Joint Crediting in Palau to Improve Returns on Investment in Waste-to-Energy Systems

Workshop on financing for renewable energy in Small Island Developing States (SIDS)
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Recent Development of The Joint Crediting Mechanism (JCM)

April 2015
Government of Japan

All ideas are subject to further consideration and discussion with host countries
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, 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.
**Scheme of the JCM**

**Japan**
- **Government**
  - Issuance of credits
  - Reports issuance of credits
- **Project Participants**
  - Implementation & monitoring of projects
- **Third party entities**
  - Validation of projects
  - Verification of amount of GHG emission reductions or removals

**Host Country**
- **Government**
  - Issuance of credits
  - Reports issuance of credits
- **Project Participants**
  - Implementation & monitoring of projects

**Joint Committee (Secretariat)**
- Development/revision of the rules, guidelines and methodologies
- Registration of projects
- Discusses the implementation of JCM

**Conduct policy consultations**
- Request registration of projects
- Submit PDD/monitoring report
- Inform results of validation/verification
The role of the Joint Committee and each Government

- The Joint Committee (JC) consists of representatives from both Governments.
- The JC develops rules and guidelines necessary for the implementation of the JCM.
- The JC determines either to approve or reject the proposed methodologies, as well as develops JCM methodologies.
- The JC designates the third-party entities (TPEs).
- The JC decides on whether to register JCM projects which have been validated by the TPEs.
- Each Government establishes and maintains a registry.
- On the basis of notification for issuance of credits by the JC, each Government issues the notified amount of credits to its registry.
The JCM should be designed and implemented, taking into account the following:

(1) Ensuring the robust methodologies, transparency and the environmental integrity;

(2) Maintaining simplicity and practicality based on the rules and guidelines;

(3) Promoting concrete actions for global GHG emission reductions or removals;

(4) Preventing uses of any mitigation projects registered under the JCM for the purpose of any other international climate mitigation mechanisms to avoid double counting on GHG emission reductions or removals.
Features of the JCM

(1) The JCM starts its operation as a non-tradable credit type mechanism.

(2) Both Governments continue consultation for the transition to a tradable credit type mechanism and reach a conclusion at the earliest possible timing, taking account of implementation of the JCM.

(3) The JCM aims for concrete contributions to assisting adaptation efforts of developing countries after the JCM is converted to the tradable credit type mechanism.

(4) The JCM covers the period until a possible coming into effect of a new international framework under the UNFCCC.
Project Cycle of the JCM and the CDM

**JCM**

- **Project Participant / Each Government Joint Committee**
  - Submission of Proposed Methodology
- **Joint Committee**
  - Approval of Proposed Methodology
- **Project Participant**
  - Development of PDD
- **Third Party Entities**
  - Validation
  - Registration
- **Joint Committee**
  - Monitoring
- **Project Participant**
  - Verification
- **Third Party Entities**
  - Issuance of credits
  - Joint Committee decides the amount Each Government issues the credit

**CDM**

- **Project Participant**
- **CDM Executive Board**
  - Designated Operational Entities (DOEs)
  - DOEs
  - CDM Executive Board
  - Project Participant
**Roadmap for the JCM**

**Governmental Consultation (Increasing numbers of JCM Partner countries)**
Consultations with interested countries

**JCM Operation**
- Establishment & operation of the JC
- Development of rules and guidelines

**JCM Demonstration Projects and JCM Model Projects**
- Development of methodologies
- Registration of projects

**Feasibility Studies & Capacity Building**

**UNFCCC negotiations**

**JFY2012**
- Signing Bilateral Document

**JFY2013**
- Establishment & operation of the website

**JFY2014**
- Establishment & operation of the registry
Japan has held consultations for the JCM with developing countries since 2011 and has established the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica, Palau, Cambodia, Mexico, Saudi Arabia and Chile.

