Capacity building cooperation for development of NAMAs in a MRV manner

Overseas Environmental Cooperation Center (OECC), Japan

Masayoshi Futami

Outline

1. Introduction

2. Cooperation Activities

3. JCM scheme *

* The Joint Crediting Mechanism (JCM)

Outline

1. Introduction

2. Cooperation Activities

3. JCM scheme

1. Introduction

Partner countries and Selected sector

Transport Sector

Lao PDR

Energy Sector

Mongolia

Waste Sector

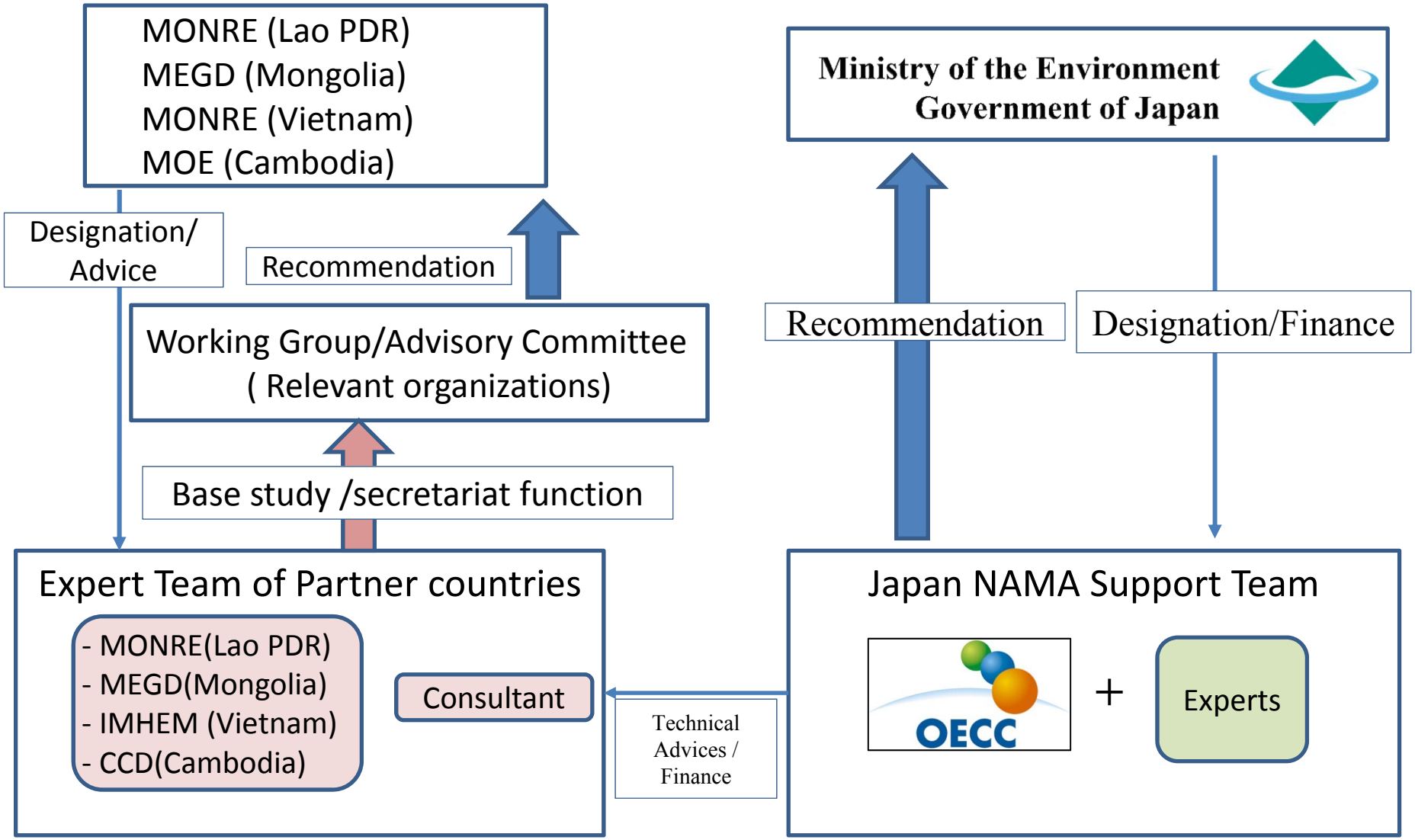
Vietnam

Energy Sector

Cambodia

1. Introduction

Institutional Arrangement of the cooperation



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2. Cooperation Activities

Proposed Steps for NAMA Development

(1) Collection of Info on relevant policies and strategies

Collect and analyze relevant policy document

(2) Collection data for BAU in the sector

Collect data for calculating BAU emission with bottom-up approach

(3) Quantification GHG emissions of BAU

Quantify GHG emissions based on (2) data,
a) Identify the formulas
b) Calculate emission in BAU

(4) Examination and selection of NAMAs options

Select possible NAMAs options and technologies based on (1) policies and additional consideration.

(5) Quantification GHG emission reduction by NAMAs

Quantify GHG emissions with (4)NAMAs assumptions
a) Set the calculation formulas
b) Calculation
c) Aggregate potential with reduction by NAMAs

Low-carbon technology survey

Examination MRV methods

Capacity-buildings for NAMAs implication

version1.0

NAMA Guidebook

Manual for practitioners working with mitigation actions

CLIMATE CHANGE DEPARTMENT
MINISTRY OF ENVIRONMENT

MINISTRY OF ENVIRONMENT AND GREEN DEVELOPMENT

IGES

MIZUHO
Mizuho Information & Research Institute, Inc.

