Formulation of the LCCAP strongly suggests LGUs to identify mitigation options to help reduce their carbon footprints and contribute to efforts in addressing climate change.

### Adaptation
Seeks to lower the risks posed by the consequences of climatic changes

### Mitigation
Human intervention to reduce sources or enhance sinks of GHGs

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<th>Obligated</th>
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LGUs’ Initiatives

- Large-scale cities are developing LCCAP with mitigation options:
  - Quezon
    - LCCAP was published in 2017.
    - GHG inventory is under improvement.
  - Davao
    - LCCAP with a focus on adaptation has been developed with Ateneo De Davao University.
    - GHG inventory and mitigation options will be incorporated in the LCCAP in collaboration with IGES and City of Kitakyushu.

Scope of our project
(Collaboration among Davao City, Ateneo De Davao University, and IGES)
Steps for the LCCAP Development

With a focus on adaptation

In order to set a target and reduce GHG emissions, we need to know how much GHGs are released from where.
GHG Inventory

GHG inventory is developed...
- To know current emission status of the city
- To serve as a basis for future projection
- To consider appropriate mitigation options
- To prioritize mitigation options by recognizing key emission sources
- To monitor the progress of low-carbonization

Assessment Boundaries

Any anthropogenic activities are the subject of estimation.

-Time period-
- One year

-Greenhouse gases-
- CO₂, CH₄, N₂O, HFCs, PFCs, SF₆, NF₃

-Geographical boundaries-
- City’s jurisdiction

-Emission sources-
- Stationary Energy Sources, Transportation, IPPU, Waste, AFOLU

Source: GPC
Development Procedure of GHG Inventory

- Institutional arrangement (who does what?)
- Boundary assessment
- Identification of required data and data providers
- Data collection
- Calculation with spreadsheet
- Compilation of calculation results (report)
- Approval by top management
- Open to public

Steps for the LCCAP Development

With a focus on mitigation

- Identifying mitigation options
- Measures implemented for different purposes can often be regarded as mitigation options.
Guidebooks in the Philippines

- LGU Guidebook 1 & 2
  (Developed by Local Government Academy (LGA)
  Department of Interior and Local Government)

- GHG Inventory Manual
  (Developed by Climate Change Commission (CCC)
  with support from USAID)

- Supplementary documents (where applicable):
  - Philippines National Communications,
  - Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC),
  - IPCC 2006 Guidelines,
  - Guidelines for developing local action plans in Japan,
  - Kitakyushu case study (New Green Frontier Plan, etc.)

Spreadsheets for Calculation

For data input
Goal of our Project

Three components are incorporated into the LCCAP of Davao City.

GHG Inventory
- Davao City gov. determines the assessment boundaries and collect necessary information and data for accounting.
- IGES provides technical assistance for developing a GHG inventory.

Mitigation Options
- Davao City gov. collects information on mitigation options which are being or to be implemented for a different purpose.
- IGES and Kitakyushu City share ideas of potential mitigation options for Davao City (e.g., JCM projects).
- Know-how on implementation and management is shared between two cities.

Adaptation Measures
- Davao City gov., Ateneo De Davao University and IGES work together on the adaptation measures.

Collaboration among Three Entities
Expected Outputs & Outcome of the Project

- LCCAP, which includes the information on GHG inventory, mitigation options and adaptation measures, is published.
- Mitigation measures of climate change are mainstreamed into local policies and measures in Davao City in addition to adaptation measures.
- Institutional arrangement is established for sustainable development and implementation of the LCCAP.
- Low-carbon city is created through the implementation of mitigation actions placed in the LCCAP.
- Achievements can be appealed in and outside of the Philippines. (City branding)

Proposed Schedule

Subject of change upon discussion with Davao City government

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Training Workshop in Japan

Scenes from workshop held last year

Thank you for your attention!
### Required data for GHG inventory

**Note:** One method should be selected out of two options for mobile combustion and solid waste disposal.

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<table>
<thead>
<tr>
<th>Option 2 (Fuel consumption)</th>
<th>Tab</th>
<th>Application if Using Fuel Consumption-Based Method</th>
<th>Annual Fuel Consumption or Fuel Sold by Fuel Supplier Units</th>
<th>Data Uncertainty</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community-Level Mobile Combustion (Scope 1 Activity Data)</td>
<td>Mobile combustion - all applications</td>
<td>100% Biodiesel</td>
<td>litres</td>
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<td></td>
<td></td>
<td>Aviation Gasoline</td>
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<td></td>
<td></td>
<td>Biodiesel/Diesel</td>
<td>litres</td>
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<td>E85</td>
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<td></td>
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<td>Ethanol</td>
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<td></td>
<td>Gasoline/Petrol</td>
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<td></td>
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<td></td>
<td></td>
<td>Jet Fuel</td>
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<td></td>
<td></td>
<td>LNG</td>
<td>litres</td>
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<td></td>
<td>LPG</td>
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<td>On-Road Diesel Fuel</td>
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<td>Residual Fuel O1 (1s, 5s and 6s)</td>
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<table>
<thead>
<tr>
<th>Electricity</th>
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<th>Application if Using Fuel Consumption-Based Method</th>
<th>Annual Fuel Consumption or Fuel Sold by Fuel Supplier Units</th>
<th>Data Uncertainty</th>
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<tbody>
<tr>
<td>Residential Electricity Consumption (Scope 2 Activity Data)</td>
<td>Residential-electricity consumption</td>
<td>Actual Annual Electricity Consumption kWh</td>
<td>kWh</td>
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<tr>
<td>Non-Residential Data</td>
<td>Commercial Electricity Consumption (Scope 2 Activity Data)</td>
<td>Commercial electricity consumption</td>
<td>Actual Annual Electricity Consumption kWh</td>
<td>kWh</td>
</tr>
<tr>
<td>All Other (Scope 2 Activity Data (e.g. MRT, Streetlights, etc.))</td>
<td>Other</td>
<td>Actual Annual Electricity Consumption kWh</td>
<td>kWh</td>
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</table>

<table>
<thead>
<tr>
<th>Agriculture</th>
<th>Tab</th>
<th>Application if Using Fuel Consumption-Based Method</th>
<th>Annual Fuel Consumption or Fuel Sold by Fuel Supplier Units</th>
<th>Data Uncertainty</th>
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</thead>
<tbody>
<tr>
<td>Agriculture-Crops Activity Data</td>
<td>Agriculture-Crops Data</td>
<td>Rice (Dry Season, Irrigated)</td>
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<tr>
<td>Agriculture-Crops Activity Data</td>
<td>Agriculture-Crops Data</td>
<td>Rice (Dry Season, Rainfed)</td>
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</table>
### Solid waste

**Option 1** (IPCC-FOD)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Data Uncertainty</th>
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</thead>
<tbody>
<tr>
<td>Total Solid Waste (Actual) for District/Barangay</td>
<td>t</td>
<td></td>
</tr>
<tr>
<td>Fraction of Total Solid Waste Sent for Anaerobic Digestion</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>% of Total Solid Waste Open Burned</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Total Solid Waste Open Burned</td>
<td>t</td>
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</table>

**Option 2** (ICLEI)

<table>
<thead>
<tr>
<th>Activity &amp; Parameter</th>
<th>Units</th>
<th>Data Uncertainty</th>
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<tbody>
<tr>
<td>Total Solid Waste (Actual) for District/Barangay</td>
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</tr>
<tr>
<td>Fraction of Total Solid Waste Sent for Anaerobic Digestion</td>
<td>%</td>
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</tr>
<tr>
<td>% of Total Solid Waste Open Burned</td>
<td>%</td>
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</tr>
<tr>
<td>Total Solid Waste Open Burned</td>
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### Forestry

<table>
<thead>
<tr>
<th>Activity &amp; Parameter</th>
<th>Units</th>
<th>Data Uncertainty</th>
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<tbody>
<tr>
<td>Wood Harvesting</td>
<td>t</td>
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<tr>
<td>Charcoal</td>
<td>t</td>
<td></td>
</tr>
<tr>
<td>Construction</td>
<td>t</td>
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<tr>
<td>Novelties</td>
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### Industrial processes

<table>
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<th>Activity &amp; Parameter</th>
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<th>Data Uncertainty</th>
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<tbody>
<tr>
<td>Chemical Industry</td>
<td>NO</td>
<td></td>
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<tr>
<td>Ammonia Production</td>
<td>t</td>
<td></td>
</tr>
<tr>
<td>Category</td>
<td>Subcategory</td>
<td></td>
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<tr>
<td>--------------------------------</td>
<td>-----------------------------------------------------------------------------</td>
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<tr>
<td>Metal industry - Yes</td>
<td>Iron and Steel Production from Integrated Facilities</td>
<td></td>
</tr>
<tr>
<td>Electronics Industry</td>
<td>Integrated Circuit or Semiconductor</td>
<td></td>
</tr>
<tr>
<td>Others</td>
<td>Pulp and Paper Industry</td>
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</table>

- Soda Ash Production
- Petrochemical and Carbon Black Production - Methanol
- Petrochemical and Carbon Black Production - Ethylene
- Petrochemical and Carbon Black Production - Ethylene Dichloride and Vinyl Chloride Monomer
- Petrochemical and Carbon Black Production - Ethylene Oxide
- Petrochemical and Carbon Black Production - Acrylonitrile
- Petrochemical and Carbon Black Production - Carbon Black
- Iron and Steel Production from Non-integrated Facilities
- TFT Flat Panel Display
- Photovoltaics
- Heat Transfer Fluid
- Food and Beverages Industry
- Other
Project to realize low carbon society in Davao City through a support for a development of Local Climate Action Plan

Program for the Training Workshop on Local GHG Inventory

Date: 6 (Tue) – 8 (Thu) November 2018
Place: Station Hotel Kokura (1-1-1, Asano, Kokura-kita-ku, Kitakyushu City, Japan)
Invitees: 5 representatives from Davao City government and relevant stakeholders
Objectives: To learn Kitakyushu’s practice on the LCCAP development;
To visit the sites where Kitakyushu’s mitigation measures are implemented.

