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

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About NEDO

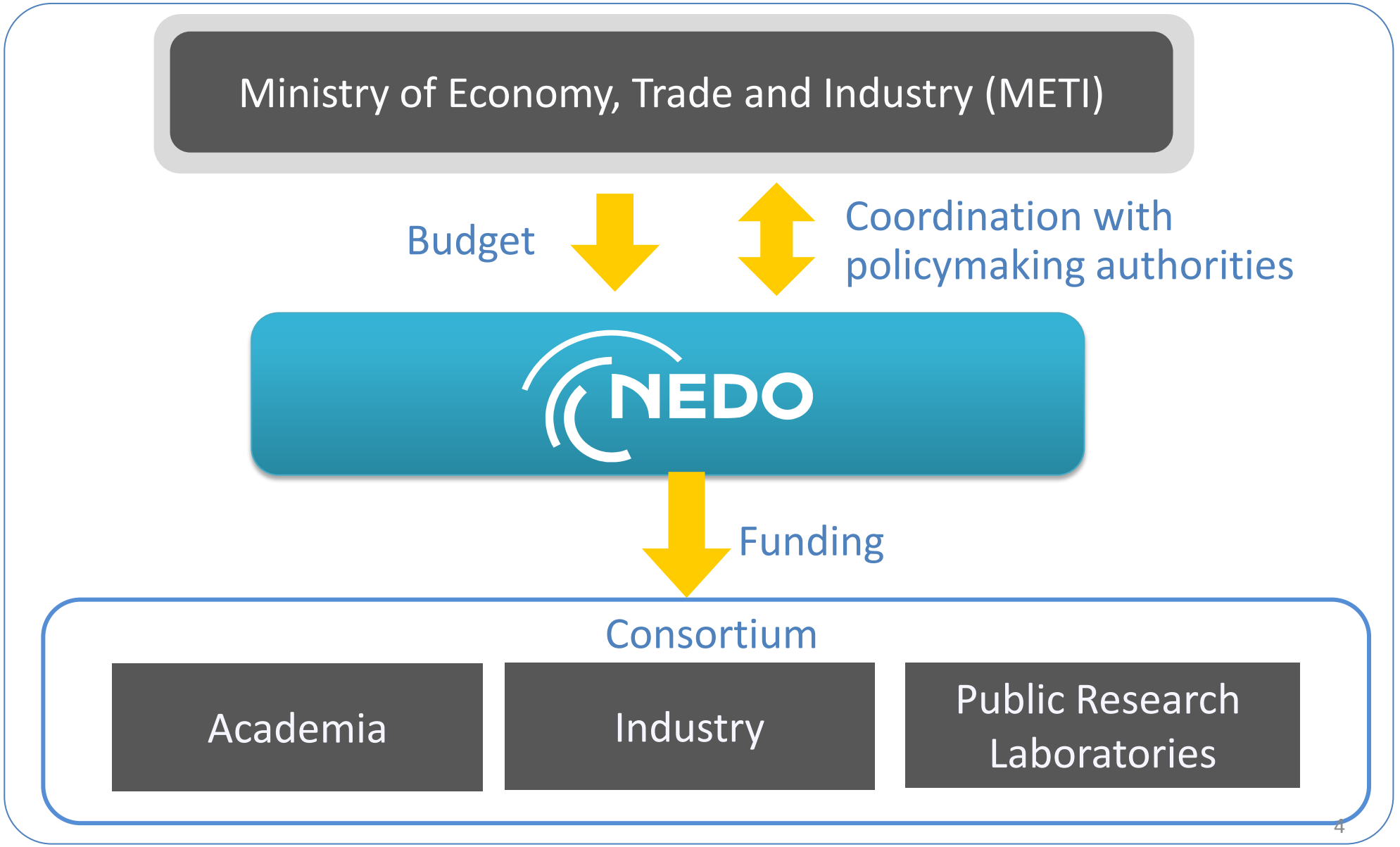
New Energy and Industrial Technology Development Organization (NEDO)