NIES JAPAN

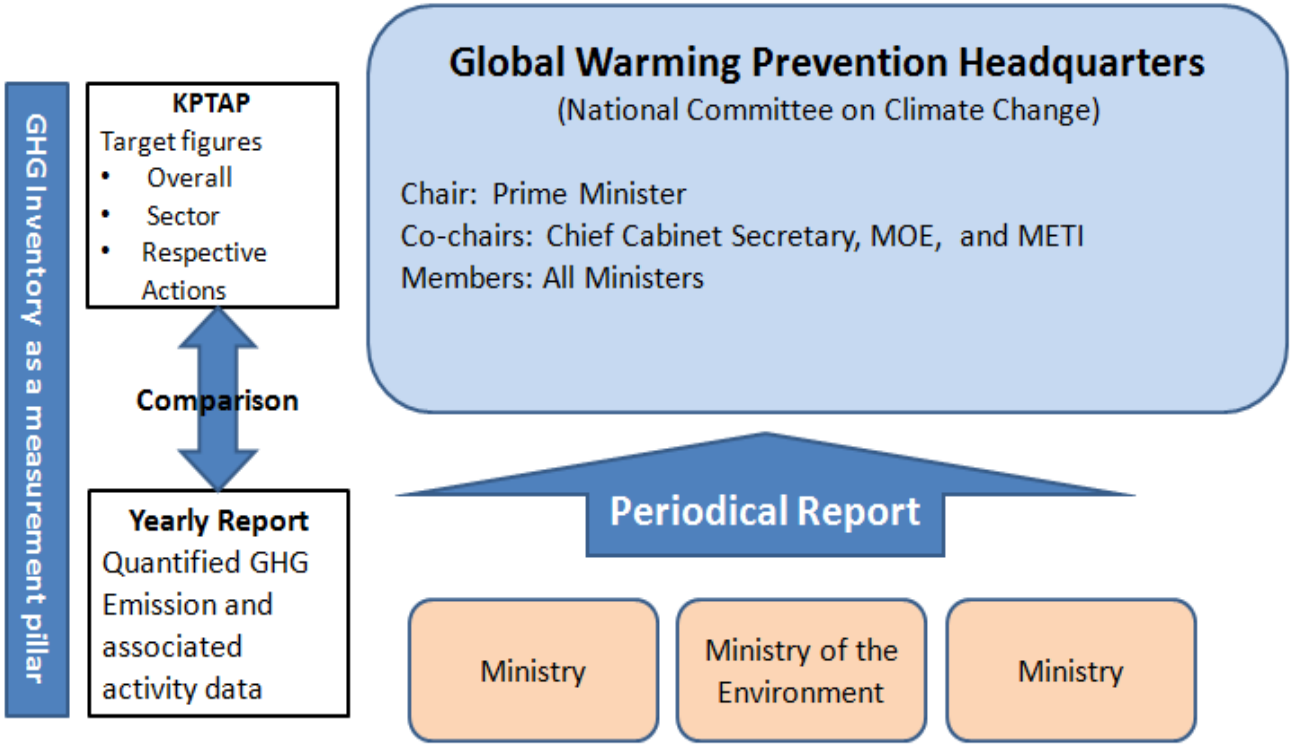
Ministry of the Environment

OECC

MRV of policy based NAMAs

Review of KPTAP

"Kyoto Protocol Target Achievement Plan (KPTAP)" was formulated which carries on the Outline in order to stipulate the measures necessary to reliably achieve the target of a 6% reduction promised by Japan under the Kyoto Protocol.



NAMA ≒ KPTAP

Ministry/Agency: Ministry of Land, Infrastructure, Transport and Tourism

Practical countermeasures:

Promotion of Intelligent Transport System (ITS)

(Appendix 1-1b [5]) (Page 3)

Projected emissions reduction:

Approx. 2.6 million tons-CO2

Premise of forecast at the time of cumulating:

[ETC]

- ETC utilization ratio
- Amount of traffic congestion by toll gate
- Number of vehicles passed by toll gate
- Improved speed due to the nonstop effect
- CO2 emission factors by speed and model

Descriptions on evidences and details (e.g. itemization) of how the "projected emissions reduction" is calculated:

1. ETC

Assuming that automobiles will not have to stop at toll gates and traffic congestion will be eased through promoting the use of the ETC system, the projected CO2 emissions reduction is calculated as follows:

CO2 reduction by promoting the use of the ETC system

= [Reduction by nonstop effort] + [Reduction resulting from eased traffic congestion at toll gates]

(1) [Reduction by nonstop effort]: Approx. 165,000 tons-CO2 [1]

The CO2 reductions achieved from the nonstop effect at toll gates are calculated for each toll gate or other factors, and the values are added.

= {(Unit CO2 emissions when automobiles with no ETC system can pass through toll gates) – (Unit CO2 emissions when automobiles with the ETC system pass through toll gates)} × Area length by toll gate × Number of vehicles passing through toll gates (ETC vehicles/day) × 365 days

(2) [Reduction resulting from eased traffic congestion at toll gates]: Approx. 30,000 tons-CO2 [2]

The CO2 reductions achieved by improving traffic congestion through the improved processing capacity at toll gates are calculated, and the values are added.

= {(Unit CO2 emissions during traffic congestion) – (Unit CO2 emissions when traffic congestion is eased)} × Length of traffic congestion × No. of vehicles passing through toll gates (ETC vehicles / hour) × Annual hours of traffic congestion / year

Projected emissions reduction:

Approx. 165,000 tons-CO2 + Approx. 30,000 tons-CO2 = Approx. 200,000 tons-CO2

[1] [2]

Ex-Ante estimation of Emission Reduction in KPTAP (2005)

Tracking KPTAP

Every year the Global Warming Prevention Headquarters under the cabinet of Japan comprehensively evaluates the progress of countermeasures and strengthens the policies as necessary with reference to the evaluation indicators

Specific measure	Evaluation indexes and the like for measures	2008	2009	2010	2011	2012	Evaluation of performance trends and the like compared to the predictions[*1]	Addition and enforcement of measures and policies
		Predicted figures						
Promotion of Intelligent Transport Systems (ITS), such as introduction of ETC.	Emission reduction (10,000 t-carbon dioxide)	19	19	20	20	21	Achieved goals or performance trends resulted higher than the prediction.	During 2012, implemented a mileage discount campaign.
	ETC use rate (%)	77	79	81	83	85		

MRV of Project level (case study: Mongolia)

1. Identification of NAMA options

Based on the NAMAs submitted by Mongolia to the UNFCCC, mitigation actions are elaborated, focusing on multiple application of energy efficiency improvement measures at the third and forth Combined Heat and Power plant (CHP3 and CHP4) in Ulaanbaatar, Heat Only Boilers and Renewable Energy.