Three (3) JCM projects have been registered between Indonesia and Japan and one (1) JCM project has been registered between Palau and Japan.
**Capacity Building Programmes**

**Region**
Asia, Africa, Latin America, and Small Island countries

**Scope**
Facilitating understanding on the JCM rules and guidelines, enhancing capacities for implementing MRV

**Activities**
Consultations, workshops, seminars, training courses and study tours, etc.

**Target**
Government officials, private sectors, candidate for validation & verification entities, local institutes and NGOs

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**Feasibility Studies**

**Objective**
Elaborating investment plan on JCM projects, developing MRV methodologies and investigating feasibility on potential JCM projects,

**Type of studies**
- **JCM Project Planning Study (PS)**
  To develop a JCM Project in the next fiscal year
- **JCM Feasibility Study (FS)**
  To survey feasibility of potential JCM projects
- **Large Scale JCM Feasibility Study**
  To survey feasibility of potential large scale JCM projects including city level cooperation

**Reports**
Available at GEC (Global Environment Centre Foundation) website [http://gec.jp](http://gec.jp)

**Outreach**

**New Mechanisms Information Platform** website provides the latest information on the JCM [http://www.mmechanisms.org/e/index.html]
The draft budget for FY 2015 2.4 billion JPY (approx. USD24 million) per year by FY2017 (total 7.2 billion JPY)

Government of Japan

Finance part of an investment cost (up to the half)

International consortiums (which include Japanese entities)

Conduct MRV and expected to deliver at least half of JCM credits issued

- Scope of the financing: facilities, equipment, vehicles, etc. which reduce CO\(_2\) from fossil fuel combustion as well as construction cost for installing those facilities, etc.
- Eligible Projects: starting installation after the adoption of the financing and finishing installation within three years.

※Budget will be fixed after approval by the Parliament
Support Program Enabling “Leapfrog” Development (Finance/ADB) by MOE

**Financial support for expansion of low-carbon technologies**

**Draft Budget for FY 2015 (Budget for FY2014)**

1.8 billion JPY (approx. USD18 million) per year by FY2018 (total 7.2 billion JPY) (4.2 billion JPY)

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

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

**ADB Trust Fund**

**Draft Budget for FY 2015 (Budget for FY2014)**

1.8 billion JPY (approx. USD18 million)

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

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

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**MOEJ**

**Finance**

**Contribution**

**JICA, other**

Financial assistance/financial investments for overseas investment and lending

**Supported Project by JICA, etc.**

**Collaboration**

**MOEJ**

**Finance**

**ADB Trust Fund**

**Financial support for expansion of low-carbon technologies**

**ADB Project**

**Superior Advanced Low Carbon Technologies**

**JCM Project**

**GHG Emission Reduction**

- Waste to Energy Plant
- Renewable Energies
- Water Supply and Sewage Systems
- Transportation

**1.8 billion JPY (approx. USD18 million)**

1.8 billion JPY (approx. USD18 million) per year by FY2018 (total 7.2 billion JPY) (4.2 billion JPY)
JCM Financing programs by MOEJ (FY2013/2014/2015)

Thailand:
○ Energy Saving at Convenience Stores with High Efficiency Air-Conditioning and Refrigerated Showcase
○ Introduction of Solar PV System on Factory Rooftop
○ Reducing GHG Emission at Textile Factory by Upgrading to Air-saving Loom (Samutprakarn)
○ Energy Saving for Semiconductor Factory with High Efficiency Centrifugal Chiller and Compressor

Bangladesh:
○ Energy Saving for Air Conditioning & Facility Cooling by High Efficiency Centrifugal Chiller (Suburbs of Dhaka)
○ Installation of High Efficiency Loom at Weaving Factory
○ Introduction of PV-diesel Hybrid System at Fastening Manufacturing Plant

Myanmar:
○ Introduction of Waste to Energy Plant in Yangon City

Kenya:
○ Solar Diesel Abatement Projects

Maldives:
○ Solar Power on Rooftop of School Building Project
  ■ Smart Micro-Grid System for POISED Project in Addu Atoll