<table>
<thead>
<tr>
<th>Date</th>
<th>Actions</th>
<th>Venue</th>
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<tbody>
<tr>
<td>11/5 (Mon)</td>
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<tr>
<td>09:30</td>
<td>Fly from Davao to Fukuoka</td>
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</tr>
<tr>
<td>09:35</td>
<td>Move from Fukuoka to Station Hotel Kokura</td>
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<tr>
<td>11/6 (Tue)</td>
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<tr>
<td>09:00</td>
<td>Opening remarks (IGES)</td>
<td>Hotel 5F Kazashi</td>
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<tr>
<td>09:35</td>
<td>Explanation of the overview of training course (IGES)</td>
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</tr>
<tr>
<td>10:00</td>
<td>Self-introduction by participants</td>
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</tr>
<tr>
<td>10:00</td>
<td><strong>Lecture: Low-carbon city development – Kitakyushu’s energy strategy – (City of Kitakyushu)</strong></td>
<td></td>
</tr>
<tr>
<td>12:00</td>
<td>Lunch</td>
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<tr>
<td>14:00</td>
<td><strong>Lecture: LCCAP development including GHGI (City of Kitakyushu)</strong></td>
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<tr>
<td>15:30</td>
<td>Break</td>
<td></td>
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<tr>
<td>15:40</td>
<td><strong>Presentation: Overview of master plan &amp; LCCAP (Davao)</strong></td>
<td></td>
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<tr>
<td>15:40</td>
<td>Discussion</td>
<td></td>
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<tr>
<td>17:00</td>
<td>End of the day</td>
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<tr>
<td>17:30</td>
<td><strong>Reception (Agura)</strong></td>
<td>Kajimachi 1-2-3</td>
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<tr>
<td>11/7 (Wed)</td>
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<td>09:30</td>
<td><strong>Lecture: How to estimate GHG emissions (IGES)</strong></td>
<td>Hotel 5F Kazashi</td>
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<tr>
<td>11:00</td>
<td><strong>Hands-on training: Calculation by participants</strong></td>
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<tr>
<td>12:00</td>
<td>Lunch</td>
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<tr>
<td>13:30</td>
<td><strong>Hands-on training: Calculation by participants (Cont.) &amp; presentations on the results of GHG emissions by participants</strong></td>
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<tr>
<td>15:00</td>
<td>Break</td>
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<tr>
<td>15:20</td>
<td><strong>Discussion: Future development of JCM projects in Davao (IGES)</strong></td>
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<td>17:00</td>
<td>End of the day</td>
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<tr>
<td>11/8 (Thu)</td>
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<tr>
<td>09:30</td>
<td><strong>Site visit: Kogasaki waste-to-energy facility, Honjo can and bottle recycling center</strong></td>
<td>Kogasaki, Honjo</td>
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<tr>
<td>12:30</td>
<td>Lunch</td>
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<tr>
<td>13:30</td>
<td><strong>Overall discussions</strong></td>
<td>Hotel 4F Katsuyama</td>
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<tr>
<td>15:00</td>
<td>Closing remarks (Asian Center for Low Carbon Society)</td>
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<td>11/9 (Fri)</td>
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<tr>
<td>Move from Station Hotel Kokura to Fukuoka</td>
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<tr>
<td>Fly from Fukuoka to Davao</td>
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Project to realize low carbon society in Davao City through a support for a development of Local Climate Action Plan

**Training Workshop on Local GHG Inventory - List of Participants**

6 (Tue) – 8 (Thu) November 2018, Station Hotel Kokura

<table>
<thead>
<tr>
<th>Davao City</th>
<th>Name</th>
<th>Job title</th>
<th>Affiliation</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Ms Bing Dela Victoria</td>
<td>Economist IV</td>
<td>City Planning Development Office (CPDO)</td>
</tr>
<tr>
<td></td>
<td>Ms Jo Ann Esguerra</td>
<td>Project Evaluation Officer III</td>
<td>City Planning Development Office (CPDO)</td>
</tr>
<tr>
<td></td>
<td>Ms Melody Samuya Dapusala</td>
<td>Engineer II</td>
<td>Davao City Environment and Resources Office (CENRO)</td>
</tr>
<tr>
<td></td>
<td>Mr Rodrigo Camarista Bustillo</td>
<td>Local DRRM Officer III</td>
<td>Disaster Risk Reduction Management Office (DRRMO)</td>
</tr>
<tr>
<td></td>
<td>Mr Lyndon Leovic Leal Ancajas</td>
<td>Local DRRM Officer II</td>
<td>Disaster Risk Reduction Management Office (DRRMO)</td>
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<table>
<thead>
<tr>
<th>City of Kitakyushu (International Environmental Economic Affairs Department, Environment Bureau)</th>
<th>Name</th>
<th>Job title</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mr Michiya Hirayama</td>
<td>Assistant Manager</td>
<td>Regional Energy Promotion Division</td>
</tr>
<tr>
<td></td>
<td>Mr Yosuke Mitoma</td>
<td>Assistant Manager</td>
<td>Global Warming Prevention Division</td>
</tr>
<tr>
<td></td>
<td>Mr Yasuhiko Takatsuka</td>
<td>Manager</td>
<td>Kitakyushu Asian Center for Low Carbon Society</td>
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<table>
<thead>
<tr>
<th>Institute for Global Environmental Strategies (IGES)</th>
<th>Name</th>
<th>Job title</th>
<th>Affiliation</th>
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<tbody>
<tr>
<td></td>
<td>Mr Shiko Hayashi</td>
<td>Programme Director</td>
<td>Kitakyushu Urban Centre</td>
</tr>
<tr>
<td></td>
<td>Ms Junko Akagi</td>
<td>Research Manager</td>
<td>Kitakyushu Urban Centre</td>
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<tr>
<td></td>
<td>Ms Shino Horizono</td>
<td>Programme Coordinator</td>
<td>Kitakyushu Urban Centre</td>
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<tr>
<td></td>
<td>Ms Larissa de Miranda Alem</td>
<td>Intern</td>
<td>Kitakyushu Urban Centre</td>
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</table>
Training Workshop on Local GHG Inventory

Orientation

Junko Akagi
Research Manager
Kitakyushu Urban Centre

06-08 Nov. 2018

ORGANIZERS

ORGANIZER
• Institute for Global Environmental Strategies (IGES)

MAIN COLLABORATOR
• Kitakyushu City Government

SPONSERSHIP
• Ministry of the Environment, Japan (MOEJ)
Project to realize low carbon society in Davao City through a support for a development of Local Climate Action Plan

- A development of GHG inventory (supported by IGES)
- A development of mitigation measures (supported by Kitakyushu City and IGES)
- A development of adaptation measures (supported by Ateneo De Davao Uni.)

An implementation of concrete mitigation measures

Study on a feasibility of renewable energy project (for JCM model project)
- Waste-to-Energy (WtE) project (Nippon Steel & Sumikin Engineering Co., Ltd.)
- Feasibility study on other low-carbon projects (renewable energy and energy saving projects)
- Coordination with related-stakeholders for an implementation, technical study, evaluation of the amount of CO2 reduction, etc.
- Supporting for a preparation of applying JCM model project

1. Kick-off meeting

- 15 May 2018, 9:30~12:00

- Participation from Davao City government:
  Mr. Domingo, Assistant City Administrator,
  Mr. Ivan Cortez, head of CPDO,
  Ms. Marvic Reyes, head of CENRO, and others

- Participation from Japan side:
  Mr. Yoshiaki Miwa, Counsellor & Director of Consular Office in Davao Embassy of Japan

- Meeting with Vice Mayor Bernie Al-ag followed by the kick-off meeting.

- Prof. Doris Montecastro from Ateneo de Davao University

- In the afternoon, a workshop was held for CENRO staffs on the data collection for a GHG inventory.
2. Support for a LCCAP development

- Current LCCAP of Davao covers mainly adaptation aspect supported by UN-HABITAT.

- GHG inventory will be produced in line with the Community-Level GHG Inventory for Local Government Units (LGUs) in the Philippines (USAID)

- In Davao, CPDO, CENRO and other relevant departments are involved in the data collection process.

- Ateneo de Davao University supports Davao City government.