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

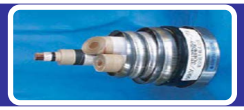
Mission

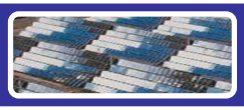
- Addressing energy and global environmental issues
- Enhancing Japan's industrial competitiveness

NEDO's Role


Ministry of Economy, Trade and Industry (METI)
Budget
Coordination with policymaking authorities
NEDO
Funding
Consortium
Academia
Industry
Public Research Laboratories

NEDO's Technology Development Activities


Energy Efficiency and Conservation

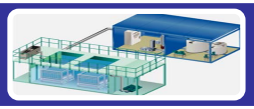

Renewable Energy

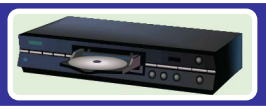
Storage Batteries

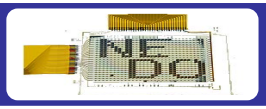

Smart Grids & Smart Community


Robots


High-efficiency Clean Coal


Water Treatment


Electronics


Materials & Nanotechnology


Biotechnology & Medical Technology

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

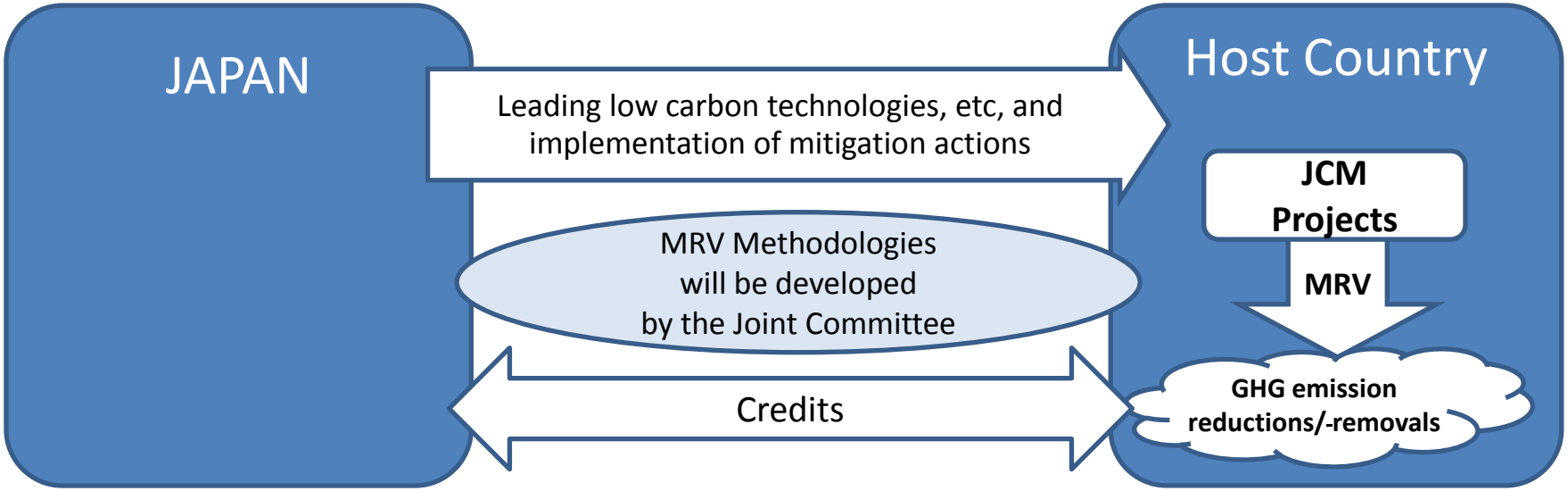
Development of low carbon breakthrough technologies