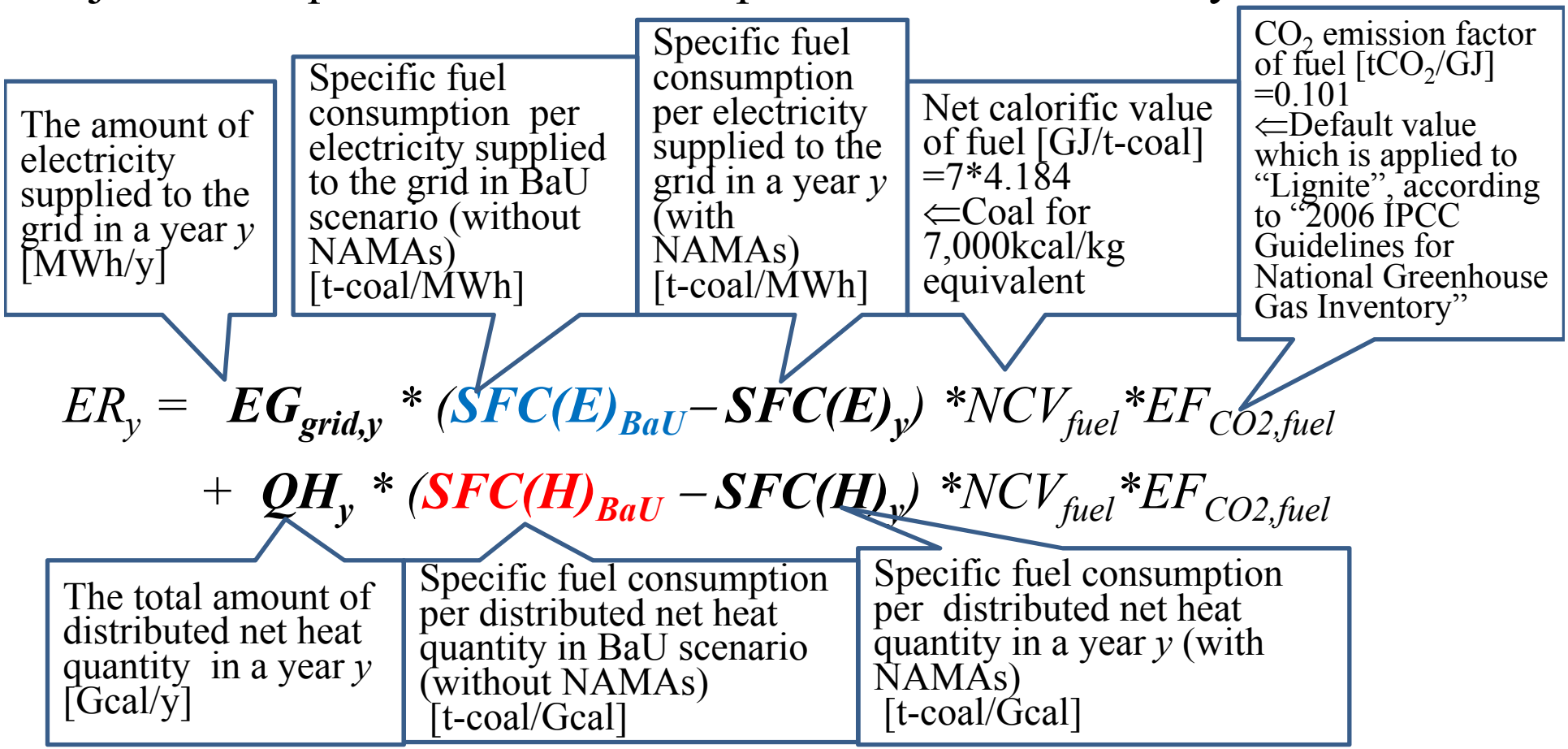
2. Quantification of GHG emission reduction by identified NAMA options.

Quantified emission reductions to be achieved by implementing specific measures at CHPs such as introducing high technologies

In Japan

In Mongolia

Project level quantification for improvement of efficiency in CHP



- $SFC(E)_{BaU}$, $SFC(H)_{BaU}$:May be fixed ex ante by yearly average value during latest 3 years before NAMAs implementation in case of domestic NAMAs.

- $EG_{grid,y}$, $SFC(E)_y$, OH_y, $SFC(H)_y$: Values by "Energy statistics" in a year y are applied.

Result of quantification


Potential NAMA options and projected emissions reductions

	Potential NAMA menu	Projected emissions reduction
CHP3	Combustion Improvement (Low O_2 operation)	CHP3: Approx. 77,360tCO_2/year
	Adoption of speed control for Boiler Feedwater Pump	
	Replacement by Top runner Transformer	
	Adoption of Light Emitting Diode (LED) Resin coating of blades surface of Condenser Pump	
	Reinforcement of insulator	
CHP4	Installation of Soot Blowers	CHP4:Approx. 208,888tCO_2/year
	Replacement to high efficiency turbine	
	Replacement by top runner LED	
	Adoption of LED	
	Resin coating on blades surface of Cooling Water Pump	
	Resin coating on blades surface of Condenser Pump	
	Reinforcement of insulator	

The above mentioned NAMAs are basically expected various opportunities for financing these actions such as unilateral, bilateral and multilateral financial resources including ODA and soft loan. Also, in order to scale up the level of finance and facilitate transfer of technologies, finances through mechanisms such as the Joint Crediting Mechanism (JCM) and other innovative means of finance are also expected.

Outline

1. Introduction

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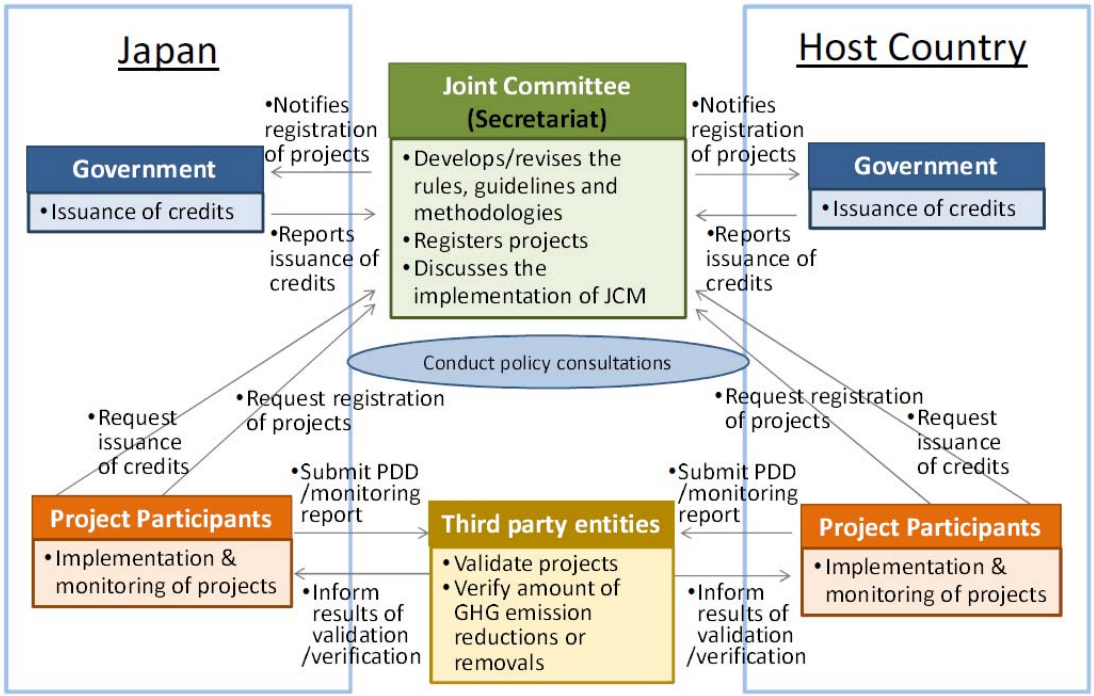
3. JCM scheme

3. JCM Scheme

- 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.



Government of Japan

JCM studies and model projects for JFY 2013

Mongolia:

- Upgrading and Installation of Centralized Control System of High-Efficiency Heat Only Boiler (HOB)
- 10MW-scale solar power plant and rooftop solar power system
- Centralization of heat supply system by installation of high efficiency heat only boiler (HOB)
- 10MW-scale solar power generation for stable power supply
- Energy conservation at cement plant
- Improvement of thermal installation and water cleaning/air purge at power plants

Lao PDR:

- Promotion of use of electric vehicles (EVs)

Cambodia:

- Small-scale Biomass Power Generation by Using Stirling Engines

-- JCM Model Project
-- JCM Project Planning Study (PS)
-- JCM Demonstration Study (DS)
-- JCM Feasibility Study (FS)

Source: http://gec.jp/

JCM model projects and studies in Cambodia, Lao PDR, Mongolia, Vietnam

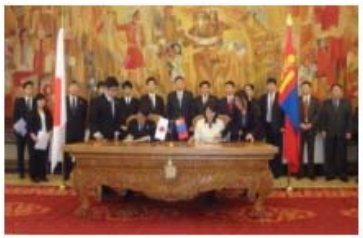
Viet Nam

- Integrated Energy Efficiency Improvement at Beer Factories
- Anaerobic digestion of organic waste for cogeneration at market
- Energy Efficiency improvement of glass furnace
- Promotion of public transport use by park-&-ride system
- Energy saving glass windows for buildings
- REDD+ with livelihood development

Fin

Countries with which Japan has signed on bilateral documents

- Japan has held consultations for the JCM with developing countries since 2011 and signed the bilateral document for the JCM with Mongolia, Bangladesh, Ethiopia, Kenya, Maldives, Viet Nam, Lao PDR, Indonesia, Costa Rica and Palau.