<table>
<thead>
<tr>
<th>Schedule for the project</th>
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<tbody>
<tr>
<td><strong>Schedule?</strong></td>
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<tr>
<td>2018</td>
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<tr>
<td>May</td>
</tr>
<tr>
<td>Kick-off MTG (Today)</td>
</tr>
<tr>
<td>Internal discussion 1</td>
</tr>
<tr>
<td>Data collection 1</td>
</tr>
<tr>
<td>Progress check</td>
</tr>
<tr>
<td>Data collection 2</td>
</tr>
<tr>
<td>Hands-on training in Japan</td>
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<tr>
<td>Emission estimation</td>
</tr>
<tr>
<td>Internal discussion 2</td>
</tr>
<tr>
<td>GHG inventory finalization</td>
</tr>
<tr>
<td>Consider mitigation options</td>
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<td>Documentation as LCCAP</td>
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<td>LCCAP finalization</td>
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<td>2019</td>
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<tr>
<td>May</td>
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<tr>
<td>MTG in Japan</td>
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OBJECTIVES

The training workshop aims to:

• learn Kitakyushu’s practice on the LCCAP development;
• learn how to estimate GHG emissions & emission reduction potential (MRV);
• learn overview of JCM scheme;
• visit the sites where Kitakyushu’s mitigation measures are implemented; and
• promote city-to-city collaboration for low-carbon, resilient and sustainable cities.

OUTLINE OF THE WORKSHOP

DAY 1
6 Nov.
Opening and introduction
Lecture: Low-carbon city development – Kitakyushu’s energy strategy –
Lecture: LCCAP development including GHG
Presentation by Davao City: Overview of master plan & LCCAP

* Social event: Reception

DAY 2
7 Nov.
Lecture: How to estimate GHG emissions & emission reduction potential
Discussion: Future development of JCM projects in Davao

DAY 3
8 Nov.
Site visit: Kogasaki WtE facility, Honjo can and bottle recycling center
Overall discussion, wrap-up and closing
## WELCOME TO KITAKYUSHU!

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<tr>
<td>Mr. Lyndon Leovic Leal Ancajas</td>
<td>Disaster Risk Reduction Management Office (DRRMO)</td>
</tr>
</tbody>
</table>
LOCAL CLIMATE CHANGE ACTION PLAN

Order of Presentation

I. Vulnerability Assessment
   - Exposure
   - Sensitivity
   - Adaptive Capacity
II. Key Adaptive Options
    - Social Sector
    - Economic Sector
    - Environment Sector
    - Infrastructure
    - Land Use
III. GHG Inventory: Davao City Experience
IV. Institutional Arrangement
V. Availability of GHG Indicators
VI. Issues and Concerns
V&AA: Determinants of Vulnerability

\[ \text{Vulnerability} = f(\text{Exposure}, \text{Sensitivity}, \text{Adaptive Capacity}) \]

CITY-WIDE EXPOSURE ANALYSIS
Climate Change Drivers and Biophysical Effects (Hazards)
Davao City is experiencing climate changes

**Changes in Average/means**
- Increasing Temperature
- Increase & Decrease in average rainfall

**Occurrence of Extreme Events**
- Increase in Temp. higher than 35°C
- Episodes of El Nino and La Nina
- Increase in Days without rain (dry days)
- Increase in Rainfall more than 150 mm

Source: PAGASA
Climate Change-Induced Hazards in Davao City

- Flooding
- Drought
- Rain-induced landslide
- Strong wind
- Sea level rise
- Monsoon waves
Flooding
Rain Induced Landslide

EXPOSURE
Monsoon Waves

Strong Wind
Drought

Sea level Rise
SENSITIVITY ANALYSIS

Five (5) Development Sectors

(a) Social
- Settlements in areas that are highly susceptible to hazards
- Informal settlers in danger zones
- Under privileged (PWD, children, senior citizens)
- Social/health/educational facilities in hazard areas

(b) Economic
- Agricultural crops/livestock
- Businesses/industries
- Tourism sites/attractions

(c) Environment
- Coastal/marine resources
- Flora and fauna habitat
- Water bodies

(d) Infrastructure
- Roads and bridges
- Water, power & Telecommunication facilities
- Irrigation system
- Transportation system (ports, terminals, etc.)
- Drainage system
- Public buildings (city hall, Market, etc.)

(e) Land Use
- Residential
- Commercial
- Industrial
- Institutional
- Agricultural
V&A: Determinants of Vulnerability

\[ \text{Vulnerability} = f(\text{Exposure, Sensitivity, Adaptive Capacity}) \]

ADAPTIVE CAPACITY ANALYSIS

- Wealth
- Information
- Technology
- Institution and Governance
- Social Capital
- Infrastructure
ADAPTIVE CAPACITY ANALYSIS

Wealth

- **Level of Education**
  - literacy rate of 98.30% in 2012
- **Employment Opportunities**
  - employment rate is at 92.54% of 2010
- **Investments for Health**

Information

- **DRRM Plan** (Davao City Risk Reduction Management Plan)
- **CIPH** (City-wide Investment Plan for Health)

Technology

- **182 barangays** have access to internet connection
- Established **Central 911** in similar to U.S and Canada, services are free 24 hours a day, 7 days a week.

Institution and Governance

A. Functional Committees:

- Local Health Board (LHB),
- Local School Board (LSB),
- Brgy. Risk Reduction & Management Council (BDRRMC)
- Davao City Disaster Risk Reduction & Management Council (DCDRRMC)
- Peace & Order Council

B. Programs

- Cash for Work
- Food for Work Programs
- Emergency Assistance Program was specially created to assist disaster victims in the city benefitting 16,674 families
- Collaboration between the DSWD & CSSDO
- Lingap sa Mahirap
- NGAs, NGOs, Sectoral Groups such as Women Federation, PWD Federation, Youth Federation, Solo Parents Federation, Religious Sector and other Civil Society Organization (CSOs)
- Shelter Code
Social Capital
- CSOs and POs
- Gawad Kalinga
- TUPAD or Tulong Pangkabuhayan
- Cooperatives and Banks
- Lending Institutions
- Labor pool has grown dramatically over the last 15 years
  - Unemployment rates in the city have dropped from 8.3% in 1995 to 6% in 2009.

Infrastructures
- 33 hospitals
- 538 Day Care Centers, 106 Home-Base, 1 Child-Minding Center for the children of government employees and 2 mobile ECCDs for the far-flung barangays and disaster affected areas.
- 428 Elementary schools 286 of these are public while 142 are private.
- A total of 151 Secondary schools (70 public and 81 are privately owned.
- 97% of 270,638 households have access to safe drinking water (2010)
- 82.69% have access to sanitary toilet.
- Identified Evacuation Centers:
  - 72 covered courts/gyms
  - 14 Brgy. Hall/ Multi-Purpose Hall
  - 5 chapels/ churches
  - 9 Day Care Centers
  - 9 Government-owned infrastructures.

Social Capital
- Infrastructure

KEY ADAPTATION OPTIONS
Intro to: Key Issues Identified, Objective Setting, Options ID

Social Sector

<table>
<thead>
<tr>
<th>OBJECTIVES</th>
<th>ADAPTATION OPTIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>PROGRAMS</td>
</tr>
<tr>
<td>1. To ensure a safer, adaptive and resilient shelter to families living in high risk areas.</td>
<td>1. Local Shelter Plan</td>
</tr>
<tr>
<td>2. To promote awareness among families on climate change adaptation (CCA)</td>
<td>1. Barangay based information dissemination</td>
</tr>
</tbody>
</table>
### Economic Sector

#### Objectives
- **To improve economic governance that support entrepreneurship, business and industry promotions**
  - 1. Financial assistance to open opportunities that will give access to wealth and credit
  - 2. Make available technologies that will improve their capabilities in adapting to climate change

- **To strengthen institutional support structures for the development of start up and existing MSMEs**
  - 1. Infrastructure support systems that are resilient to climate change
  - 2. Upgrading of existing infrastructure to support marketing of MSMEs

- **To strengthen agricultural support to farmers**
  - 1. Increase awareness of farmers to climate change adaptation thru establishing alternative farming system as a new technology
  - 2. Establish nurseries to reinforce production

#### Adaptation Options

<table>
<thead>
<tr>
<th>Economic Sector</th>
<th>Program</th>
<th>Projects</th>
<th>Legislations</th>
</tr>
</thead>
<tbody>
<tr>
<td>To improve economic governance that support entrepreneurship, business and industry promotions</td>
<td>To improve economic governance that support entrepreneurship, business and industry promotions</td>
<td>1. Financial assistance to open opportunities that will give access to wealth and credit</td>
<td>1. Adoption of the MSME Plan thru an ordinance</td>
</tr>
<tr>
<td>To strengthen institutional support structures for the development of start up and existing MSMEs</td>
<td>To strengthen institutional support structures for the development of start up and existing MSMEs</td>
<td>1. Infrastructure support systems that are resilient to climate change</td>
<td>1. Establishment of Barangay Disaster Risk Reduction Management Councils 2. Drafting of IRR for the implementation of the Organic Farming ordinance</td>
</tr>
<tr>
<td>To strengthen agricultural support to farmers</td>
<td>To strengthen agricultural support to farmers</td>
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<td>1. Establishment of Barangay Disaster Risk Reduction Management Councils 2. Drafting of IRR for the implementation of the Organic Farming ordinance</td>
</tr>
</tbody>
</table>

