Recent Development of the JCM

Achieving Net Reductions by Simplifying Monitoring through the JCM methodologies

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Approved JCM methodologies

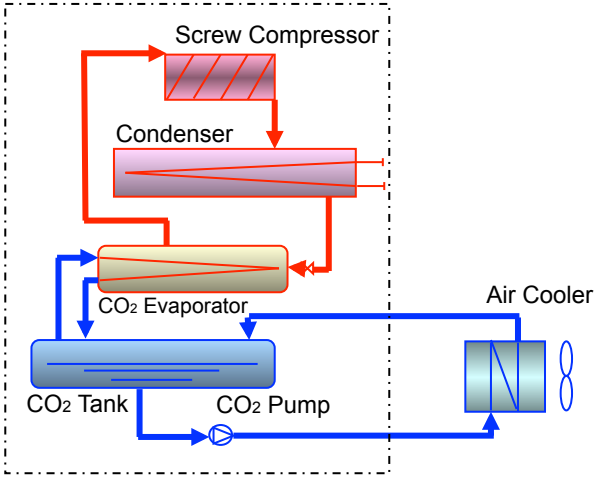
Country	Methodology	Sector	Public input/ comment	Approved Date
Mongolia	Installation of energy-saving transmission lines in the Mongolian Grid	Energy distribution	4 Feb 14 - 18 Feb 14	20 Feb 14
	Replacement and Installation of High Efficiency Heat Only Boiler (HOB) for Hot Water Supply Systems	Energy industries	18 Nov 14 - 2 Dec 14	28 Jan 15
Viet Nam	Transportation energy efficiency activities by installing digital tachograph systems	Transport	19 Nov 14 - 3 Dec 14	14 Jan 15
	Introduction of room air conditioners equipped with inverters to public sector buildings	Energy demand	5 Dec 14 - 19 Dec 14	14 Jan 15
	Improving the energy efficiency of commercial buildings by utilization of high efficiency equipment	Energy demand	5 Dec 14 - 19 Dec 14	14 Jan 15
Indonesia	Power Generation by Waste Heat Recovery in Cement Industry	Energy industries	1 May 14 - 15 May 14	19 May 14
	Energy Saving by Introduction of High Efficiency Centrifugal Chiller	Energy demand	1 May 14 - 15 May 14	17 Sep 14
	Installation of Energy-efficient Refrigerators Using Natural Refrigerant at Food Industry Cold Storage and Frozen Food Processing Plant	Energy demand	10 Sep 14 - 24 Sep 14	30 Oct 14
	Installation of Inverter-Type Air Conditioning System for Cooling for Grocery Store	Energy demand	10 Sep 14 - 24 Sep 14	30 Oct 14
Palau	Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System	Energy industries	22 Jan 15 - 5 Feb 15	20 Feb 15

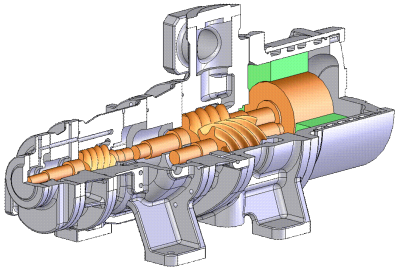
JCM methodologies under consideration by JCs

Country	Methodology	Sector	Public input/ comment
Indonesia	Installation of LED Lighting for Grocery Store	Energy demand	10 Sep 14 - 24 Sep 14
	GHG emission reductions through optimization of refinery plant operation in Indonesia	Energy demand	10 Sep 14 - 24 Sep 14
	GHG emission reductions through optimization of boiler operation in Indonesia	Energy demand	16 Oct 14 - 30 Oct 14

Methodology for High Efficiency Refrigerators Using Natural Refrigerant (1/2)

- High efficient secondary loop cooling system:
  - ✓ Refrigerant: Non-fluorocarbon
    (primary:NH3, secondary:CO2)
  - ✓ COP: for individual quick freezer - more than 1.5
    for cold storage - more than 2.0