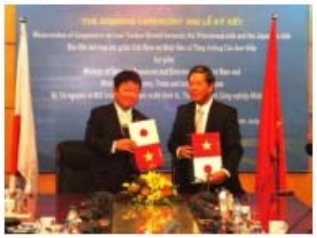
Mongolia
On January 8, 2013
（Ulaanbaatar）

Bangladesh
On March 19, 2013
(Dhaka)

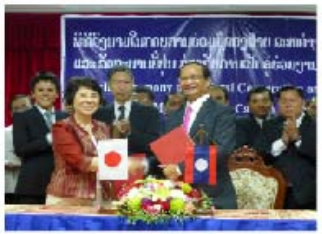
Ethiopia
On May 27, 2013
(Addis Ababa)

Kenya
On June 12,2013
(Nairobi)

Maldives
On June 29, 2013
(Okinawa)

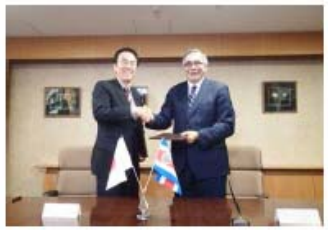


Viet Nam
On July 2, 2013
(Hanoi)



Lao PDR
On August 7, 2013
(Vientiane)

Indonesia
On August 26, 2013
(Jakarta)



Costa Rica
On December 9, 2013
(Tokyo)

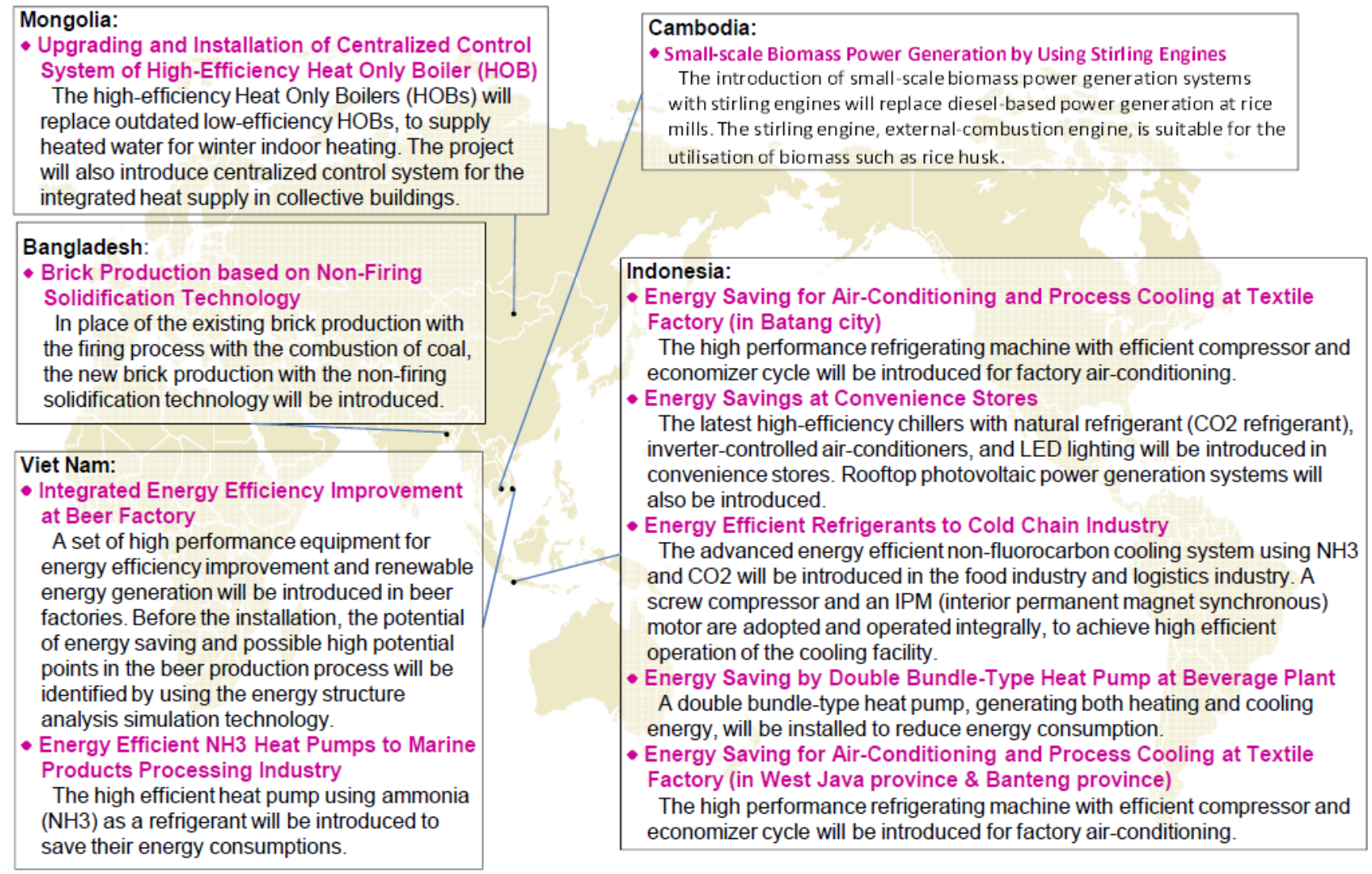
Palau
On January 13, 2014
(Ngerulmud)

＋ Cambodia

- Japan held the 1st Joint Committee with Mongolia, Bangladesh, Ethiopia, Kenya, Viet Nam and Indonesia respectively.

Government of Japan

JCM Model Projects in 2013 by MOEJ



Mongolia:

- **Upgrading and Installation of Centralized Control System of High-Efficiency Heat Only Boiler (HOB)**
  The high-efficiency Heat Only Boilers (HOBs) will replace outdated low-efficiency HOBs, to supply heated water for winter indoor heating. The project will also introduce centralized control system for the integrated heat supply in collective buildings.

Bangladesh:

- **Brick Production based on Non-Firing Solidification Technology**
  In place of the existing brick production with the firing process with the combustion of coal, the new brick production with the non-firing solidification technology will be introduced.