### Environment Sector

#### Objectives
- **Sea-level Rise**
  - Install / Enhance capacity to monitor sea-level rise in the city as part of an island-wide network
  - Establish protection zone
  - Minimize saltwater intrusion

- **Drought**
  - Enhance / Increase recharge rate of aquifers / Minimize extraction rate

- **General**
  - Minimize green-house gas emissions
  - Increase use of renewable energy in the city

#### Adaptation Options

<table>
<thead>
<tr>
<th>Environment Sector</th>
<th>Program</th>
<th>Projects</th>
<th>Legislations</th>
</tr>
</thead>
<tbody>
<tr>
<td>To improve economic governance that support entrepreneurship, business and industry promotions</td>
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<td>To strengthen agricultural support to farmers</td>
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<td>1. Establishment of Barangay Disaster Risk Reduction Management Councils 2. Drafting of IRR for the implementation of the Organic Farming ordinance</td>
</tr>
<tr>
<td>Establish protection zone</td>
<td>Establish protection zone</td>
<td>Environment Management Program</td>
<td>1. Set-back zone / buffer zone Delineation 2. Beach Reforestation Project</td>
</tr>
<tr>
<td>Increase / Enhance recharge rate of aquifers / Minimize extraction rate</td>
<td>Increase / Enhance recharge rate of aquifers / Minimize extraction rate</td>
<td>Water Conservation / Management Program</td>
<td>1. Surface water development 2. River easement protection 3. Strict implementation of rain-harvesting ordinance</td>
</tr>
<tr>
<td>Drought</td>
<td>Drought</td>
<td>Environment Management Program</td>
<td>1. Biodiversity inventory project 2. Reforestation project</td>
</tr>
<tr>
<td>General</td>
<td>General</td>
<td>Environment Management Program</td>
<td>1. Intensify implementation of Anti-Smoke Belching Ordinance</td>
</tr>
<tr>
<td>Minimize green-house gas emissions</td>
<td>Minimize green-house gas emissions</td>
<td>Environment Management Program</td>
<td>1. Intensify implementation of Anti-Smoke Belching Ordinance</td>
</tr>
</tbody>
</table>
## Infrastructure Sector

### Objectives

<table>
<thead>
<tr>
<th>Flooding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. To provide climate change resilient flood protection infrastructures without compromising the natural water flow system.</strong></td>
</tr>
<tr>
<td>- Formulation of an Updated DRAINAGE MASTERPLAN</td>
</tr>
<tr>
<td>- Implementation of the required buffer/easement zones for rivers, creeks and coastlines</td>
</tr>
<tr>
<td>- Development of drainage system's engineering design to manage risks from natural hazards and climate change</td>
</tr>
<tr>
<td><strong>2. To provide adequate, safe and potable water supply to all Davao City residents (both rural and urban).</strong></td>
</tr>
<tr>
<td>- Management of the development of projects and activities that pose danger to the city's water resources.</td>
</tr>
<tr>
<td>- Strict implementation of Rain Water Harvesting Ordinance which will provide additional water resources and easing the pressure of groundwater extraction</td>
</tr>
<tr>
<td>- Monitoring of Level II water system from spring, rivers and deep wells sources that were installed to rural barangays.</td>
</tr>
<tr>
<td>- Provision of Level II Water System to all outlying district or barangays short of such utility.</td>
</tr>
<tr>
<td>- Conservation undertakings for all watershed areas</td>
</tr>
</tbody>
</table>

### Adaptation Options

<table>
<thead>
<tr>
<th>Programs</th>
<th>Projects</th>
<th>Legislations</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Formulation of an Updated DRAINAGE MASTERPLAN</td>
<td>- Inventory of storm drainage system on engineering design vis a vis holding capacity of runoff water.</td>
<td></td>
</tr>
<tr>
<td>- Implementation of the required buffer/easement zones for rivers, creeks and coastlines</td>
<td>- Construction of Concrete Revetment Bank Protection</td>
<td></td>
</tr>
<tr>
<td>- Development of drainage system’s engineering design to manage risks from natural hazards and climate change</td>
<td>- Rehabilitate and improve all existing drainage structures</td>
<td></td>
</tr>
<tr>
<td>- Monitoring of Level II water system from spring, rivers and deep wells sources that were installed to rural barangays.</td>
<td>- Maintenance of drainage canals by desilting &amp; decllogging.</td>
<td></td>
</tr>
<tr>
<td>- Provision of Level II Water System to all outlying district or barangays short of such utility.</td>
<td>- All development structures should be assessed to ensure flow alterations are acceptable in relation to flood risk and environmental flows.</td>
<td></td>
</tr>
<tr>
<td>- Conservation undertakings for all watershed areas</td>
<td>- Non-buildable areas to slope and areas with geo-hazards</td>
<td></td>
</tr>
</tbody>
</table>

### Sea-level Rise/Monsoon Waves

<table>
<thead>
<tr>
<th>Flooding</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. To provide protective infrastructure facilities that are resistant to potential climate change hazards and pursues to maintain the natural flow of the city's drainage system.</strong></td>
</tr>
<tr>
<td>- Crafting of a Sea-Level Rise profile of Davao City</td>
</tr>
<tr>
<td>- Updating of 1998 Drainage Master plan</td>
</tr>
<tr>
<td>- Installation of equipment/tool to monitor sea level rise</td>
</tr>
<tr>
<td>- Rehabilitate and improve existing sea walls</td>
</tr>
<tr>
<td>- Construction of additional sea walls</td>
</tr>
<tr>
<td>- Fastract the implementation of the Sasa Port Upgrading master plan</td>
</tr>
<tr>
<td>- Improve outfall structures, and provide flap gates</td>
</tr>
<tr>
<td>- Realign outfall in higher elevated areas to other waterways in the low lying parts (overflow weirs)</td>
</tr>
<tr>
<td><strong>2. To provide protective infrastructure facilities that are resistant to potential climate change hazards and pursues to maintain the natural flow of the city's drainage system.</strong></td>
</tr>
<tr>
<td>- Identification and prioritize additional electricity transmission lines, substations and auxiliary infrastructure required supporting the preferred pattern of development.</td>
</tr>
<tr>
<td>- Prioritize grid infrastructure development and reinforcement to ensure the massive uptake of Renewable energy technologies.</td>
</tr>
<tr>
<td>- Restoration/Re-opening/Re-establishment of natural waterways/creeks traversing private properties</td>
</tr>
<tr>
<td>- Strict implementation of the required buffer zones on the rivers, creeks and beaches</td>
</tr>
</tbody>
</table>

### ADAPTIVE CAPACITY
### Land Use Sector

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Adaptation Options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sea-level Rise</strong></td>
<td>Programs</td>
</tr>
<tr>
<td>Establish protection zone</td>
<td>Environment Management Program</td>
</tr>
<tr>
<td>Minimize saltwater intrusion</td>
<td></td>
</tr>
<tr>
<td><strong>Drought</strong></td>
<td></td>
</tr>
<tr>
<td>Enhance / increase vegetation or forest cover for wildlife (flora and fauna)</td>
<td>Environment Management Program</td>
</tr>
<tr>
<td><strong>General</strong></td>
<td></td>
</tr>
<tr>
<td>Enhance adaptation plan (to be adaptive)</td>
<td></td>
</tr>
</tbody>
</table>

### GHG Inventory

- Estimates of all emissions and removals of greenhouse gases (GHG) from given sources or sinks from a defined region in a specific period of time (IPCC, 2015).
- Help identify the major source of air pollution so that mitigation measures can be made.

### EMISSION SOURCES

#### Area Sources
- Commercial Cooking
- Generator Sets
- Landfill
- Residential Cooking
- Residential Lighting
- Agricultural Lands

#### Point Sources
- Coal
- Bunker
- Low Sulphur Fuel Oil
- Wood
- Power plant
- Cement

#### Mobile Sources
- Jeepney
- Motorcycle
- Tricycle
- Taxi
- Utility Vehicles (UV)
- Sports Utility Vehicles (SUV)
- Car
- Light Duty Vehicles (LDV)
- Truck, Trailer
SUMMARY OF ACTIVITY DATA

<table>
<thead>
<tr>
<th>Area Sources</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>From Landfill, Commercial &amp; Residential Cooking</td>
<td>214,056</td>
<td>metric tons/year</td>
</tr>
<tr>
<td>Generator Sets</td>
<td>17,724,574</td>
<td>liters/year</td>
</tr>
<tr>
<td>Agricultural Lands</td>
<td>91,082</td>
<td>hectares</td>
</tr>
<tr>
<td>Forest Cover</td>
<td>134,380</td>
<td>hectares</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Point Sources</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coal &amp; Wood</td>
<td>1,117,011</td>
<td>metric tons/year</td>
</tr>
<tr>
<td>LSFO &amp; Bunker</td>
<td>17,247,459</td>
<td>liters/year</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mobile Sources</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Kilometers Travelled (VKT)</td>
<td>2,859,368,067</td>
<td>kilometers</td>
</tr>
<tr>
<td>Total Idling Time</td>
<td>57,762,702</td>
<td>hours</td>
</tr>
</tbody>
</table>