Dissemination of low carbon technologies
to all over the world

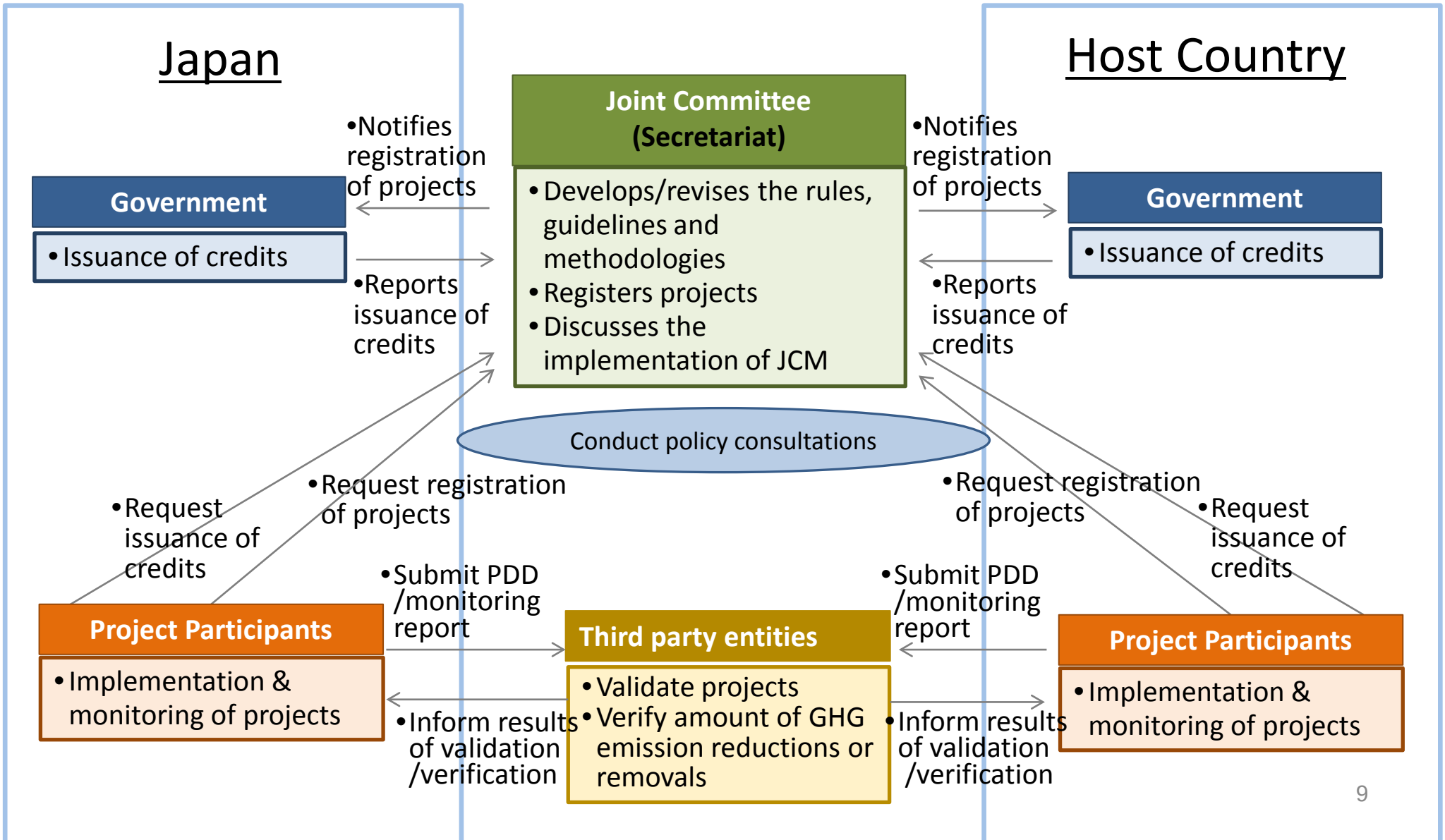
It leads to reduce the emission of GHG worldwide