Viet Nam:

- **Integrated Energy Efficiency Improvement at Beer Factory**
  A set of high performance equipment for energy efficiency improvement and renewable energy generation will be introduced in beer factories. Before the installation, the potential of energy saving and possible high potential points in the beer production process will be identified by using the energy structure analysis simulation technology.
- **Energy Efficient NH3 Heat Pumps to Marine Products Processing Industry**
  The high efficient heat pump using ammonia (NH3) as a refrigerant will be introduced to save their energy consumptions.

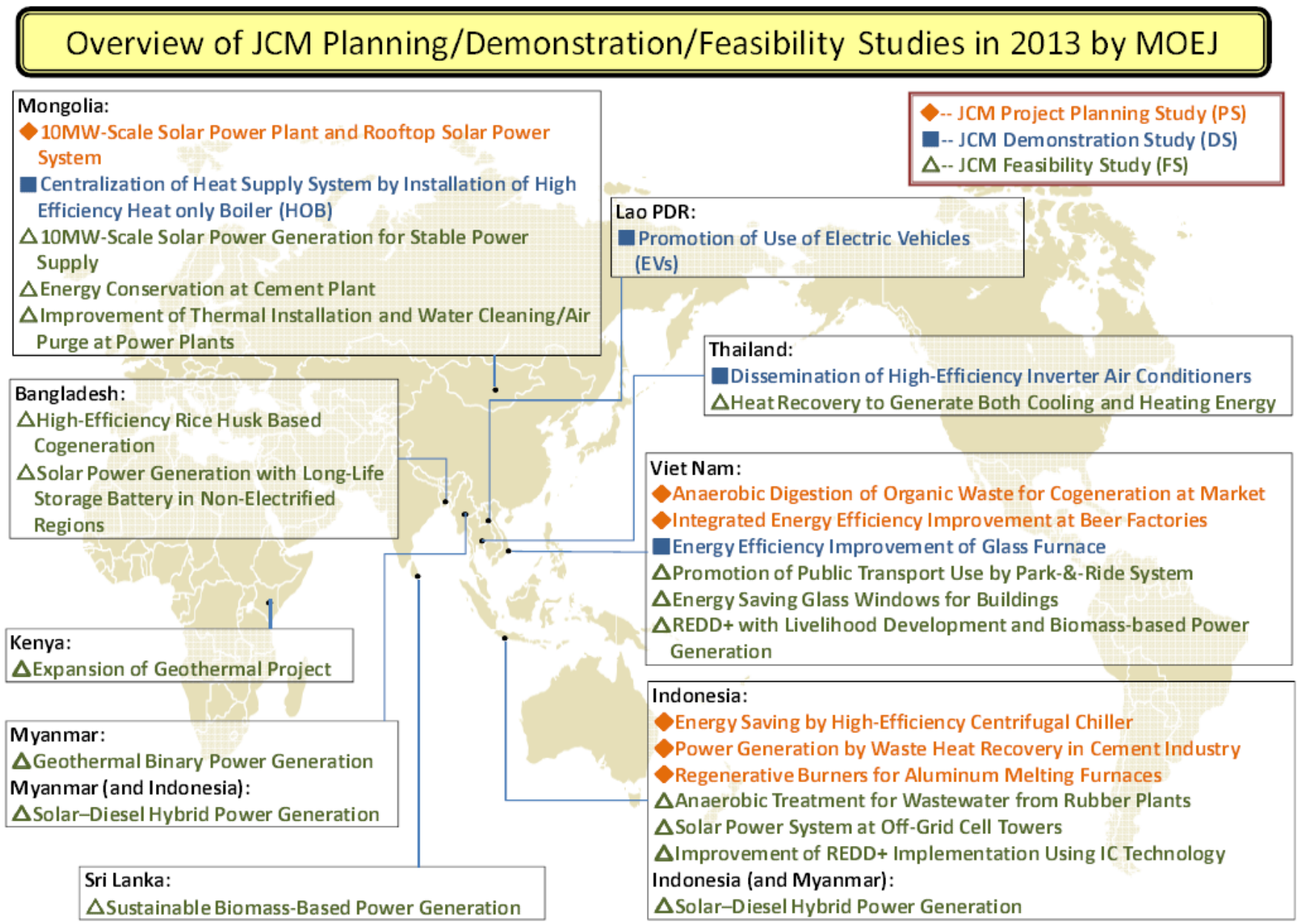
Cambodia:

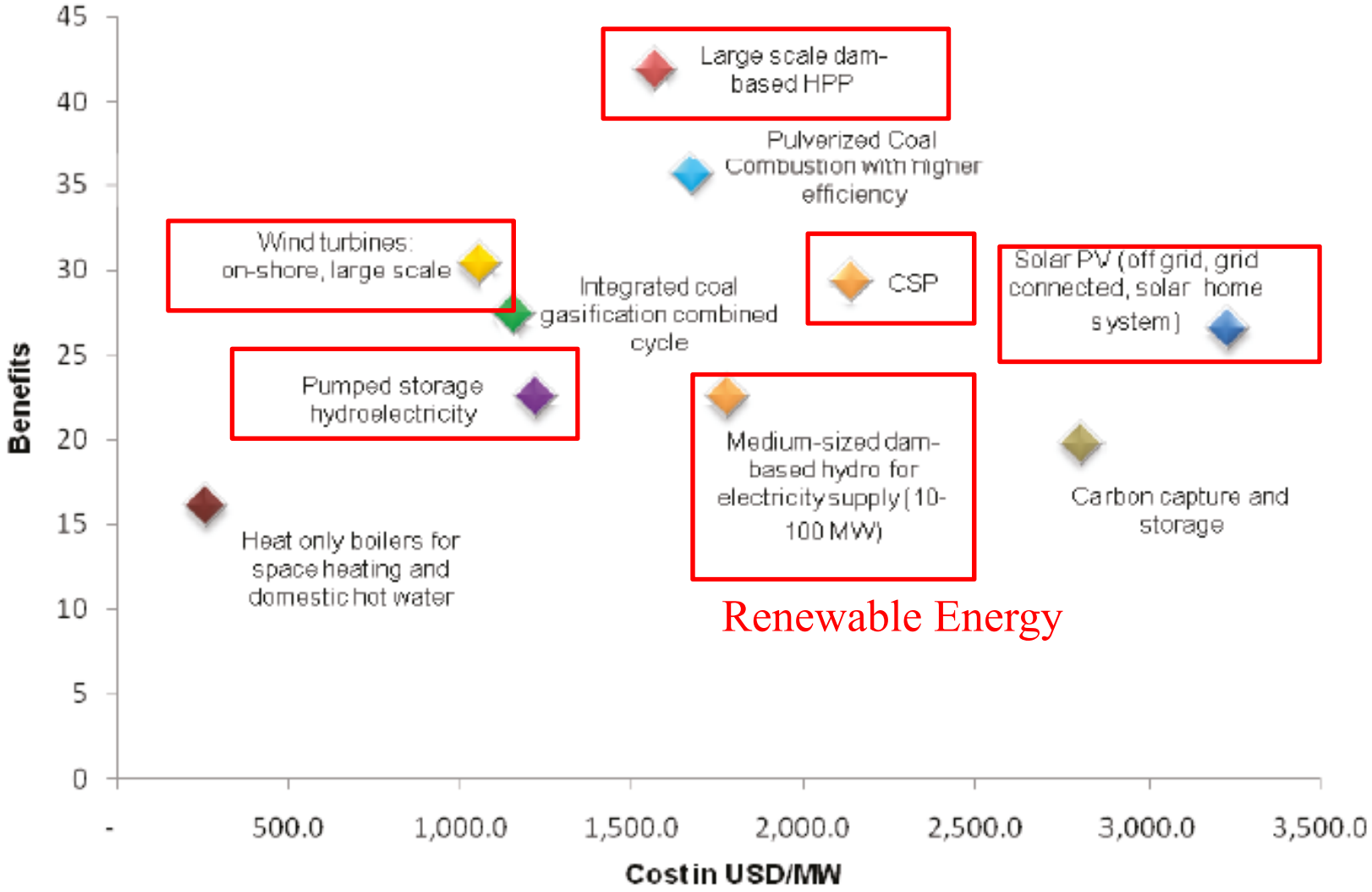
- **Small-scale Biomass Power Generation by Using Stirling Engines**
  The introduction of small-scale biomass power generation systems with stirling engines will replace diesel-based power generation at rice mills. The stirling engine, external-combustion engine, is suitable for the utilisation of biomass such as rice husk.