GHG Emissions

- CO2: 25,829,211 metric tonnes
- N2O: 709 metric tonnes
- CH4: 125,071 metric tonnes
GHG Emissions

TOTAL CO2 EMISSIONS = 28,675,586 metric tonnes

DAVAO CITY CORE TEAM

LCCAP
CMO - CadO
CPDO Coordinating

GHG Inventory
CENRO

Mitigation
DRRM

Adaptation
CPDO

Coordinator
CENRO Officer In-Charge

Stationary Combustion CPDO
Mobile Combustion CPDO
Electricity CPDO
Agriculture CAgrO
Solid Waste CENRO
Waste Water CENRO
Forestry DRRM
Industrial Processes CPDO
## INVENTORY OF DATA

### STATIONARY COMBUSTION

<table>
<thead>
<tr>
<th>SECTOR/SUB-SECTOR</th>
<th>APPLICATIONS</th>
<th>AVAILABLE DATA</th>
<th>SOURCE OF DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Residential</td>
<td>Cooking</td>
<td>No. of HHs by type of cooking, 2010</td>
<td>PRA-CPDO</td>
</tr>
<tr>
<td>• Commercial</td>
<td></td>
<td>No. of commercial establishments/business lines</td>
<td>PRA-CPDO</td>
</tr>
<tr>
<td>Generators</td>
<td></td>
<td>No. of HHs using generator for energy, 2015</td>
<td>PRA-CPDO</td>
</tr>
<tr>
<td>Lighting</td>
<td></td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td>HVAC</td>
<td></td>
<td>No data available</td>
<td></td>
</tr>
</tbody>
</table>

### MOBILE COMBUSTION

<table>
<thead>
<tr>
<th>SECTOR/SUB-SECTOR</th>
<th>APPLICATIONS</th>
<th>AVAILABLE DATA</th>
<th>SOURCE OF DATA</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Option I – Distance</td>
<td>Buses</td>
<td>Registered public &amp; private vehicles, by type 2017</td>
<td>CPDO, LTO, LTFRB</td>
</tr>
<tr>
<td>(Community Mobile Combustion)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heavy Duty Vehicles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Light Goods Vehicle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motorbike</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Passenger Car</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SECTOR/SUB-SECTOR</td>
<td>APPLICATIONS</td>
<td>AVAILABLE DATA</td>
<td>SOURCE OF DATA</td>
</tr>
<tr>
<td>-------------------</td>
<td>--------------</td>
<td>----------------</td>
<td>---------------</td>
</tr>
<tr>
<td>Option II – Fuel Consumption (Community Mobile Combustion)</td>
<td>All applications</td>
<td>No data available</td>
<td></td>
</tr>
<tr>
<td><strong>ELECTRICITY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residential Electricity Consumption</td>
<td></td>
<td>Annual energy production, 2017</td>
<td>CPDO</td>
</tr>
<tr>
<td>Commercial Electricity Consumption</td>
<td></td>
<td>Annual energy consumption per category, 2017</td>
<td>CPDO</td>
</tr>
<tr>
<td><strong>AGRICULTURE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td></td>
<td>All types of crop production, in hectare, 2017</td>
<td>CPDO, CAgRO</td>
</tr>
<tr>
<td>Livestock</td>
<td></td>
<td>No. of heads, 2017</td>
<td>CPDO, CAgRO</td>
</tr>
<tr>
<td><strong>SOLID WASTE</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Option 1</td>
<td></td>
<td>Volume of garbage collected at Sanitary Landfill, by category, 2017</td>
<td>CENRO</td>
</tr>
<tr>
<td>Solid Waste Disposal Parameters (IPCC-Intergovernmental Panel on Climate Change FOD Method)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solid Waste Disposal Methane Factor (MCF) Calculate Distribution of Waste Management Type</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MSW Activity Data Input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WASTEWATER</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wastewater</td>
<td></td>
<td>No available data</td>
<td></td>
</tr>
<tr>
<td><strong>FORESTRY</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Forestry Emission</td>
<td></td>
<td>Data requirement very specific at Barangay level, figures not available. Wood for fuel trading is an informal economic activity</td>
<td>DENR</td>
</tr>
<tr>
<td>Forestry Removal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>INDUSTRIAL PROCESSES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emission</td>
<td></td>
<td>No. of establishments engaged in industrial activities</td>
<td>Business Bureau</td>
</tr>
</tbody>
</table>
ISSUES AND CONCERNS:

• Need to strengthen institutional arrangements. (Executive Order/ Memo for TWG)

• Need to strengthen arrangements by academe/partners in sharing data/technology.

• Inavailability of required data.

• Need for standard units of measure in quantifying GHG emissions for proxy indicators.

• Need for capacity building of TWG on GHG emission inventory.

Daghang Salamat!

ありがとうございます
Workshop on Greenhouse Gas Inventory Development of Davao City

Date: Jan 22nd 2019 (Tuesday)  
Time: 9:30～11:45  
Venue: City Accountant's Conference Room

<table>
<thead>
<tr>
<th>No</th>
<th>Time</th>
<th>Programme</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>9:30～9:35</td>
<td>Opening remarks</td>
<td>Mr. Ivan Cortes Head, City Planning and Development Office, Davao City</td>
</tr>
<tr>
<td>2</td>
<td>9:35～9:40</td>
<td>Opening remarks</td>
<td>Mr. Yasuhiko Takatsuka Deputy Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu</td>
</tr>
<tr>
<td>3</td>
<td>9:40～9:50</td>
<td>Photo session</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>9:50～10:20</td>
<td>Current situation of an development of GHGI of Davao City: Progress and Challenges</td>
<td>Ms. Melody S. Dapusala City Environment and Natural Resources Office (CENRO), Davao City</td>
</tr>
<tr>
<td>5</td>
<td>10:20～10:50</td>
<td>Introduction of an guideline for local GHGI development and other cities’ experiences on GHGI development in the Philippines</td>
<td>Ms. Sandee G. Recabar Implementation Oversight Division, Climate Change Commission of the Philippines</td>
</tr>
<tr>
<td>6</td>
<td>10:50～11:40</td>
<td>Q&amp;A and discussions on GHGI development of Davao City</td>
<td>Facilitator: Dr. Junko Akagi, Research Manager, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES)</td>
</tr>
<tr>
<td>7</td>
<td>11:40～11:45</td>
<td>Closing Remarks</td>
<td>Mr. Tristan D. Domingo Assistant City Administrator, Davao City</td>
</tr>
</tbody>
</table>

*The kick-off meeting will be held in English (A consecutive translator between English and Japanese will be available)*
List of participants

- Mr. Tristan D. Domingo, Assistant City Administrator, Davao City
- Mr. Ivan Cortes, Head, City Planning and Development Office, Davao City
- Ms. Melody S. Dapusala, City Environment and Natural Resources Office (CENRO), Davao City
- Dr. Doris B. Montecastro, Chairperson, Environmental Science Department, Ateneo de Davao University and other relevant staffs from Davao City
- Ms. Sandee G. Recabar, Implementation Oversight Division, Climate Change Commission of the Philippines
- Mr. Shiko Hayashi, Programme Director, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES)
- Ms. Junko Akagi, Research Manager, Kitakyushu Urban Centre, Institute for Global Environmental Strategies (IGES)
- Mr. Yasuhiko Takatsuka, Deputy Director, Kitakyushu Asian Center for Low Carbon Society, Environment Bureau, City of Kitakyushu
- Mr. Noboru Kawai, Senior Manager, Nippon Steel & Sumikin Engineering Co., Ltd. / Representative of Davao Office, PNS Construction, Inc.
- An interpreter
DAVAO CITY
GREENHOUSE GAS INVENTORY (GHGI)
PROGRESS AND CHALLENGES

BACKGROUND:

- November 28, 2017 Memorandum of Understanding (MOU) between Davao City and Kitakyushu City.
- May 15, 2018 City to City Collaboration kick-off meeting for LCCAP preparation.
- June 26, 2018; July 17, 2018... Series of GHGI Training Workshop conducted by Ateneo de Davao University.
- November 5 to 9, 2018 Training Workshop on Local GHGI in Kitakyushu City, Japan.
CHALLENGES:

- Need to strengthen institutional arrangements. (Executive Order/Memo for TWG)
- Need to strengthen arrangement by academe/partners in sharing data/technology.
- Unavailability of required data.
- Need for capacity building of TWG on GHG emission inventory.

PROGRESS:

- Coordination with Ateneo de Davao University — done, awaiting feedback from ADDU.
- Draft Memorandum of Understanding between ADDU and Davao City Gov. — done.
- Executive Order No. 40, Series of 2018, signed by the City Mayor Sara Z. Duterte last December 28, 2018.
EXECUTIVE ORDER NO. 40  
Series of 2018

"AN ORDER CREATING A TECHNICAL WORKING GROUP (TWG) TO FACILITATE IN THE PREPARATION OF THE LOCAL CLIMATE ACTION PLAN OF DAVAO CITY FOCUSING ON GREENHOUSE GAS (GHG) INVENTORY, MITIGATION AND ADAPTATION."