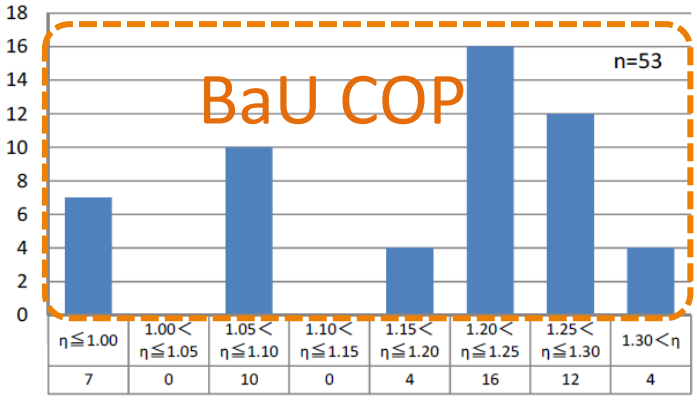
Screw Compressor

Condensing Unit

- The reference emissions are calculated based on the **maximum COP of commercially available** chillers.

Methodology for High Efficiency Refrigerators Using Natural Refrigerant (2/2)

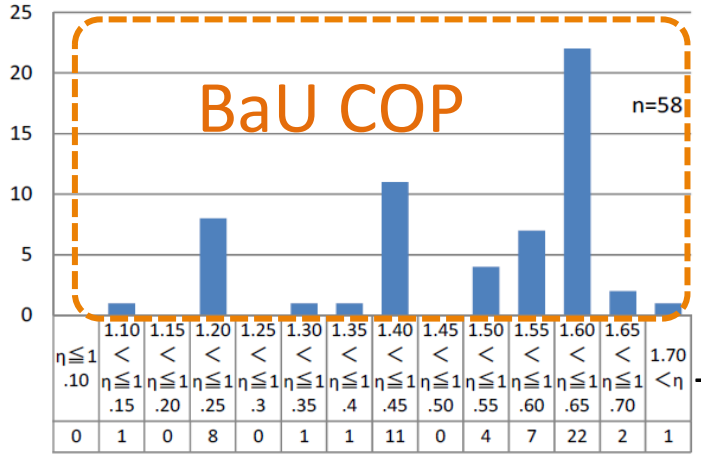
COP value of the possible refrigerators



η≦1.00	1.00< η≦1.05	1.05< η≦1.10	1.10< η≦1.15	1.15< η≦1.20	1.20< η≦1.25	1.25< η≦1.30	1.30<η
7	0	10	0	4	16	12	4

Reference COP

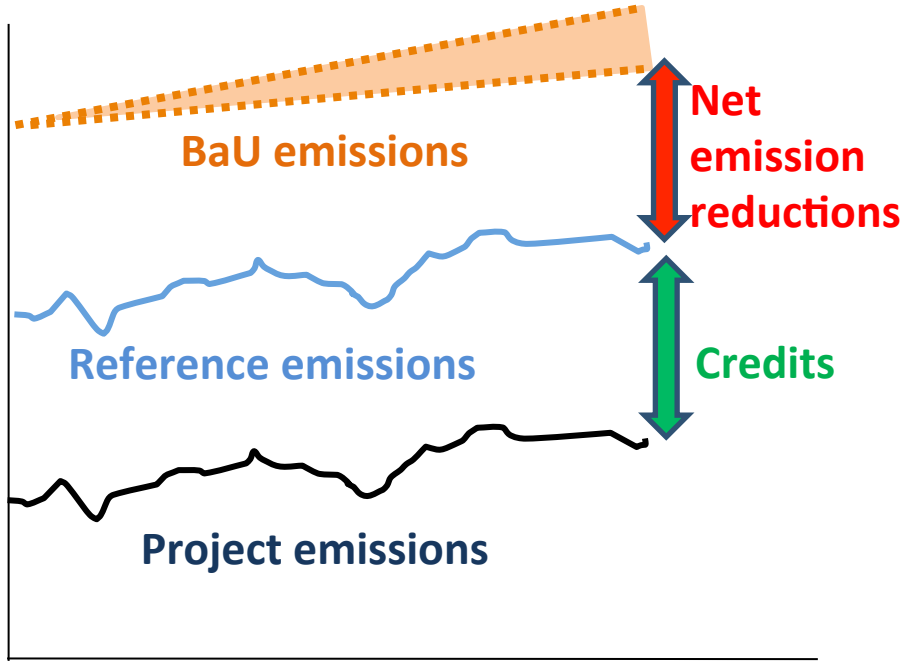
-35 degree Celsius
(Max COP: 1.32)