Basic Concept of the JCM/BOCM

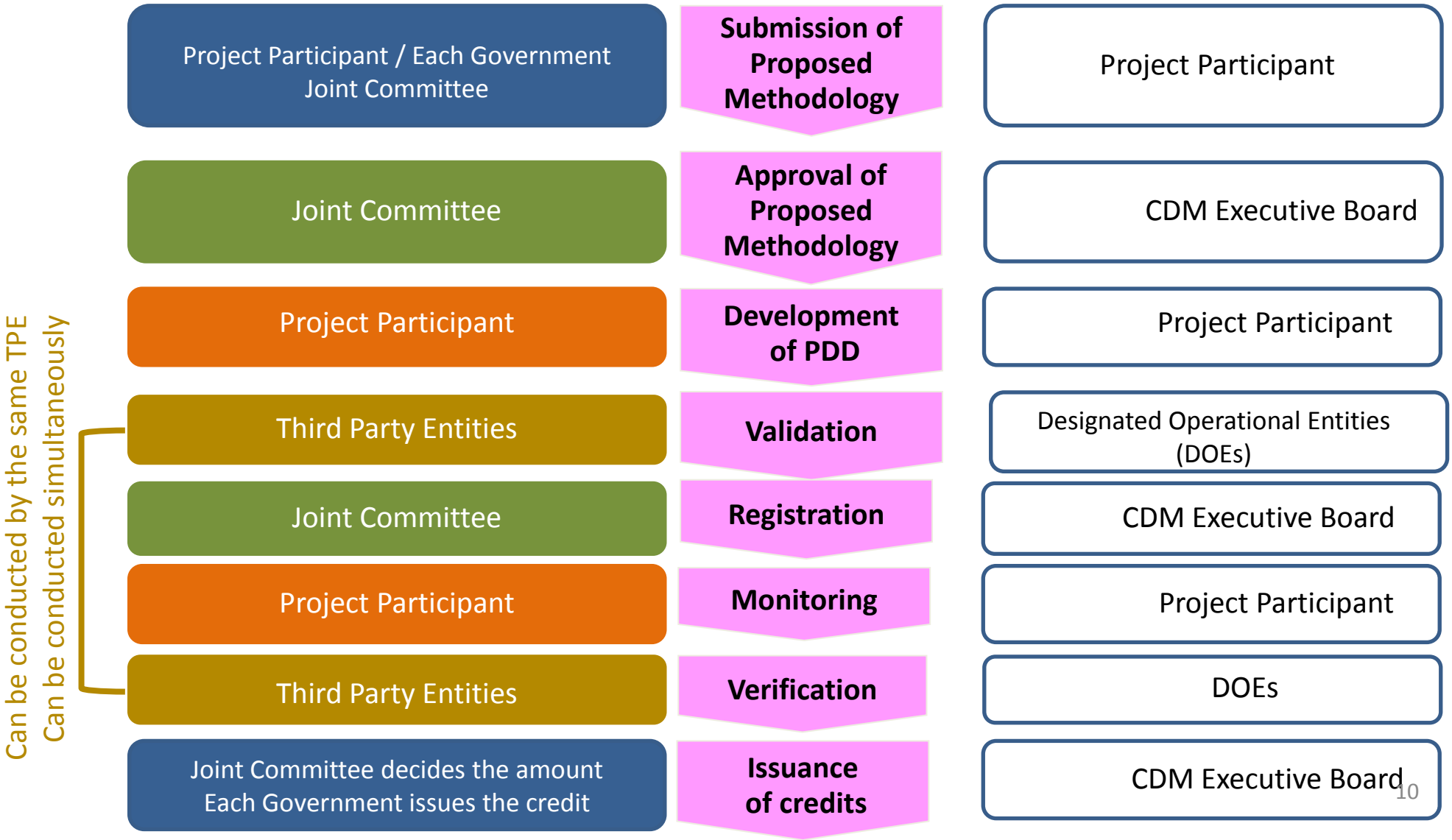
- Facilitating diffusion of leading low carbon technologies, products, systems, services, and infrastructure as well as implementation of mitigation actions, and contributing to sustainable development of developing countries.
- Appropriately evaluating contributions to GHG emission reductions or removals 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.



