The Importance of GHG Inventories for Ensuring Emission Reduction through Technology Deployment

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About NEDO

New Energy and Industrial Technology Development Organization (NEDO)

Promotes research and development as well as the demonstration of industrial, energy and environmental technologies.

Mission

• Addressing energy and global environmental issues

• Enhancing Japan's industrial competitiveness
NEDO’s Role

Ministry of Economy, Trade and Industry (METI)

Budget

Coordination with policymaking authorities

Funding

Consortium

Academia

Industry

Public Research Laboratories
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Technologies for Countermeasure against Climate Change

• Energy Conservation
  – Energy management – HEMS, BEMS, CEMS
  – Energy Storage
  – Heat Pump
  – Combined heat and power

• New Energy
  – Smart Grid
  – Photovoltaic power generation
  – Wind power generation
  – Energy from Waste
  – Fuel Cell technology (PEFC, SOFC)
  – Solar power generation
  – Ocean energy utilization

• Fuel for Transportation
  – E.V., Hybrid V., Fuel cell V.
  – Secondary battery
  – Gas to liquid (GTL) technology
  – Biomass fuel production
  – Hydrogen production

• Fossil fuel production and clean technology
  – Clean coal technology
  – CO2 capture and storage
  – New coke-making technology

• Non-fluorocarbon technology
  – Non-fluorocarbon refrigerator
  – Non-fluorocarbon insulator
  – Fluorocarbon decomposition
The way to realize a **low carbon society** through technology

Development of low carbon breakthrough technologies

Dissemination of low carbon technologies to all over the world

It leads to reduce the emission of GHG worldwide
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 to GHG emission reductions or removals from Japan in a quantitative manner, by applying measurement, reporting and verification (MRV) methodologies, 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, complementing the CDM.
2. What is JCM/BOCM?

Scheme of the JCM/BOCM

**Japan**

**Government**
- Issuance of credits
- Notifies registration of projects
- Reports issuance of credits

**Project Participants**
- Implementation & monitoring of projects
- Request issuance of credits
- Submit PDD/monitoring report

**Third party entities**
- Validate projects
- Inform results of validation/verification
- Verify amount of GHG emission reductions or removals

**Host Country**

**Government**
- Issuance of credits
- Notifies registration of projects
- Reports issuance of credits

**Project Participants**
- Implementation & monitoring of projects
- Request issuance of credits
- Submit PDD/monitoring report

**Joint Committee (Secretariat)**
- Develops/revises the rules, guidelines and methodologies
- Registers projects
- Discusses the implementation of JCM
- Conduct policy consultations
2. What is JCM/BOCM?

### Project Cycle of the JCM and the CDM

#### JCM
- **Project Participant / Each Government**
- **Joint Committee**
- **Project Participant**
- **Third Party Entities**
- **Joint Committee**
- **Project Participant**
- **Third Party Entities**
- **Joint Committee decides the amount Each Government issues the credit**

#### CDM
- **Submission of Proposed Methodology**
- **Approval of Proposed Methodology**
- **Development of PDD**
- **Validation**
- **Registration**
- **Monitoring**
- **Verification**
- **Issuance of credits**

- **Project Participant**
- **CDM Executive Board**
- **Project Participant**
- **Designated Operational Entities (DOEs)**
- **CDM Executive Board**
- **Project Participant**
- **DOEs**
- **CDM Executive Board**
Japanese Government

has signed Bilateral Agreement with

- **Mongolia** on 8\(^{th}\) January, 2013.
- **Bangladesh** on 19\(^{th}\) March, 2013.
- **Ethiopia** on 27\(^{th}\) May, 2013.
- **Kenya** on 12\(^{th}\) June, 2013.
- **Maldives** on 29\(^{th}\) June, 2013.
- **Vietnam** on 2nd July, 2013.
Key Features of the JCM methodology

- The JCM methodologies are designed in such a way that project participants can use them easily and verifiers can verify the data easily.
- In order to reduce monitoring burden, default values are widely used in a conservative manner.
- Eligibility criteria clearly defined in the methodology can reduce the risks of rejection of the projects proposed by project participants.

<table>
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<th>Eligibility criteria</th>
<th>A “check list” will allow easy determination of eligibility of a proposed project under the JCM and applicability of JCM methodologies to the project.</th>
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</table>
| Data (parameter)     | List of parameters will inform project participants of what data is necessary to calculate GHG emission reductions/removals with JCM methodologies.  
                        | Default values for specific country and sector are provided beforehand. |
| Calculation          | Premade spreadsheets will help calculate GHG emission reductions/removals automatically by inputting relevant values for parameters, in accordance with methodologies. |
Why is JCM/BOCM expected to supplement CDM?(1)

① Considering each Country’s Circumstances

Each country has its distinctive natural or social circumstances.

   ex. Energy Supply structure.

→ JCM/BOCM is more **adjustable** for many countries since JCM/BOCM is governed by the Joint Committee under the bilateral document.
Why is JCM/BOCM expected to supplement CDM?(2)

② JCM/BOCM *doesn’t require* economic additionality

CDM strictly requires “additionality”, which makes it difficult to achieve “economic viability”.