Malaysia:
○ PV power generation and relevant monitoring system for the office building
○ Model project in FY 2013 (3 countries, 7 projects)
○ Model project in FY 2014 (7 countries, 15 projects)
○ ADB project in FY 2014 (1 country, 1 project)
○ Model project in FY 2015 (7 countries, 18 projects)

Total 12 countries, 41 projects
- The underlined projects have been registered as the JCM projects (6 projects)
※these projects account for 2 registered JCM projects respectively, as they’re operating in different sites

○ Energy Saving by Converting from Hg-Cell Process to Ion-exchange Membrane Process at Chlorine Production Plant

Mongolia:
○ Upgrading and Installation of Centralized Control System of High-Efficiency Heat Only Boiler (HOB)※

Viet Nam:
○ Anaerobic Digestion of Organic Waste for Biogas Utilization at Market
○ Eco-driving with the Use of Digital Tachographs
○ Introduction of amorphous high efficiency transformers in power distribution systems
○ Introduction of High Efficiency Air-conditioning in Hotel
○ Energy Saving in Lens Factory with Energy Efficient Air-Conditioners

Cambodia:
○ Introduction of High Efficiency LED Lighting Utilizing Wireless Network

Palau:
○ Small-Scale Solar Power Plant for Commercial Facilities in Island States Project
○ Small-Scale Solar Power Plants for Commercial Facilities Project II
○ Solar PV System for Schools Project

Mexico:
○ Domo de San Pedro II Geothermal Power Generation
○ Energy Saving by Converting from Hg-Cell Process to Ion-exchange Membrane Process at Chlorine Production Plant

Indonesia:
○ Energy Saving for Air-Conditioning and Process Cooling at Textile Factory (in Batang city)
○ Energy Savings at Convenience Stores
○ Energy Efficient Refrigerants to Cold Chain Industry※
○ Energy Saving by Double Bundle-Type Heat Pump at Beverage Plant
○ Energy Saving for Air-Conditioning and Process Cooling at Textile Factory
○ Power Generation by Waste Heat Recovery in Cement Industry
○ Solar Power Hybrid System Installation to Existing Base Transceiver Stations in Off-grid Area
○ Energy Saving through Introduction of Regenerative Burners to the Aluminum Holding Furnace of the Automotive Components Manufacturer
○ Energy Saving for Textile Factory Facility Cooling by High Efficiency Centrifugal Chiller
○ Introduction of high efficient Old Corrugated Cartons Process at Paper Factory
○ Reducing GHG emission at textile factories by upgrading to air-saving loom
○ Installation of Cogeneration System in Hotel
○ Energy Saving by Utilizing Waste Heat at Hotel
○ Energy Saving for Air-Conditioning at Shopping Mall with High Efficiency Centrifugal Chiller
○ Energy Saving for Industrial Park with Smart LED Street Lighting System
○ Energy Saving for Office Building with High Efficiency Water Cooled Air-Conditioning Unit
○ Introduction of High Efficiency Once-through Boiler System in Film Factory

※ Renewable energy related projects are highlighted in yellow
Selected Studies

1. The feasibility study to promote Low Carbon Technology application in India (Gujarat, Maharashtra, Punjab)
2. Feasibility study on financing scheme development project for promoting energy efficiency equipment installation in Indonesia (Jakarta, Bali etc.)
3. Low Carbon City Planning Project in Surabaya, Indonesia (Surabaya City)
4. Feasibility Study on Eco-Lease Scheme for Low Carbon Vehicle towards Joint Crediting Mechanism Projects Expansion (Indonesia National Level)
5. Collaboration on Project for Developing a Low Carbon Society under collaboration between Bandung city and Kawasaki city in Bandung, Indonesia (Bandung)
6. Study for Developing Environmentally and Culturally Sustainable Cities through the Joint Crediting Mechanism in Siem Reap (Angkor Park and Siem Reap city)
7. Study on the Accelerating Implementation of Bangkok Master Plan on Climate Change through the JCM (Bangkok)
8. Introduction of a recycling system for cars and parts in Thailand (Bangkok)
9. Strategic Promotion of Recovery and Destruction of Fluorocarbons (Bangkok/Johto Bahr)
10. Demonstration Project on Installing an Evacuation Shelter with Renewable Energy as a “Low-Carbon/Resilient Model for Small Island Countries” (Palau etc.)