Indonesia:

- **Energy Saving for Air-Conditioning and Process Cooling at Textile Factory (in Batang city)**
  The high performance refrigerating machine with efficient compressor and economizer cycle will be introduced for factory air-conditioning.
- **Energy Savings at Convenience Stores**
  The latest high-efficiency chillers with natural refrigerant (CO2 refrigerant), inverter-controlled air-conditioners, and LED lighting will be introduced in convenience stores. Rooftop photovoltaic power generation systems will also be introduced.
- **Energy Efficient Refrigerants to Cold Chain Industry**
  The advanced energy efficient non-fluorocarbon cooling system using NH3 and CO2 will be introduced in the food industry and logistics industry. A screw compressor and an IPM (interior permanent magnet synchronous) motor are adopted and operated integrally, to achieve high efficient operation of the cooling facility.
- **Energy Saving by Double Bundle-Type Heat Pump at Beverage Plant**
  A double bundle-type heat pump, generating both heating and cooling energy, will be installed to reduce energy consumption.
- **Energy Saving for Air-Conditioning and Process Cooling at Textile Factory (in West Java province & Banteng province)**
  The high performance refrigerating machine with efficient compressor and economizer cycle will be introduced for factory air-conditioning.

Overview of JCM Planning/Demonstration/Feasibility Studies in 2013 by MOEJ





Cost benefit comparisons of the energy industry subsector technologies for climate change mitigation (TNA 2013)

Components of KPTAP

KPTAP provides mitigation measures information in a tabular format by responsible ministries.

- Individual countermeasures
  = Planed RE project (capacities)

- Their evaluation indicators
  = Total introduced capacity in target year

- Expected GHG emissions reduction
  = Electricity generation × EF

- Policies of the government
  = Renewable Energy low, National Action Program on Climate Change, National Renewable Energy Program, Mongolia's Strategy Low of Mongolia on Energy etc

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Case study

- Individual countermeasures = Planed RE project (capacities)

Grid	Project location	Capacity	Annual electricity generation
HYDRO POWER PLANT			
CES	Khutag-Undur soum, Bulgan province (Egiin HPP)	220 MW	500 mil kWh
CES	Tsagaannuur soum, Selenge province (Shuren HPP)	300 MW	1100 mil kWh
CES	Songinokhairkan district, Ulaanbaatar city	Pumped storage HPP, 100 MW	82 mil kWh
SOLAR POWER PLANT			
CES	Sainshand city, Dornogovi province	30 MW	52 mil kWh
CES	Bayanteeg bag, Nariinteel soum, Uvurkhangai province	8 MW	13 mil kWh
WIND POWER PLANT			
CES	Choir city, Govisumber province	50 MW	123 mil kWh
CES	Khanbogd soum, Umnugovi province	102 MW	300 mil kWh
CES	Sainshand city, Dornogovi province	50 MW	130 mil kWh

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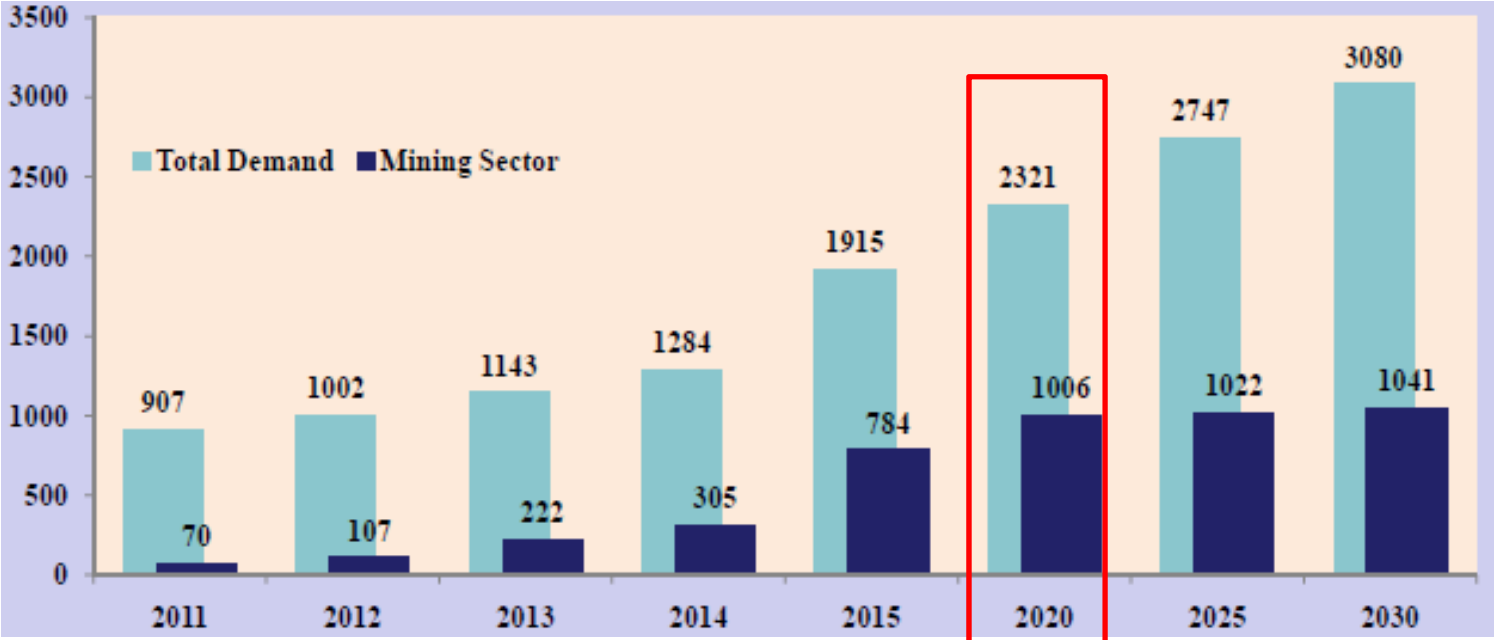
- Their evaluation indicators= Total introduced capacity in target year