Scheme of the JCM/BOCM



Project Cycle of the JCM and the CDM



Japanese Government

has signed Bilateral Agreement with

- **Mongolia on 8th January, 2013.**
- **Bangladesh on 19th March, 2013.**
- **Ethiopia on 27th May, 2013.**
- **Kenya on 12th June, 2013.**
- **Maldives on 29th June, 2013**
- **Vietnam on 2nd July, 2013**

JCM Methodology

- 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.

Eligibility criteria	• A “check list” will allow easy determination of eligibility of a proposed project under the JCM and applicability of JCM methodologies to the project.
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 it's 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 projects 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)

③Simplification 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

→Sophisticatedly-**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 !

JCM/BOCM visualizes emission reduction

○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

The Role and Contributions of GHG Inventory Experts

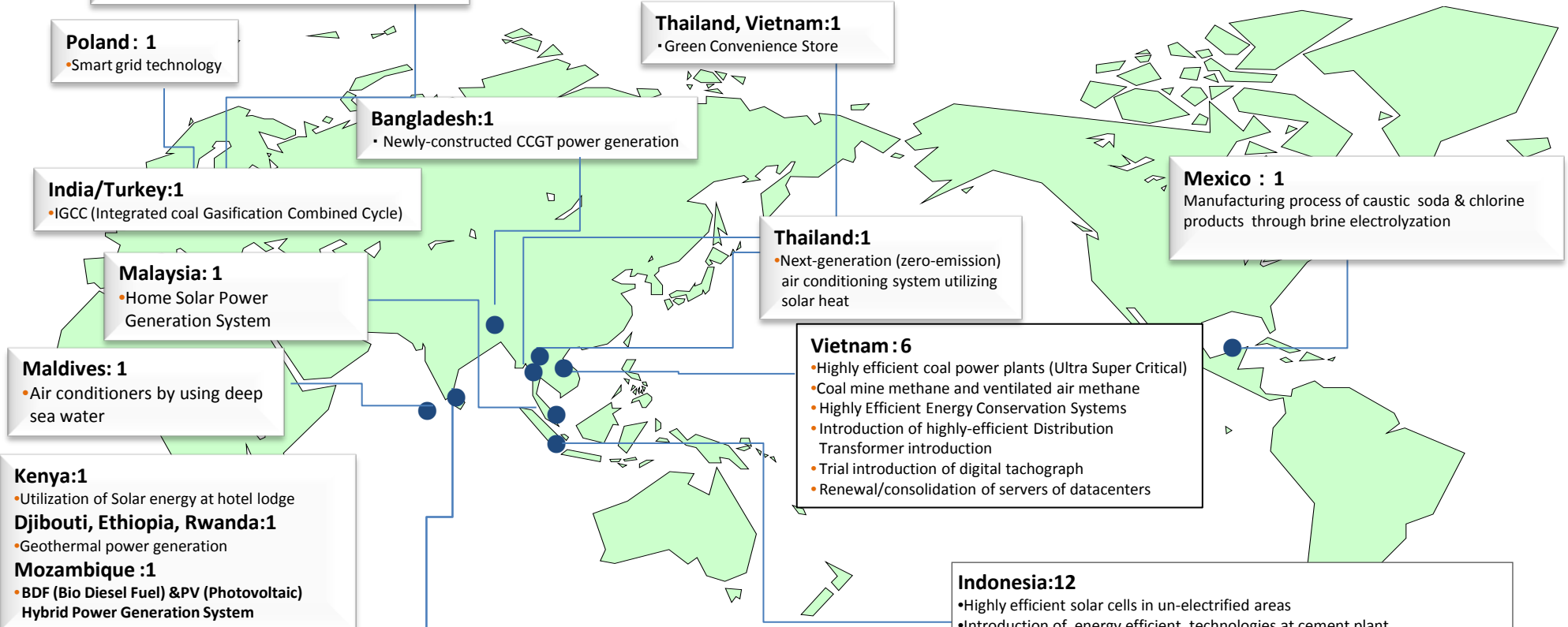
○Estimation of **present circumstances** and **future prediction** are based on data of GHG inventories