WHEREAS, In November 28, 2017 a Memorandum of Understanding was signed creating a Green Sister City relationship between Davao City and the City of Kitakyushu. The objective of the Memorandum of Understanding is to establish Green Sister City Cooperation in order to promote and expand effective and mutually beneficial cooperation in the development of the two cities. The parties shall undertake to implement the MOU in accordance with the laws and regulation of their respective countries in the environment fields as follows:

a.) Low Carbon Society  
b.) Resource Recycling  
c.) Capacity Building for the Officials of each City  
d.) Other fields of cooperation as mutually agreed upon by the Parties in writing.

WHEREAS, a kick-off meeting of the City to City collaboration was conducted in May 15, 2018 at Grand MenSeng Hotel regarding the preparation of the Davao City Local Climate Change Action Plan (LCCAP);

WHEREAS, pursuant to Section 14 of Republic Act No. 9729 or also known as the Climate Change Act of 2009; the Local Government Units (LGU's) shall be the frontline agencies in the formulation, planning and implementation of climate change action plans in their respective areas;

WHEREAS, pursuant to Section 18 of Republic Act No. 7160 or the "Local Government Code of 1991" authorizes local government units to establish an organization that shall be responsible for the efficient and effective implementation of their development plans, programs, objectives and priorities;

NOW, THEREFORE, I, SARA Z. DUTERTÉ, Mayor of the City of Davao, by virtue of the powers vested in me by law, do hereby order the following:

SECTION 1. CREATION AND COMPOSITION. There is hereby created a TECHNICAL WORKING GROUP (TWG) to facilitate in the preparation of the Local Climate Action Plan of Davao City focusing on greenhouse gas (GHG) inventory, mitigation and adaptation.
The Technical Working Group (TWG) shall be composed of the following City Government of Davao (CGD) personnel:

Head - City Mayor's Office (CMO)
Permanent Representative - Assistant City Administrator for Administration (ACAdO)

Assistant Head - Office of the City Planning and Development Coordinator (OCPDC)

Members:
1. City Environment and Natural Resources Office (CENRO)
2. City Transport and Traffic Management Office (CTTMO)
3. City Engineer's Office (CEO)
4. City Agriculturist's Office (CAgO)
5. City Veterinarian's Office (CVO)
6. Disaster Risk and Reduction Management Office (DRRMO)
7. Department of Environment and Natural Resources – Environmental Management Bureau (DENR-EMB)
8. One (1) Representative from the Local Academe

For this purpose, the aforementioned offices shall name a permanent representative to the TWG herein created.

The City Administrator may hereinafter designate additional CGD employees and/or identify qualified personnel, including those under job order or contract of services, representatives from the academe, private sector and other stakeholders, to support the group herein created in preparation of the LCCAP.

SECTION 2. DUTIES AND FUNCTIONS. The Technical Working Group shall perform the functions as follows:

> Directly coordinate, collaborate and work with Japanese government representatives, national government offices, CGD agencies and private entities as may be required for the preparation of the LCCAP;
> Provide technical expertise and render administrative decision support to the City Mayor; and
> Manage the implementation schedule of the LCCAP preparation, data collection, reporting process, as well as document key decisions.

SECTION 3. FUNDING/OPERATING COSTS. All costs pertaining to the operation of the TWG shall be taken from the available funds of the City Government of Davao subject to the usual accounting and auditing rules and regulations.

SECTION 4. SUPPORT. All City Government of Davao (CGD) offices are hereby directed to provide their full and active support, and utmost cooperation to the preparation of the LCCAP focusing on Greenhouse Gas (GHG) inventory, mitigation and adaptation. The City Administrator and/or the respective heads of the offices to which the members of the TWG belong shall endeavor to allow the said members to prioritize the performance of their functions herein for the success of the plan.
All national government offices within the territorial jurisdiction of Davao City are likewise requested to extend their support and assistance to the endeavors of the TWG and the plan.

SECTION 5. SUNSET CLAUSE. The TWG shall function as a special unit that exists only for the duration of the LCCAP preparation and shall be discontinued thereafter, or as may be determined by the City Mayor.

SECTION 6. SEPARABILITY CLAUSE. If any provision of this Executive Order is declared invalid or unconstitutional, the other provisions not affected thereby shall remain valid and subsisting.

SECTION 7. REPEALING CLAUSE. All orders or parts thereof which are inconsistent with the provisions of this Executive Order are hereby repealed or modified accordingly.

SECTION 8. EFFECTIVITY. This Executive Order shall take effect immediately.

Done on __8 DEC 2016__ at Davao City, Philippines.

Attested by:

[Signature]
City Mayor

[Signature]
City Administrator

CMO-CRD
RELEASED
8 DEC 2016 4:00
April 5, 2018

MR. JAIME JOSE Y. ABOITIZ
President & Chief Executive Officer
Davao Light and Power Company (DLPC)
C. Bangoy Sr. St., Davao City

Sir:

Attached is a copy of Resolution No. 01927-18, with its corresponding Ordinance No. 0409-18, both Series of 2018, of the Sangguniang Panlungsod, City of Davao, for your information and guidance.

For and in the absence of the Secretary:

NILDA C. MÁNGNO
Acting Secretary to the Sangguniang Panlungsod
(Assistant Secretary to the Sangguniang Panlungsod)
Republic of the Philippines  
City of Davao  
Office of the Sangguniang Panlungsod

18th City Council  
8th Regular Session  
Series of 2018

PRESENT:

Councilor  Victorio U. Advincula Jr.  
Vice Mayor  Bernard E. Al-ag  
Councilor  Nilo M. Abellera Jr.  
Councilor  Maria Belen S. Acosta  
Councilor  Al Ryan S. Alejandro  
Councilor  Dante L. Apostol Sr.  
Councilor  Conrado C. Baluran  
Councilor  Ma. Cherry Ann M. Bonguyan  
Councilor  Pilar C. Braga  
Councilor  April Marie C. Dayap  
Councilor  January N. Duterte  
Councilor  Edgar P. Ibayan Jr.  
Councilor  Diosdado Angelo A. Mahipus Sr.  
Councilor  Bonifacio E. Militar  
Councilor  Avegayle Dalodo Ortiz  
Councilor  Antoinette G. Prinipe-Castrodes  
Councilor  J. Melchor B. Quitain Jr.  
Councilor  Haila Y. Sudagar  
Councilor  Mary Joselle D. Villafuerte  
Councilor  Jesus Joseph P. Zozobrado III

ON OFFICIAL BUSINESS:

Councilor  Danilo C. Dayanghirang  
Councilor  Rene Elias C. Lopez  
Councilor  Marissa P. Salvador-Abella

- Attended the Regional Assembly of the Philippine Councilors League-Zamboanga Peninsula  
- Davao City delegation on the study of the Solid Waste Management Program of Kitakyushu City, Japan  
- Attended the 1st Quarterly Meeting of the National Fisheries and Aquatic Resources Management Council (NFARMC)

ABSENT:

Councilor  Joanne M. Bonguyan-Quilos  
Councilor  Jimmy G. Dureza  
Councilor  Leah A. Librado-Yap

- On Maternity Leave  
- On Domestic Emergency Leave  
- On Domestic Emergency Leave

RESOLUTION NO. 01922-18  
Series of 2018

ENACTING AN ORDINANCE REQUIRING THE DAVAO LIGHT AND POWER COMPANY (DLPC) TO CONFORM WITH THE STREET LIGHTING EFFICIENCY PROGRAM OF THE CITY GOVERNMENT OF DAVAO THROUGH THE INSTALLATION OF LIGHT-EMITTING DIODES (LED) ON ALL STREET LIGHTING FACILITIES WITHIN THE TERRITORIAL JURISDICTION OF THE CITY OF DAVAO
WHEREAS, modern energy-efficient street lighting technology such as Light-Emitting Diodes (LED) provides lower energy consumption and maintenance cost as well as improve efficiency of the street lights in terms of road safety, environmental impact, and energy and cost effectiveness;

WHEREAS, the City is currently using Sodium Light Bulbs in all street lighting facilities within its territorial jurisdiction that consumed more energy compared to Light-Emitting Diodes (LED);

WHEREAS, there is a need to replace the existing sodium light bulbs to Light-Emitting Diodes (LED) in all street lighting facilities of the City of Davao in order to save energy consumption and improve light efficiency;

NOW THEREFORE, on motion of Councilor Diosdado Angelo A. Mahipus Sr., duly and jointly seconded by Councilors Pilar C. Braga, Edgar P. Ibuyan Jr., J. Melchor B. Quitain Jr., Mary Joselle D. Villafruete, Avegayle Dalodo Ortiz and Conrado C. Baluran, be it resolved, as it is hereby resolved, TO ENACT AN ORDINANCE REQUIRING THE DAVAO LIGHT AND POWER COMPANY (D LPC) TO CONFORM WITH THE STREET LIGHTING EFFICIENCY PROGRAM OF THE CITY GOVERNMENT OF DAVAO THROUGH THE INSTALLATION OF LIGHT-EMITTING DIODES (LED) ON ALL STREET LIGHTING FACILITIES WITHIN THE TERRITORIAL JURISDICTION OF THE CITY OF DAVAO;

RESOLVED FURTHER, that copies of this Resolution be furnished the Office of the City Mayor through the City Administrator's Office, the Vice Mayor's Office, Davao Light and Power Company (DLPC), the City Engineer's Office (CEO), the City Planning and Development Office (CPDO) and all other offices/departments concerned, for their information, guidance and appropriate action;

ADOPTED, February 27, 2018, by a unanimous vote of all the Members of the Sanggunian present, there being a quorum.