→ Under the CDM regime, a project will NOT be viable WITHOUT revenue from carbon credit issuance.

For countries that are facing *(rapid) economic growth*, it is necessary for them;

a) to choose *less GHG emission technologies* which meet each project having economic viability, and

b) to mitigate GHG emission while *supporting domestic growth and business activities*. 
Why is JCM/BOCM expected to supplement CDM?(3)

③ Simplification of Procedure in MRV

MRV (Measurement, Report, Verification) of the project is often a big burden for Project participants in the host country.

ex. number of items, collection of various data, difficulty to follow up original monitoring plan...etc

→ Sophistically-simplified but conservative methodologies are developed and adopted under the JCM/BOCM

ex. easier accessibility of data, simpler measurement and calculation, effective and efficient monitoring...etc

→ Low carbon growth projects in developing countries may be more viable under JCM/BOCM!
Emission reduction of a project is estimated from each country’s circumstances:

**Natural Circumstance**
- land (inland/coastal island/desert)
- natural resources (coal, gas, crude oil, water, biomass, etc.)
- climate (temperature, humidity, tropical/desert, etc.)
- day light hours, wind direction & speed

**Social Circumstance**
- population, population structure
- fuel composition structure
- energy supply structure
- dissemination of technologies (products, facilities, infrastructure)
- GHG emission
3. Why is JCM/BOCM expected to supplement CDM?

The Role and Contributions of GHG Inventory Experts

- Estimation of present circumstances and future prediction are based on data of GHG inventories

- GHG inventories contribute to:
  - set energy efficiency standard of products (ie. labeling, eco mark, top runner standard, etc.)
  - set measures and plans to disseminate low carbon technologies
  - provide “transparent”, “consistent”, “comparable”, “accurate” and “complete” data, which is essential in constructing sophisticatedly-simplified MRV methodologies.
4. NEDO’s activities under JCM/BOCM scheme

**JCM/BOCM Feasibility Studies (FSs) by NEDO in FY2011**

40 projects were selected (17 countries)

**Poland:** 1
- Smart grid technology

**Indonesia:** 12
- Highly efficient solar cells in un-electrified areas
- Introduction of energy efficient technologies at cement plant
- Newly-constructed geothermal power generation
- Introduction of steam tube drying system at low rank coal power plant
- SNF project (Substitute Natural Gas)
- Biomass Boiler Power Generation Project
- CCS (Carbon dioxide Capture and Storage)
- Small Hydroelectric Generation
- Eco-Shipping Support System
- Flash and Binary Geothermal Power Generation Plants
- Energy Consumption Optimization at Facilities using IT
- Optimum control of plant equipment (by IT)

**Russia:** 1
- Recovery & effective utilization of associated gas

**Bangladesh:** 1
- Newly-constructed CCGT power generation

**Malaysia:** 1
- Home Solar Power Generation System

**Vietnam:** 6
- Highly efficient coal power plants (Ultra Super Critical)
- Coal mine methane and ventilated air methane
- Highly Efficient Energy Conservation Systems
- Introduction of highly-efficient Distribution Transformer introduction
- Trial introduction of digital tachograph
- Renewal/consolidation of servers of datacenters

**Mexico:** 1
- Manufacturing process of caustic soda & chlorine products through brine electrolyzation

**South Africa:** 2
- Energy Efficient Technologies for steel sinter process
- Development of Energy Saving Technology such as CDQ
- Highly efficient coal power plants (Ultra Super Critical)
- Energy Efficient Technologies for Integrated steel works
- ACCC technology (Automatic coal control system)
- Solar Energy Technology
- Run-of-river micro hydro power project
- Highly efficient server in Data center

**Kenya:** 1
- Utilization of Solar energy at hotel lodge

**Djibouti, Ethiopia, Rwanda:** 1
- Geothermal power generation

**Thailand:** 1
- Next-generation (zero-emission) air conditioning system utilizing solar heat

**Thailand, Vietnam:** 1
- Green Convenience Store

**Maldives:** 1
- Air conditioners by using deep sea water

**India/Turkey:** 1
- IGCC (Integrated coal Gasification Combined Cycle)

**India:** 8
- Energy Efficient Technologies for Steel sinter process
- Development of Energy Saving Technology such as CDQ
- Highly efficient coal power plants (Ultra Super Critical)
- Energy Efficient Technologies for Integrated steel works
- ACCC technology (Automatic coal control system)
- Solar Energy Technology
- Run-of-river micro hydro power project
- Highly efficient server in Data center
JCM/BOCM Feasibility Studies (FSs) by NEDO in FY2012

21 projects were selected (12 countries)

※ As of Oct, 2012

India: 2
- Highly Efficient Coal Power Plants (Ultra super critical)
- Energy Efficient Technologies for Integrated Steel Works

Indonesia: 7
- SNG project (Substitute Natural Gas)
- CCS (Carbon dioxide Capture and Storage)
- Biomass Power Generation
- Eco-shipping for Coastal Cement Tanker
- Small Hydro Power Generation

Vietnam: 2
- Disseminating and Promoting Electric Motorcycles
- Highly Efficient Coal Power Plants (Ultra Super Critical)