η≦1.10	1.10< η≦1.15	1.15< η≦1.20	1.20< η≦1.25	1.25< η≦1.3	1.30< η≦1.35	1.35< η≦1.4	1.40< η≦1.45	1.45< η≦1.50	1.50< η≦1.55	1.55< η≦1.60	1.60< η≦1.65	1.65< η≦1.70	1.70 <η
0	1	0	8	0	1	1	11	0	4	7	22	2	1

Reference COP

-25 degree Celsius
(Max COP: 1.71)



- Simplified monitoring: three parameters to be monitored
  - ✓ Amount of electricity consumed by project refrigerator
  - ✓ Electricity imported from the grid, where applicable
  - ✓ Operating time of captive electricity generator, where applicable

Methodology for High Efficiency HOB for Hot Water Supply Systems (1/2)

- High efficient HOB (Heat Only Boiler) for hot water supply system:
  - ✓80% or higher boiler efficiency (catalog value)
  - ✓feeding coal on the stoker uniformly
  - ✓dust collector equipped

Conventional HOBs

High efficient HOBs

- Efficiency of both reference HOBs and project HOBs are set as default value based upon actual measurement.

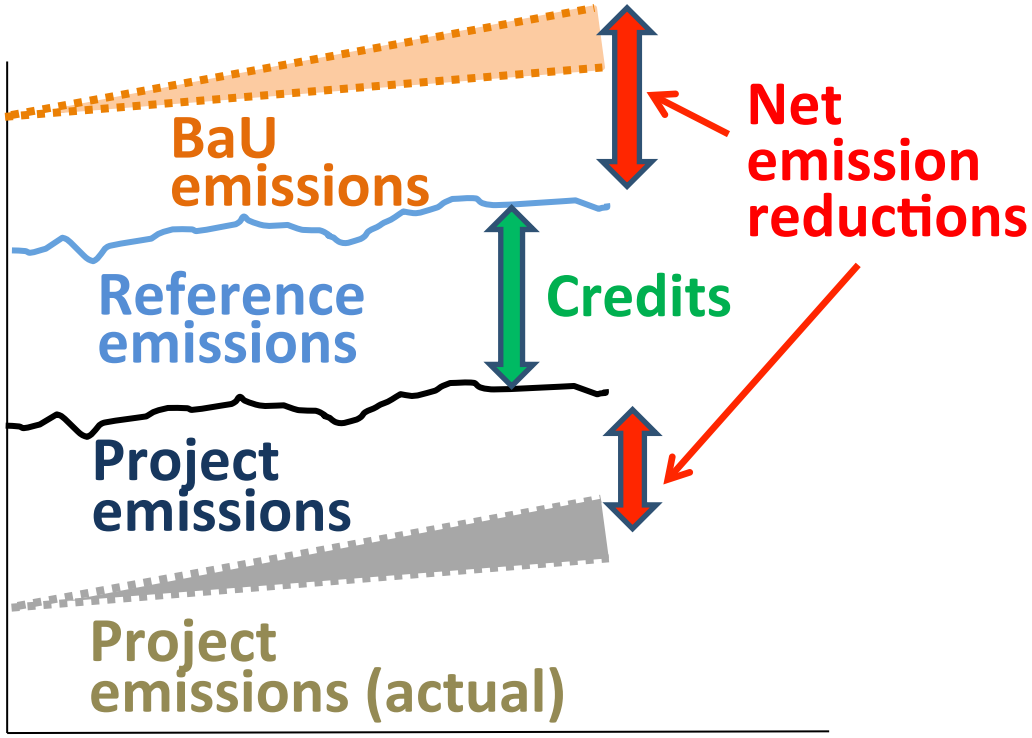
Methodology for High Efficiency HOB for Hot Water Supply Systems (2/2)