CERTIFIED CORRECT:

NILDA C. MAGNO
Assistant Secretary to the Sangguniang Panlungsod
(City Government Assistant Department Head II)

ATTESTED:

VICTORIO U. ADVINCULA JR.
City Councilor
Temporary Presiding Officer
ncm/jsdam
Republic of the Philippines  
City of Davao  
Office of the Sangguniang Panlungsod

18th City Council  
8th Regular Session  
Series of 2018

PRESENT:

- Councilor Victorio U. Advincula Jr.
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- Councilor Nilo M. Abellera Jr.
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- Councilor Al Ryan S. Alejandre
- Councilor Dante L. Apostol Sr.
- Councilor Conrado C. Baluran
- Councilor Ma. Cherry Ann M. Bonguyan
- Councilor Pilar C. Braga
- Councilor April Marie C. Dayap
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- Councilor Edgar P. Ibuyan Jr.
- Councilor Diosdado Angelo A. Mahipus Sr.
- Councilor Bonifacio E. Militar
- Councilor Avegayle Dalodo Ortiz
- Councilor Antoinette G. Principe-Castrodes
- Councilor J. Melchor B. Quitain Jr.
- Councilor Halila Y. Sudagar
- Councilor Mary Joselle D. Villafuerte
- Councilor Jesus Joseph P. Zozobrado III

- Temporary Presiding Officer

ON OFFICIAL BUSINESS:

- Councilor Danilo C. Dayanghirang
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- Councilor Rene Elias C. Lopez

- Councilor Marissa P. Salvador-Abella

ABSENT:

- Councilor Joanne M. Bonguyan-Quilos  - On Maternity Leave
- Councilor Jimmy G. Dureza  - On Domestic Emergency Leave
- Councilor Leah A. Librado-Yap  - On Domestic Emergency Leave

ORDINANCE NO. 0409-18  
Series of 2018

AN ORDINANCE REQUIRING THE DAVAO LIGHT AND POWER COMPANY (DLPC) TO CONFORM WITH THE STREET LIGHTING EFFICIENCY PROGRAM OF THE CITY GOVERNMENT OF DAVAO THROUGH THE INSTALLATION OF LIGHT-EMITTING DIODES (LED) ON ALL STREET LIGHTING FACILITIES WITHIN THE TERRITORIAL JURISDICTION OF THE CITY OF DAVAO
Be it ordained by the Sangguniang Panlungsod of Davao City in session assembled, that:

SECTION 1. TITLE - This Ordinance shall be known as "AN ORDINANCE REQUIRING THE DAVAO LIGHT AND POWER COMPANY (DLPC) TO CONFORM WITH THE STREET LIGHTING EFFICIENCY PROGRAM OF THE CITY GOVERNMENT OF DAVAO THROUGH THE INSTALLATION OF LIGHT-EMITTING DIODES (LED) ON ALL STREET LIGHTING FACILITIES WITHIN THE TERRITORIAL JURISDICTION OF THE CITY OF DAVAO."

SECTION 2. SHORT TITLE – This ordinance shall be known as the "LED ORDINANCE OF DAVAO CITY;"

SECTION 3. DEFINITION OF TERMS – As used in this Ordinance, the following terms are defined as follows:

a. Central Business District (CBD) – is the commercial and business center of the City. It is the City's financial district, city center or downtown historic district.

b. Installation – the act of putting something in place so that it is ready to use. For purposes of this Ordinance, installation includes the conversion into, replacement or the placing of new Light-Emitting Diodes (LED) lights.

c. High Pressure Sodium (HPS) Lamp – is a broad-spectrum gas-discharge lamp that uses sodium in an excited state to produce light at a characteristic wavelength near 589 nm.

d. Light-Emitting Diode (LED) Light – is a two-lead semi-conductor light source. It is a p-n junction diode that emits light when activated. When a suitable voltage is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons.

SECTION 4. COVERAGE – This Ordinance shall cover all street lighting facilities within the territorial jurisdiction of Davao City;

SECTION 5. PURPOSE – This Ordinance is enacted for the following purposes:

a. To reduce energy consumption and maintenance cost and eventually generate savings to the City;

b. To improve efficiency of the street lights in terms of road safety, environmental impact, and energy and cost effectiveness.

SECTION 6. IMPLEMENTATION – The Implementation of this Ordinance shall Conform with the 5-year implementation plan scheduled as follows:

a. Initial Phase: Installation or conversion of the HPS to LED units within the Central Business District (CBD) of the City starting immediately after the approval of this City Ordinance;

b. Succeeding Implementation Phase: Once the installation within the CBD shall have been completed, all other street lights within the remaining City area shall likewise be replaced with LED units, to commence from the nearest area to the farthest.
SECTION 7. COSTS – The installation of all LED Lights, including all gadgets to improve lighting focus, shall be at the expense of the Davao Light and Power Company (DLPC). Only appropriate – type LED lights shall be installed as replacements to the existing street lights as specified in Section 8;

SECTION 8. LED STREET LIGHTING REQUIREMENT – The installation of LED lights shall take note of the following minimum specifications:

a. The luminary may be designed specifically for the use of the light source based on solid-state technology (LED). Products designed for other types of light sources, adapted or retrofitted to LED light sources will not be allowed.

b. Tightness level of both optical and control gear compartments have minimum rating of IP66.

c. Impact resistance level against vandalism rating must be minimum IK08 (on a scale of 10).

d. Lifespan of the luminary performance must be minimum of L80B10 @ 100,000 burning hours (90% lamp survived at 80% lumen remaining at 100,000 hours) to prevent fast depreciation of the light output of the luminary.

e. Electrical Safety Class: Class I with double insulated wires.

f. Power Factor: > 90 at full load.

g. Operating Ambient Temperature (Ta): minimum of 45 degrees Celsius.

h. Mains voltage tolerance: 120V – 227V

i. Color Temperature CCT: 3000k

j. Color rendering CRI: > 70.

k. Lumen per Watt: Minimum-85

l. Casing be made of Die Cast Aluminum Alloy with clear flat tempered glass protector (no polycarbonate or any related products allowed).

m. Surge protection devise: 10KV.

n. Luminary inclination angle system: Minimum + 5 to -10 degrees.

o. Manufacturer’s Warranty: Minimum-6 years

p. IEC complaint Certificates need to be provided for: IP, IK, Fragmentation, EMC, LMB80 Tests.

q. All measurements from ISO 17025 accredited laboratory.

r. Appearance on CCTV Security Monitoring Equipment must not be impeded/impaired by these lights used.

SECTION 9. LED STREET LIGHT TASK FORCE – There is hereby created a LED Street Light Task Force composed of the following:

Chairperson : City Mayor or the City Administrator

Co-Chairperson : Davao Light and Power Company (DLPC)

Vice-Chairperson : City Engineer

Members : City Planning and Development Officer (CPDO)

: Chairperson, Committee on Energy

SECTION 10. FUNCTION – The LED STREET LIGHT TASK FORCE shall oversee the implementation and enforcement of this Ordinance.

SECTION 11. SEPARABILITY CLAUSE – If, for any reason, any section or provision of this Ordinance is declared unconstitutional or invalid, other sections or provisions hereof not affected by such declaration shall continue to be in full force and effect;
SECTION 12. EFFECTIVITY – This Ordinance shall take effect immediately upon approval;

ENACTED, on February 27, 2018, by a unanimous vote of all the Members of the Sanggunian, there being a quorum.

CERTIFIED CORRECT:

NILDA C. MAGNO
Assistant Secretary to the Sangguniang Panlungsod
(City Government Assistant Department Head II)

ATTESTED:

VICTORIO U. ADVINCULA JR.
City Councilor
Temporary Presiding Officer
ncm/jsdam

APPROVED: MAR 9 2018, 2018

SARA Z. DUTERTE
City Mayor

ATTESTED:

ATTY. ZULEIKA T. LOPEZ
City Administrator
Low Carbon Development under City-to-City Collaboration Programme between Davao City and City of Kitakyushu

February 19th, 2019

Shiko Hayashi
Programme Director, Kitakyushu Urban Centre

Project to realize low carbon society in Davao City through a support for a development of Local Climate Change Action Plan

- Green Sister City Agreement (November, 28th, 2017)
  - Expanding the cooperation area to a development of low carbon society

Support for a development of Local Climate Change Action Plan of Davao City
- A development of GHG inventory (supported by IGES)
- A development of mitigation measures (supported by Kitakyushu City and IGES)
- A development of adaptation measures (supported by Ateneo De Davao Uni.)