○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.

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

40 projects were selected (17 countries)



Russia : 1
- Recovery & effective utilization of associated gas

Poland : 1
- Smart grid technology

Thailand, Vietnam:1
- Green Convenience Store

Bangladesh:1
- Newly-constructed CCGT power generation

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

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

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

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

Maldives: 1
- Air conditioners by using deep sea water

Kenya:1
- Utilization of Solar energy at hotel lodge

Djibouti, Ethiopia, Rwanda:1
- Geothermal power generation

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

South Africa:2
- **Energy Efficient Technologies for steel plant**
- **Highly efficient gas turbine**

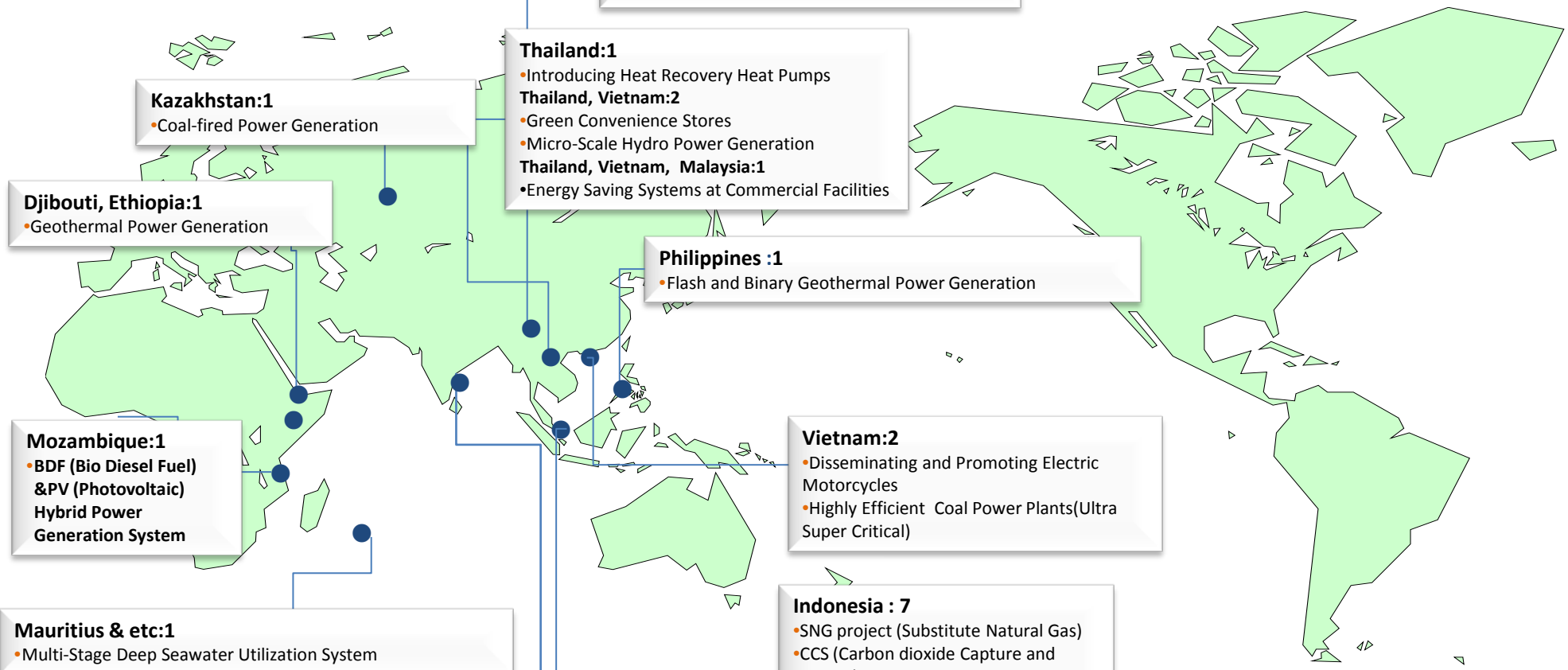
India:8
- Energy Efficient Technologies for Steel sinter process
- Development of Energy Saving Technology such as CDQ
- Highly efficient coal power plants(Ultra Super Critical)
- Energy Efficient Technologies for Integrated steel works
- ACCC technology(Automatic coal control system)
- Solar Energy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