- Net emission reductions by setting default values as :
  - ✓ Higher possible efficiency of reference HOBs
  - ✓ Lower possible efficiency of project HOBs

Boiler Efficiencies

Reference HOBs:
37.1-60% (measured)
35-63% (literature)
53.3%

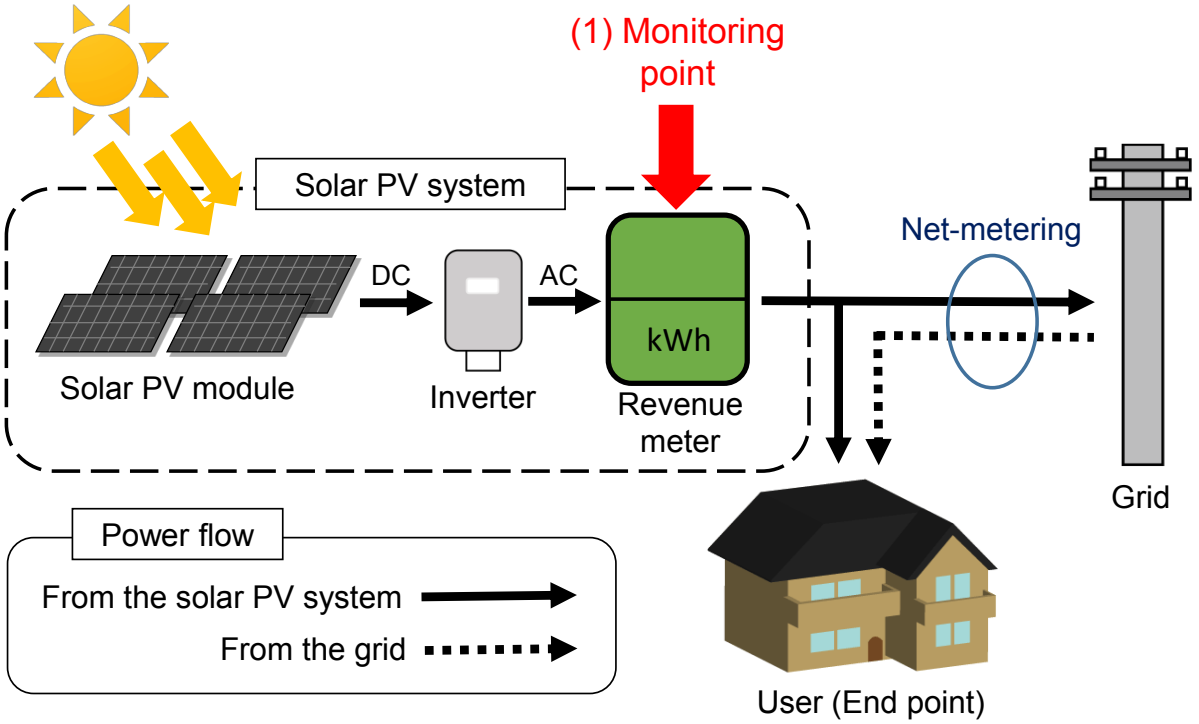
Project HOBs:
56.2-69.1% (measured)
75-85% (literature)
61%



- Monitoring is simplified as only two parameters are to be monitored:
  - ✓ Net heat quantity supplied by the project HOB
  - ✓ Total hours of the project HOB operation during the monitoring period

Methodology for small-scale solar PV system at commercial facility in Small Island States (1/2)

- Solar PV system to displace grid electricity and/or captive electricity using diesel fuel as power source
- Solar PV system certified with:
  - ✓ Design qualifications (IEC 61215, IEC 61646 or IEC 62108)
  - ✓ Safety qualification (IEC 61730-1 and IEC 61730-2)



- The quantity of the electricity generated by the project solar PV system and irradiance are monitored for checking the operational status of the installed solar PV system