Study on a feasibility of low-carbon project (for JCM Model Project)
- Feasibility study on other low-carbon projects (renewable energy and energy saving projects)
- Coordination with related-stakeholders for an implementation, technical study, evaluation of the amount of CO2 reduction, etc.
- Supporting for a preparation of applying JCM Model Project
Financing Programme for Joint Crediting Mechanism (JCM)

- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions of partner countries.
- Evaluating contributions from Japan to GHG emission reductions or removals from fossil fuel combustion in a quantitative manner by MRV.
- Contributing to achieve Japan’s emission reduction target of the UNFCCC by facilitating global actions for GHG emission reductions.

![Diagram](image)

*measurement, reporting and verification

**17 Countries**
(signed with the Philippines in Jan 2017)

Source: Ministry of the Environment, Japan

Some conditions for JCM Model Project

- Finance rate will be determined based on the number of already selected JCM Model Projects using a similar technology in each country.
- Regardless of the finance rate, selected entities in JCM Model Project are expected to deliver at least half of JCM credits issued to Government of Japan.

<table>
<thead>
<tr>
<th>Number of already selected project(s) using a similar technology in each partner country</th>
<th>Percentage of financial support</th>
</tr>
</thead>
<tbody>
<tr>
<td>None (0)</td>
<td>Up to 50%</td>
</tr>
<tr>
<td>Up to 3 (1 – 3)</td>
<td>Up to 40%</td>
</tr>
<tr>
<td>More than 3 (&gt;3)</td>
<td>Up to 30%</td>
</tr>
</tbody>
</table>

*Cost effectiveness (JPY/t-CO₂_e)*

- Dividing “the amount of proposed subsidy” by “the accumulated emission reduction” achieved during “the legal durable years” (under Japanese tax law).
- **Below 4,000 JPY/t-CO₂_e** (Energy saving projects: 10,000 JPY/t-CO₂_e in FY2016)

**Payback period (year)**

\[
\text{Payback period} = \frac{(\text{Total initial cost} - \text{Amount of subsidy})}{(\text{Reduction for annual operation cost})}
\]

* Average: 3,500 JPY/t-CO₂_e

- Payback (or Return of Investment) period of should be more than 3 years with the financial support.

Source: Ministry of the Environment, Japan
Study on possible application of JCM Model Project

Components will be checked for a feasibility study on low-carbon projects:
- Forming an international consortium including both a owner and user of the equipment, etc.
- Coordination on a timing and condition of a procurement of a low-carbon project in Davao City with related organizations, etc.
- Coordination with manufacturers of renewable energy equipment as well as constructors
- Selection of equipment, calculate the amount CO2 reduction, support for a preparation to apply for JCM Model Project

Possible Project Structure (draft as of 2019.1.21)

Boost local economy and produce a concrete outcome of C2C

- Kitakyushu City
- Davao City
- LED Resolution No.01927-18
- with Ordinance No.0409-18

- Manufacturer of LED light and equipment (JOINPLANNING Co., Ltd.)
- Constructor (Local company)
- LED Resolution No.01927-18

- IGES
- Support of implementation
- LG
- Financial support
- Duration period: 15 years

- Applicant (DHOWA TECHNOHS Co. Ltd.)
- Co-applicant
- Manufacturer of LED light and equipment (JOINPLANNING Co., Ltd.)
- Constructor (Local company)
- LED Resolution No.01927-18
- with Ordinance No.0409-18

- International Consortium
- * Excl. costs of removing current sodium lumps

- Agreement of a consortium
- Profit Exclusion
- GHG credit
- Subsidy
- JCM Consortium
- Co-applicant (Local company)
- Manufacturer of renewable energy equipment
- Constructor
- LED Resolution No.01927-18
- with Ordinance No.0409-18

- Project Management
- Reporting of GHGs emission reduction, etc.

- Own equipment and operation and maintenance
- Monitoring of GHGs emission reduction, etc.

- Engineering, procurement, trial operation, etc.

- Installation and construction
Discussion points today

- Safety standard: PSE (Product Safety Electrical Appliance & Materials) in Japan
  - Is this compatible with the Philippines standard, PS standard?

- Ordering system
  
  **Proposal A**
  - Pattern 1: a full-spec as proposed today (supplying LED lights with arm parts)
  - Pattern 2-1: supplying LED units and arm parts are designed by Japan-side but manufactured by local companies
  - Pattern 2-2: supplying LED units but utilizing existing arm parts
  - Pattern 3: selling as ready made product (products shown in a catalogue)

- Return of Investment
  How long term will be set by DLPC for recovering the investment costs for LED replacement project?
Calculation of GHG emission reduction

\[ ER_p = RE_p - PE_p \]

- \( ER_p \): Emissions reduction during the period \( p \) (tCO2/p)  
- \( RE_p \): Reference emissions during the period \( p \) (tCO2/p)  
- \( PE_p \): Project emissions during the period \( p \) (tCO2/p)  

\[ RE_p = \sum_i P_i \times (\eta_{P_i} + \eta_{RE}) \times PO_{i,p} \times EF_{grid} \times 10^{-6} \]

- \( RE_p \): Reference emissions during the period \( p \) (tCO2/p)  
- \( P_i \): Rated power consumption of a lighting equipment used in the project lighting system \( i \) (W)  
- \( \eta_{P_i} \): Luminaire efficiency of a lighting equipment used in the project lighting system \( i \) (lm/W)  
- \( \eta_{RE} \): 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 (tCO2/MWh)  
- \( i \): Identification number of the lighting system

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

- \( PE_p \): Project emissions during the period \( p \) (tCO2/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 (tCO2/MWh)  
- \( i \): Identification number of the lighting system

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.

**REFERENCE: LED light projects for JCM Model Project: Example 1**

**Introduction of High Efficiency LED Lighting Utilizing Wireless Network (Cambodia)**

- Introducing total of 9,755 units of high efficiency LED Lighting utilizing wireless network technology
- Also, using smart lighting system with wireless network and dimmer adjustment
- Expected GHG emission reduction: 4,190 tCO2/year (70% of energy reduction)
REFERENCE: LED light projects for JCM Model Project: Example 2

Energy Saving for Industrial Park with Smart LED Street Lighting System (Indonesia)

- Replacement of existing street lights with high efficient LED lights
- Dimmable High Efficient LED: 95W for 660 pcs and 190W for 600 pcs
- Smart Lighting System: 14 smart boxes and 1,260 Outdoor Lighting Controllers
- Power line communication, Remote controlling, Remote monitoring, Cloud based service
- Expected GHG emission reduction: 1,016 tCO2/year (70% energy saving)

Source: http://gec.jp/jcm/projects/15pro_ina_02/
1. Actions taken by your city’s/region’s for the C2C collaboration project up to now and future prospects

Milestones in the implementation of C2C collaboration between Kitakyushu City and Davao City.

- Signing of Green Sister City Agreement by both parties on November 17, 2016 and November 28, 2017 in Davao City and Kitakyushu City respectively.
- Learning visits of Davao City Government to City of Kitakyushu on best practices of solid waste mgmt.

Jointly worked with Japan Project Team:

- Data acquisition and conduct of Waste analysis. (Waste-to-energy Feasibility Study)
- Establishing links and acquiring permissions for visits to business establishments. (recyclers, food establishments, malls, bus companies and etc.)
- Upgrading of city’s solid waste management system through JICA Grassroots Project.
  1. Establishing a system for waste analysis in CENRO
  2. Setting up preparatory body to develop an organization to promote waste reduction
  3. Pilot activities on waste reduction in business sector and barangay to be conducted
1. Actions taken by your city’s/region’s for the C2C collaboration project up to now and future prospects

Milestones in the implementation of C2C collaboration between Kitakyushu City and Davao City.

- Creation of “Waste-to-Energy – Project Management Team” through Executive Order No. 18. (City Admin., CEO, City Legal Office, CPDO, City Budget Office, CENRO)
- Creation of Inter-Agency Team for the development of LCCAP. (City DRRMO, CPDO, CENRO, Ateneo de Davao University)
- Jointly worked with Japan Project Team:
  - Project to realize low carbon society in Davao City through a support for a development of Local Climate Change Action Plan (LCCAP).
    1. A development of GHG inventory (supported by IGES)
    2. A development of mitigation measures (supported by Kitakyushu City and IGES)
    3. A development of adaptation measures (supported by Ateneo De Davao University)

Future Prospects:

- Part of the Objectives is to come up with a Waste analysis manual for the city being crucial in the implementation of Waste-to-energy facility in Davao.
- Promotion of waste reduction and recycling activities in communities and businesses and other preparations for WTE.
- Construction of Waste-to-energy (WTE) facility in Davao City.
- Development of City Greenhouse Gas Inventory and Local Climate Change Action Plan.
- Investigate and promote a potential JCM model project in Davao based on the needs and proposed mitigating plans enumerated in the LCCAP.
2. What kinds of challenges does your city/region face in the C2C collaboration project?

- Implementation schedules and expected results were delayed or didn’t went as planned.  
  (Barangay elections, delays in selection of WTE sites, and etc.)

- Available systems and facilities crucial to the attainment of Solid Waste reduction and recycling are limited or lacking.  
  (Lack of Segregated collection, Solid waste management facilities e.g. Material Recovery Facilities, Composting, Recycling facilities and Industries)

- Paradigm and behavioral shift in adopting to new Solid Waste Mgt. methods takes time to show positive effects.

THANK YOU!