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
- SNG 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)

JCM/BOCM Feasibility Studies (FSs) by NEDO in FY2012

21 projects were selected (12 countries)

※ As of Oct, 2012



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

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

Kazakhstan:1
- Coal-fired Power Generation

Djibouti, Ethiopia:1
- Geothermal Power Generation

Philippines :1
- Flash and Binary Geothermal Power Generation

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

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

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

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

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

NEDO's Activities

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

Example No.1: Country: Island countries Sector: Ocean energy

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

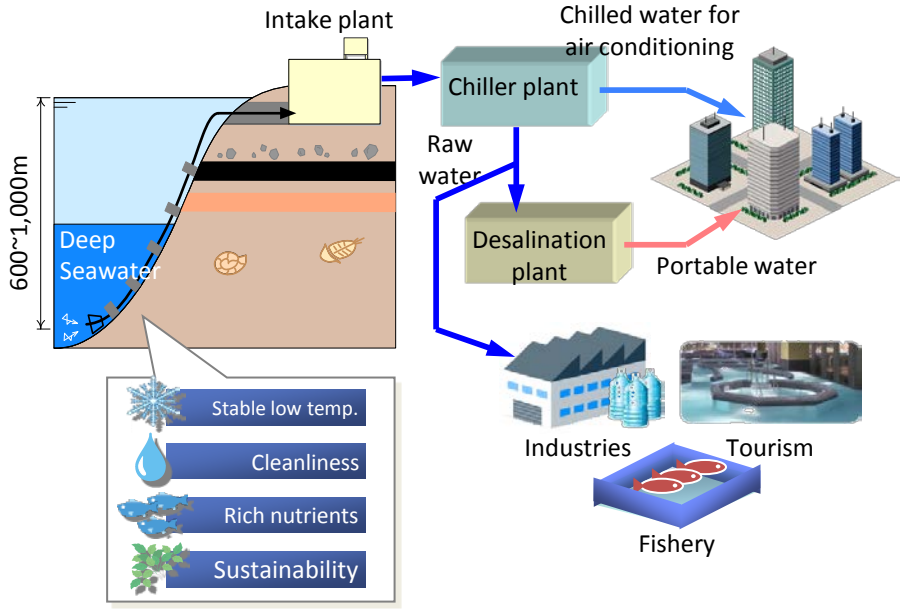
Features of the system

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.