Methodology for small-scale solar PV system at commercial facility in Small Island States (2/2)

- Project emissions are zero
- Reference emissions are calculated from [AC output of solar PV system (monitored value)] X [emission factor (tCO2/MWh)]

BaU: **Existing diesel generators**

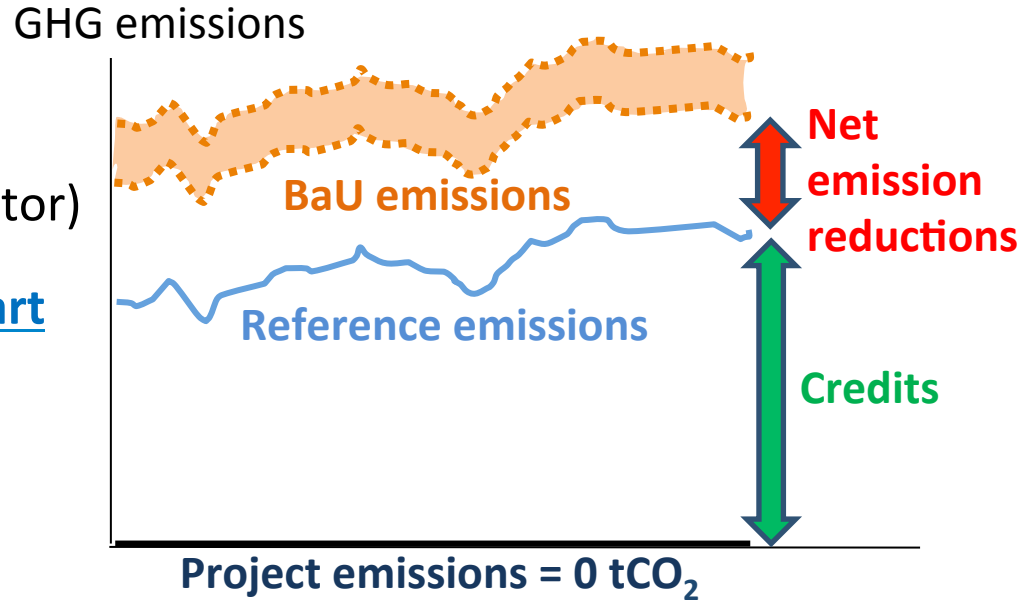
33-41% (power generation efficiency)

0.805-0.631 tCO2/MWh (emission factor)

Reference: **Hypothetical state-of-the-art diesel generators**:

49% (power generation efficiency)

0.533 tCO2/MWh (emission factor)



- The grid emission factor provided by this methodology;
  - ✓ ensure net emission reductions;
  - ✓ eliminates the burden to calculate emission factor by finding out field data;
  - ✓ avoids confusion as to which data vintage should be used when calculating emission reductions;
  - ✓ is applicable in countries where necessary field data are not available;
  - ✓ has potential to be applied widely.

JCM Website: https://www.jcm.go.jp

Contents

- General information page
- Individual JCM Partner countries-Japan page

Function

- Information sharing to the public, e.g.,
  - the JC decisions,
  - rules and guidelines,
  - methodologies,
  - projects,
  - call for public inputs/comments,
  - status of TPEs, etc.
- Internal information sharing for the JC members, e.g.,
  - File sharing for electric decisions by the JC