11. Feasibility study on comprehensive resource circulation system for low carbon society in Republic of Palau (Palau)
12. The feasibility study toward eco-island in cooperation between Kien Giang Province and Kobe City (Kien Giang Province)
13. Hai Phong Green Growth Action Plan Development in Association with Kitakyushu City (Hai Phong City)
14. Ho Chi Minh City – Osaka City Cooperation Project for Developing Low Carbon City (Ho Chi Minh City)
15. Feasibility Study on a Large-Scale GHG Emissions-Reduction Project Development in the Iskandar Development Region, Malaysia (Iskandar Development Region)
16. Feasibility Study on Rice Husk Power Generation System for Low-carbon Communities in Ayeyarwady Region, Myanmar (Ayeyarwady)
17. Study for the development of JCM projects for comprehensive improvements in the power generation, transmission and distribution systems in Ulaanbaatar City and on the possibility of nationwide horizontal application of the same improvement model in Mongolia (Ulaanbaatar)
18. Feasibility study on a programme-type finance scheme for the JCM in Mongolia (Ulaanbaatar)
19. JCM Feasibility Studies of GHG Mitigation Projects Contributing to Low Carbon Old Capital based on City-to-City Cooperation between Vientiane and Kyoto ("Vientiane")
Comprehensive Resource Circulation System Plan for Sustainable Future in Republic of Palau

AMITA Institute for Sustainable Economies (AISE)
Republic of Palau

Land Area: 488 km²
Population: 20,000
Major Issues of Palau - Background of the Proposal

- Waste problem
- Food security
- Energy security
- Environmental conservation
- Tourism promotion
Total amount of collected waste to M-dock landfill site
(Estimated from the result of waste weight measurement survey at M-dock landfill)

16t/day

- Food waste: 3.3t/day
- Plastic, Paper, Fiber: 7.0t/day

Potential capacity of disposal
Total 10.3t
(Estimated from waste composition survey)

- Condensed sewage sludge: 3t
- Recycled Solid Fuel System
- Biogas System

Totally **70%** of waste could be recycled though biogas and solid fuel project.
Outline of Comprehensive Circulation System

Current Situation and Issues
- Final disposal site (reaching its capacity, marine pollution by leachate)
- Leakage of sewage sludge
- Dependency on imported fossil fuel
- Food Security
- Problems caused by waste tires

Recycling of Waste Tire
- Shred and recycle waste tires into cement materials & fuel at factories in neighbor countries

Recycling of Wastes with Low Moisture Content as Solid Fuel
- Establish integrated recycling system from solid fuel production to heat utilization for air conditioning.

Bio Gasification of Wastes with High Moisture Content and Sludge
- Establish a coherent system to generate power, to utilize liquid fertilizer to grow food and energy crops

Preservation of the marine environment

Republic of Palau
Key Technologies of Converting Waste to Resource/Energy

Biogas Technology

Recycled Solid Fuel

Cement Production
Biogas Related Technologies

**INPUT**
- Blending organic waste with high moisture content
  - Swage sludge
  - Food waste
  - Animal manure
  - Waste Grass

**OUTPUT**
- Biogas → Electricity
- Digestion → Fertilizer

- Power generator
- Biogas
- Fertilizer
- Agriculture
- Food
- Energy Crop

**Methane fermentation technology**
Recycled Solid Fuel Related Technologies (1)

### INPUT
Waste with low moisture content

- Plastic: 30-70% (PVC is not acceptable)
- Paper
- Yard waste: 70-30%
- Wood
- Textile

### OUTPUT

- **Shredder**
- **Pelletizer**
- **Solid Fuel**
- **Boiler**
- **Absorption chiller**