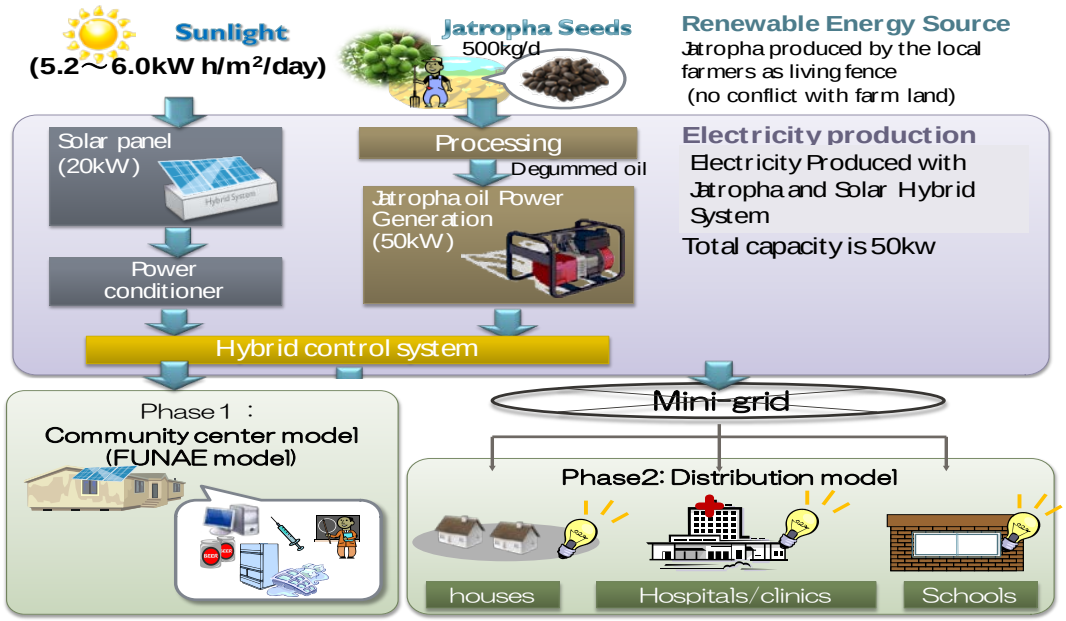
Multi-stage deep seawater utilization system

Example No. 2 Country：Mozambique　Sector：Biomass &Solar Power

Summary of Introduced Technology

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 Jatropah** procured near the sites. Furthermore, all the major components are mounted in 20ft. containers, which enables easy transportation and installation in remote areas.

Hybrid Power Generation System (PV and Jatropha Oil-fired diesel generator)



＜System composition（50kw unit）＞

① Fuel production + Biodiesel power generator

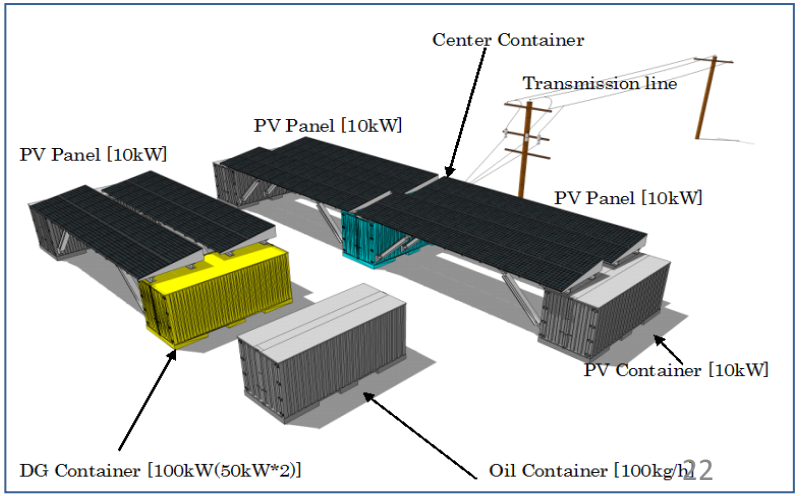
Consists of oil expeller, degumming processes. Capable of produce 12.5L/h fuel oil from 50 kg/h Jatropha seeds.
The minimum unit of DG capacity is 50kw.

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



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

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.

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.

CONTACT POINT

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Thank you !