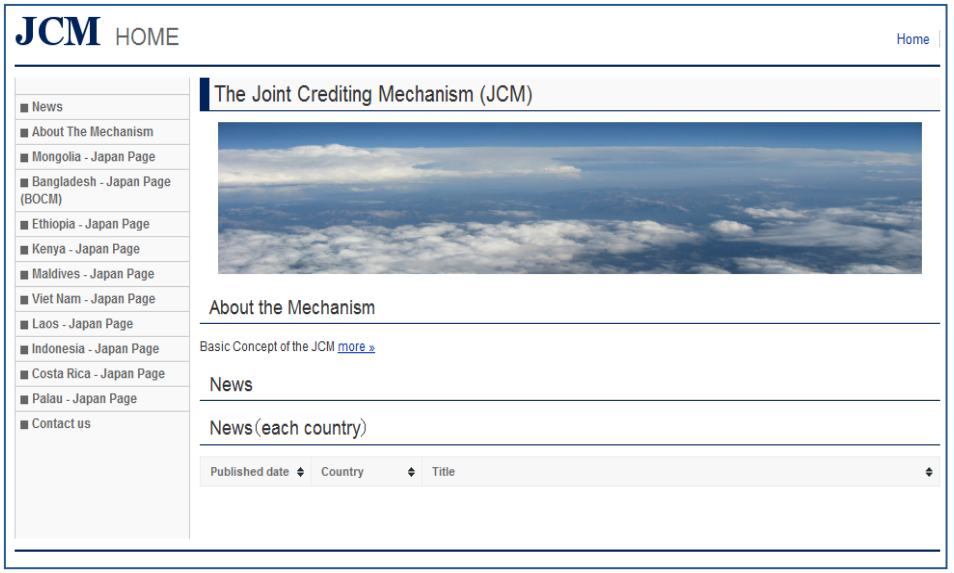
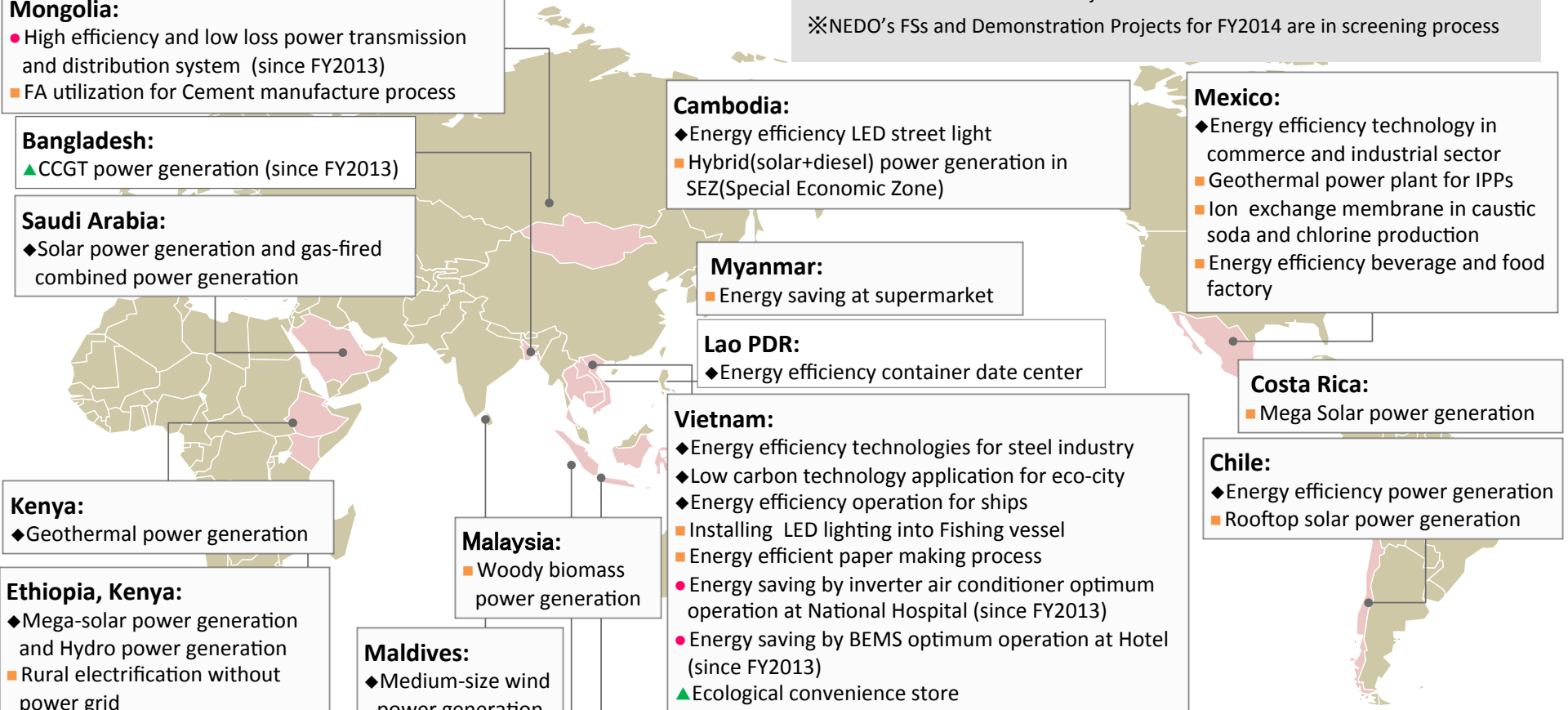