National overall target for the share of Renewable Energy in 2020 is 20-25% according to the National Renewable Energy Program

Target of electricity from renewable sources in total electricityproduction in 2020	20-25%
Expected total electricity consumption in 2020 (million kWh)	7800.0
Expected amount of electricity from renewable sources corresponding to 2020 target (million kWh)	1560.0

(TNA 2013)



Energy demand MW (Ministry of Energy)

Target of electricity from renewable sources in total electricityproduction in 2020	20-25%
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(TNA 2013)

Evaluation Indicator

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2300 million kWh

Planed RE project attain the target if it will be constricted and generated by 2020

2300 million kWh > Target (1560 million kWh)

It should be reviewed by Mongolia government (in cross cutting manner) comparing with evaluation indicators in target year or break down of EI in planed initial year of the facilities

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Case study

- Expected GHG emissions reduction= Electricity generation × EF

Emission Factor (EF)

Regional Grid	2009-2010	
	OM*	BM*
Central Energy System	1.1501	1.0559

*(unit: tCO2/MWh)

CDM National Bureau, Mongolia

Combined Margin (CM) is used by MEGD for the estimation of project

EF=CM={OM (Operating Margin) + BM (Build Margin)}/2
=(1.1501+1.0559)/2=1.103 (tCO2/MWh)

Expected GHG emissions reduction
= 2300 million kWh /year × 1.103 tCO2/MWh
= 2,536,900 tCO2/year

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Case study

- Policies of the government

Renewable Energy low

- Article 11.3 Feed in Tariff

US$/kWh

Type of renewable energy generation	Capacity	Connected to electricity grid	Independent power generation
Wind power source	-	0.08-0.095	0.1-0.15
Hydropower station	Up to 5,000 kW	0.045-0.060	-
	Up to 500 kW	-	0.08—0.10
	501-2,000 kW	-	0.05-0.06
	2,001-5,000 kW	-	0.045-0.05
Solar power source	-	0.15-0.18	0.20-0.30