#### Characteristics of the Fuel
- Stable calorie
- Stable combustion
- Minimal harmful emission
- Compact
- Easy to handle
- High storability

### Waste with low moisture content

- Paper
- Yard waste
- Wood
- Textile

### Characteristics
- Stable calorie
- Stable combustion
- Minimal harmful emission
- Compact
- Easy to handle
- High storability

### Alternative to fossil fuel

- Use of hot water

**Compact plant**

**Pellet type fuel**

**Dedicated boiler**

**Use of hot water**
Proposed Business Scheme: Biogas System

- **Household**
  - Waste (Collection Fee)
  - Sewage
  - Fee

- **Business**
  - Organic Crops
  - Fee

- **Agriculture**
  - Food Crop
    - Ex. Napier Grass
  - Energy Crop
    - Crops
    - Liquid fertilizer
    - Fee

- **State Gov.**
  - Waste (Tipping Fee)
  - Sewage
  - Tipping Fee

- **National Gov.**
  - Food Waste
  - Cooking Oil
  - Grass
  - Recycling Fee
  - Green Fee
  - Basic (Fixed) Commission For Env. Conservation

- **PPUC**
  - Public company of utility, water supply and sewage treatment

- **Joint Company**
  - Fee
Proposed Business Scheme

* For Biogas business

**PPUC**
- Long-term Agreement* (Sludge, Electricity)

**State Gov.**
- Entrustment of Operation

**Joint company**
- **Operation & Maintenance**
- **MRV monitoring** *(grow energy plant)*

**Recycled solid fuel user**
- **Cooperating to MRV monitoring**

**National Gov.**
- **Long-term Agreement**
- **Investment**

**Japanese Gov.**
- **Max. 50% Subsidy for Initial Cost**
- **JCM Application**

Formation of international consortium

- **Project management**
- **Support for MRV monitoring and reporting**
- **Accounting and delivering credit**

* The proposed business scheme is subject to further consideration and discussion with relevant stakeholders.
Estimation of Benefits for Palau

**Reduction of waste**
- *Potential of 70% reduction*
- *Prolonging the landfill life*
- *Reducing the impact for water environment*

**Recycling all of the swage sludge**
- *100% of condensed sludge*
- *Reducing the environmental risk*

**Saving landfill cost**
- *$120,000/year*

**Energy generation**
- *Equivalent to 3.8% of total electricity consumption in Palau*
- *Raising national energy security*
Residential Waste Segregation Trial

Segregation Category of Waste

1. Recyclable
   - Paper
   - Textile
   - Plastics
   - Yard Waste (grass/leaves/wood)
   - Metal Can
   - Glass Bottle
   - Only Clean Waste!!
   - Clear Plastic Bag

2. Food waste
   - Food Waste
   - Leftover meals
   - Waste Cooking Oil
   - Clear Plastic Bag with bucket
   - Plastic Bottle

3. Others
   - Leather/Rubber
   - Metals
   - Glass/Ceramic
   - Complex Waste
   - Dirty Waste (wet waste, dirty food container etc.)
   - White Plastic Bag

If you have another way to dispose or recycle, please dispose and recycle as usual.
(For example... Dispose for pig food, recycle redeemable beverage containers etc.)

Thank you for your cooperation!!
Experimental Small Biogas Plant for Demonstration
# Roadmap of the Project

<table>
<thead>
<tr>
<th>Year</th>
<th>Biogas</th>
<th>Recycled solid fuel</th>
<th>Waste tire recycling</th>
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<tbody>
<tr>
<td>2015</td>
<td>Feasibility Study (FS) Phase 2 → Basic Agreement with local government and PPUC</td>
<td>Technical detailed design Management plan</td>
<td>Test exporting</td>
</tr>
<tr>
<td>2016</td>
<td>Technical detailed design Management plan</td>
<td>Construction</td>
<td>Start operation</td>
</tr>
<tr>
<td>2017</td>
<td>Construction</td>
<td>Start operation</td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>Start operation</td>
<td></td>
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Thank you for your kind attention!