Image of the general information page <URL: https://www.jcm.go.jp/>

Image of the individual JCM Partner countries-Japan page

JCM Feasibility Studies, MRV Applicability Verification Studies and Demonstration Projects by METI & NEDO in FY2014

◆→ METI's FSs for Policy Recommendation
■ → NEDO's FSs for Project Exploration /Development
▲→ NEDO's MRV Applicability Verification Studies
● → NEDO's Demonstration Projects
※NEDO's FSs and Demonstration Projects for FY2014 are in screening process



Mongolia:
- ● High efficiency and low loss power transmission and distribution system (since FY2013)
- ■ FA utilization for Cement manufacture process

Bangladesh:
- ▲ CCGT power generation (since FY2013)

Saudi Arabia:
- ◆ Solar power generation and gas-fired combined power generation

Kenya:
- ◆ Geothermal power generation

Ethiopia, Kenya:
- ◆ Mega-solar power generation and Hydro power generation
- ■ Rural electrification without power grid

Ethiopia:
- ■ Bioethanol from molasses

Thailand:
- ◆ Energy efficiency technologies for steel industry
- ◆ Bio-coke
- ■ High efficiency small boiler

Malaysia:
- ■ Woody biomass power generation

Maldives:
- ◆ Medium-size wind power generation

Cambodia:
- ◆ Energy efficiency LED street light
- ■ Hybrid(solar+diesel) power generation in SEZ(Special Economic Zone)

Myanmar:
- ■ Energy saving at supermarket

Lao PDR:
- ◆ Energy efficiency container date center

Vietnam:
- ◆ Energy efficiency technologies for steel industry
- ◆ Low carbon technology application for eco-city
- ◆ Energy efficiency operation for ships
- ■ Installing LED lighting into Fishing vessel
- ■ Energy efficient paper making process
- ● Energy saving by inverter air conditioner optimum operation at National Hospital (since FY2013)
- ● Energy saving by BEMS optimum operation at Hotel (since FY2013)
- ▲ Ecological convenience store