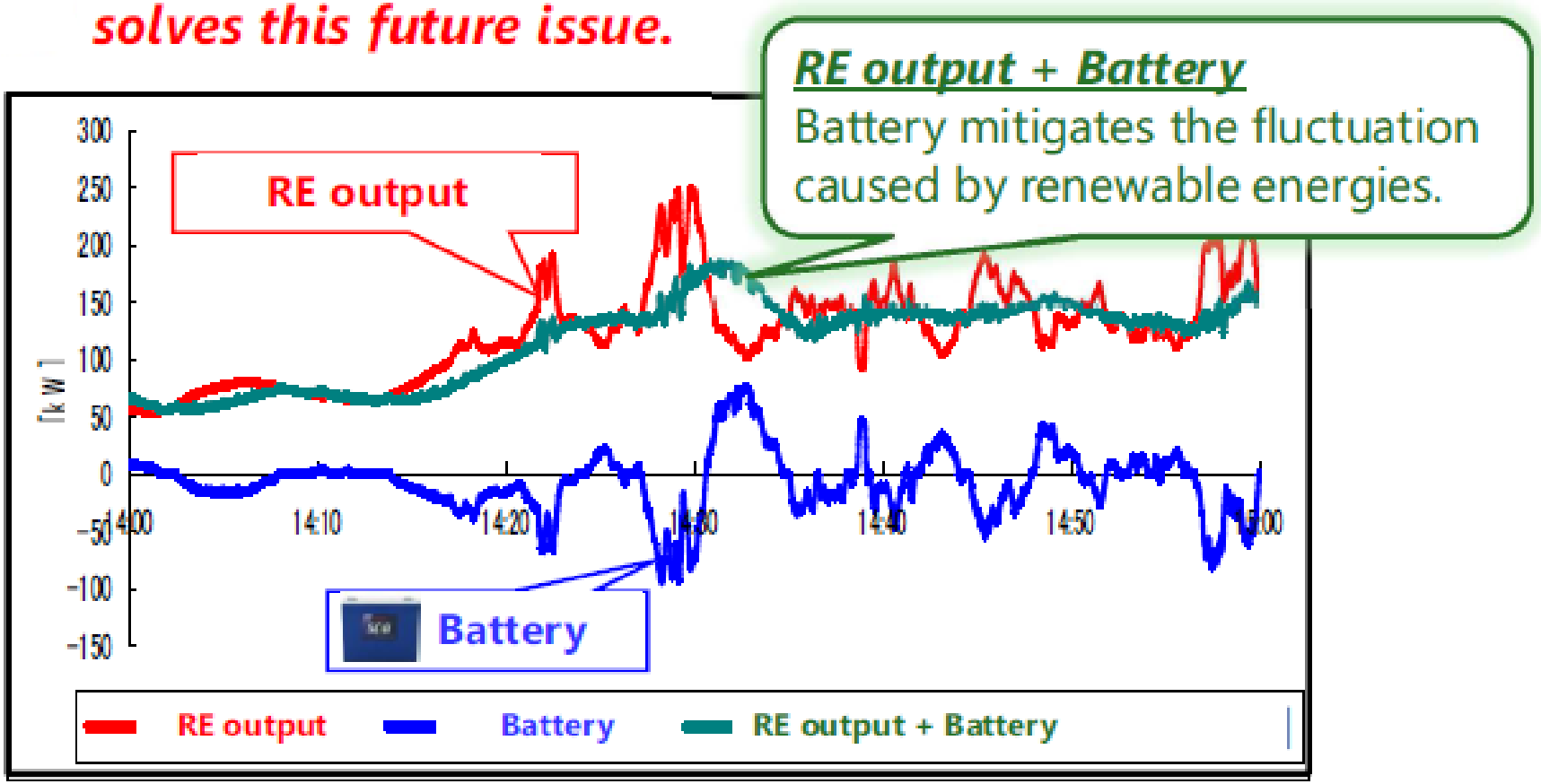
SNC 2010

Renewable Energy low

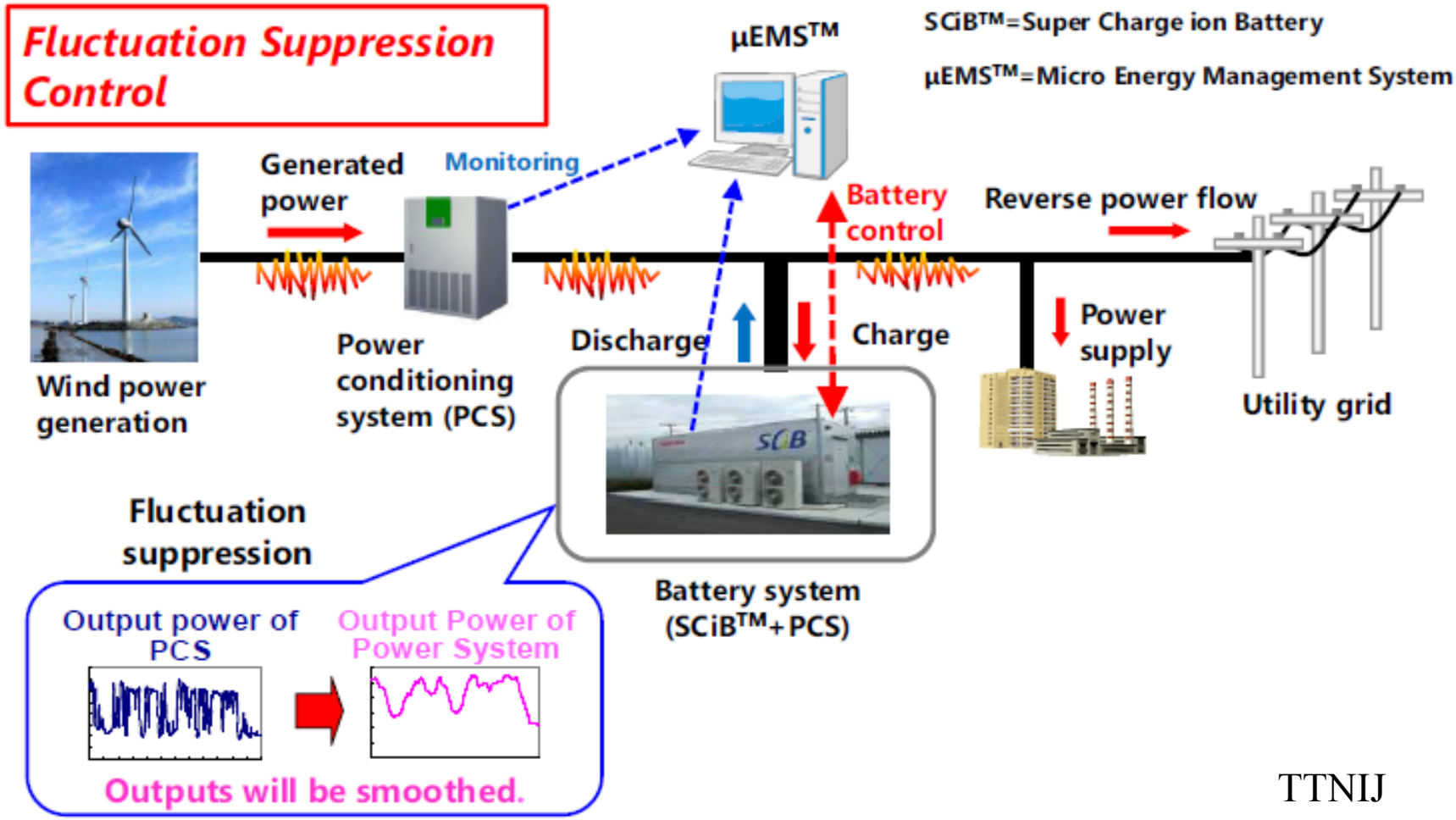
- Article 13 Renewable Energy Fund

Additional technology proposal

solves this future issue.



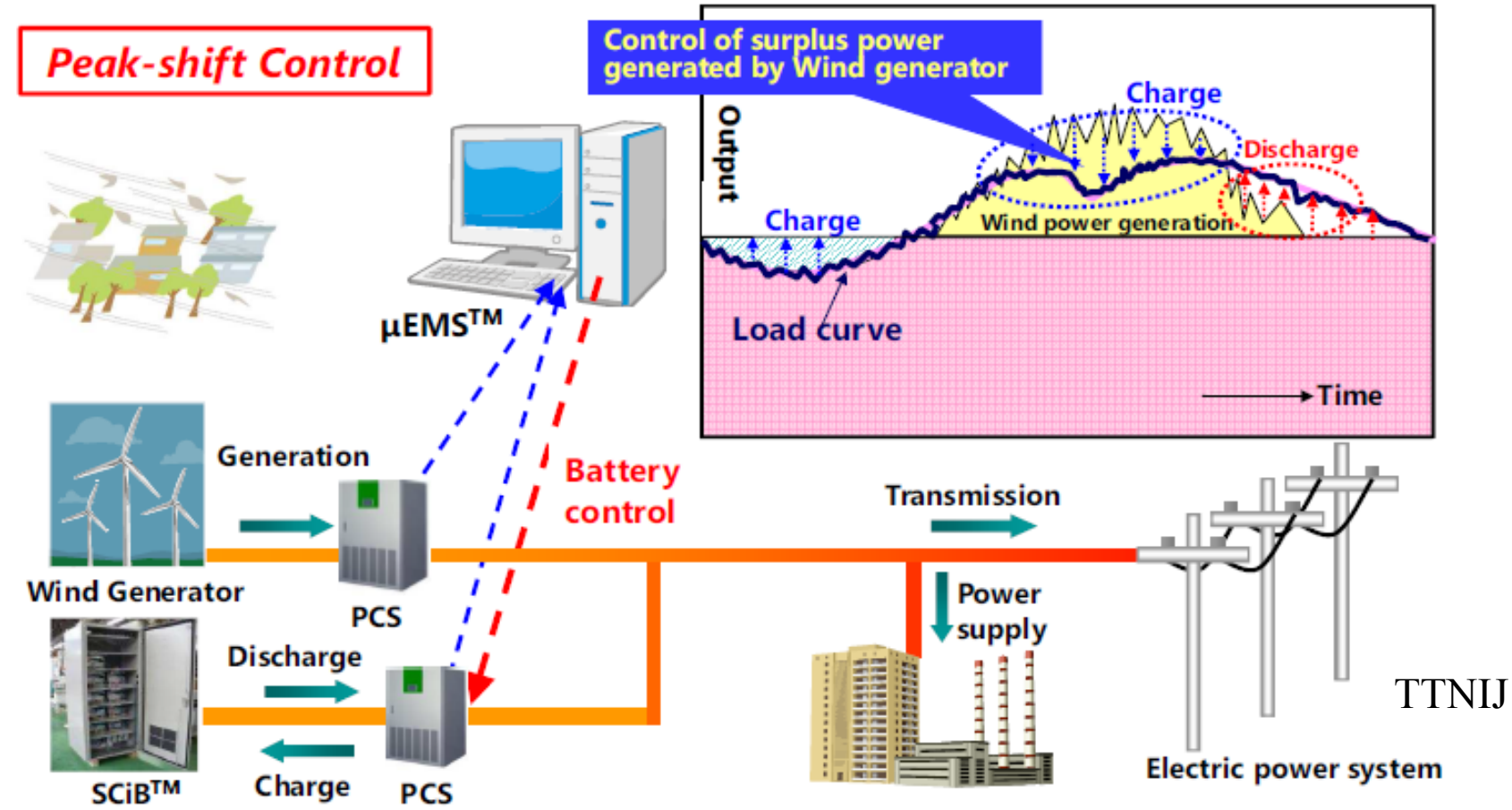
TTNIJ



TTNIJ

The output of WF is smoothed by controlling a battery system.

The battery supports introduction of Wind and Solar facility to connect with CES



The surplus power generated by wind generator can be utilized efficiency.

It is possible to use night time generated electricity by RE supplying charged electricity during peak time to reduce the rate of electricity import from Russia or to reduce coal consumption