Thailand: 1
- Introducing Heat Recovery Heat Pumps

Thailand, Vietnam: 2
- Green Convenience Stores
- Micro-Scale Hydro Power Generation

Thailand, Vietnam, Malaysia: 1
- Energy Saving Systems at Commercial Facilities

Philippines: 1
- Flash and Binary Geothermal Power Generation

Myanmar: 1
- Run-of-river Micro Hydro Power Generation

Mauritius & etc: 1
- Multi-Stage Deep Seawater Utilization System

Mozambique: 1
- BDF (Bio Diesel Fuel) & PV (Photovoltaic) Hybrid Power Generation System

Djibouti, Ethiopia: 1
- Geothermal Power Generation

Kazakhstan: 1
- Coal-fired Power Generation
Through these Studies, NEDO developed various types of MRV methodologies to use under JCM/BOCM.

From 2013, NEDO starts MRV Applicability Verification Surveys and JCM Demonstration and Verification Projects to support JCM/BOCM.

MRV Applicability Verification Surveys

Applying MRV methodology to a plant/facility which will start (commercial) running under the JCM/BOCM, emission reduction of the plants or facility is verified and MRV methodology is verified.

JCM Demo and Verification Projects

Installing and operating a plant/facility in host country, applying MRV methodology to use JCM/BOCM procedure, emission reduction of the plants or facility is verified.
Technology outline

What is deep seawater
Deep sea water is seawater deeper than the compensation depth (approx. 200m in general) where respiration and photosynthesis are balanced. The seawater is cooled and starts down-slope flow at northern Atlantic and moves to Indian ocean. So the seawater temperature below 1,000m is stable at about 5 degree. The deep seawater has features, such as “Stable low temperature”, “Cleanliness”, “Rich nutrients” and “Sustainability”.

Multi-stage deep seawater utilization system
The system creates chilled water for air conditioning effectively using of deep seawater features and contributes to GHG emission reduction. Also deep seawater supplies for several Industries, and local water safety and industry promotion are achieved.

Features of the system
1. Air conditioning without chillers.
   Use only 5 degree deep seawater to create chilled water.

2. Achieve 82%* of GHG emission for air conditioning
   Chilled water supply for 24hrs operated airport at tropical island.
   *Compared with conventional system

3. Local industry promotion
   The deep seawater after chilled water creation is used as desalination raw water and so on.

4. Establish deep seawater business model
   The deep seawater business model contributes energy saving at tropical island countries.
The system/composition to be installed in the project is designed based on Japanese cutting-edge technologies. The latest technology is employed for the hybrid control system, which will maximize the utilization of solar power, rich in Mozambique.

In addition, the whole system is designed to match the requirements in electrification of remote villages in Mozambique where road network is under development. There is no need for transport the fuel for DG, as it can produce fuel oil on sites from Jatropha procured near the sites. Furthermore, all the major components are mounted in 20ft. containers, which enables easy transportation and installation in remote areas.

**System composition (50kw unit)**

1. **Fuel production + Biodiesel power generator**
   Consists of oil expeller, degumming processes. Capable of produce 12.5L/h fuel oil from 50 kg/h Jatropha seeds. The minimum unit of DG capacity is 50kw.

2. **Solar power generation**
   20kw output capacity, consists of 2 units of 10kW PV array

3. **Hybrid control system**
   Employ power conditioner that can remotely controllable, which enables maximum output of solar power generation
Green Convenience Stores with High-Efficiency Equipment

**Lightings**

- Lit at a high-frequency combined with the inverter ballast, reducing power consumption (about 27%).
  - Improve efficiency [lm/w] (140% higher than the conventional products)
  - Can be turned on instantly because the electrodes require less pre-heating hours.
  - Flickering can be mitigated by raising the lighting frequency.
  - Little noise is emitted from the apparatus.

**Air conditioners**

- Both indoor and outdoor units are operated in energy-saving mode by the adoption of inverters and optimal control, reducing power consumption (about 46%).
  - Power consumption can be reduced also by the weekly schedule control.

**Refrigerated showcases**

- Operated in the energy-saving mode by the adoption of the LED lighting, inverters and low-pressure shift control, and high-precision linkage operation of the refrigerator and showcase, reducing power consumption (about 27%).
  - The operation with rare switching on/off and little change in temperature reduce power consumption.
  - The refrigerator unit adjusts its performance based on the signals received from the showcase unit, attaining the operation intended for at a constant temperature.

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**Example No. 3 Country**: Thailand, Vietnam  
**Sector**: Energy Conservation

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5. Examples of Feasibility Studies
Conclusion

- **Low carbon technologies** will contribute not only to **energy security** and/or huge potentials to **reduce GHGs** but also to **development and growth**.

- Considering each country’s circumstances, **JCM/BOCM** is an effective approach to **disseminate low carbon technologies**.

- GHG inventory experts are crucial in structuring MRVs that suite each countries’ characteristics, which is an important factor in facilitating and introducing **low carbon technologies**.
NEDO would like to co-operate with each country’s GHG inventory experts.

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Thank you !