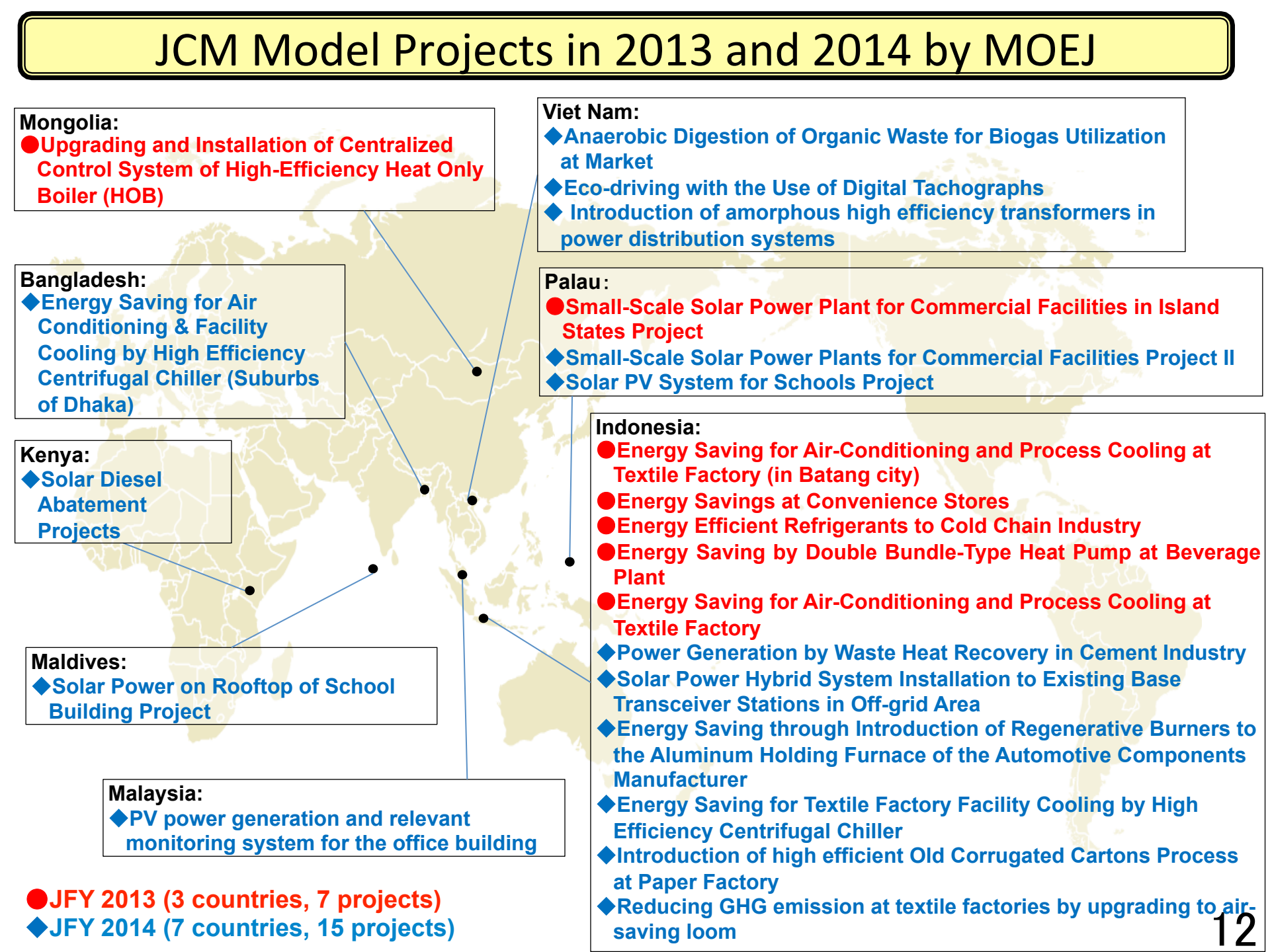
Indonesia:
- ◆ Energy efficiency for mobile communication system ◆ Low carbon waste treatment
- ◆ LNG supply chain development and energy conversion ◆ REDD+ (6 projects)
- ■ Energy saving by operation at material factory
- ■ Energy efficiency at data center ■ CCS
- ● Energy saving by optimum operation at Oil factory (since FY2013)
- ● Utility facility operation optimization technology into Oil factory (since FY2013)
- ● Thin-Film solar power plant (since FY2013)

Mexico:
- ◆ Energy efficiency technology in commerce and industrial sector
- ■ Geothermal power plant for IPPs
- ■ Ion exchange membrane in caustic soda and chlorine production
- ■ Energy efficiency beverage and food factory

Costa Rica:
- ■ Mega Solar power generation

Chile:
- ◆ Energy efficiency power generation
- ■ Rooftop solar power generation

JCM Model Projects in 2013 and 2014 by MOEJ



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

Bangladesh:
- ◆Energy Saving for Air Conditioning & Facility Cooling by High Efficiency Centrifugal Chiller (Suburbs of Dhaka)

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

Kenya:
- ◆Solar Diesel Abatement Projects

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

Maldives:
- ◆Solar Power on Rooftop of School Building Project

Malaysia:
- ◆PV power generation and relevant monitoring system for the office building

●JFY 2013 (3 countries, 7 projects)
◆JFY 2014 (7 countries, 15 projects)