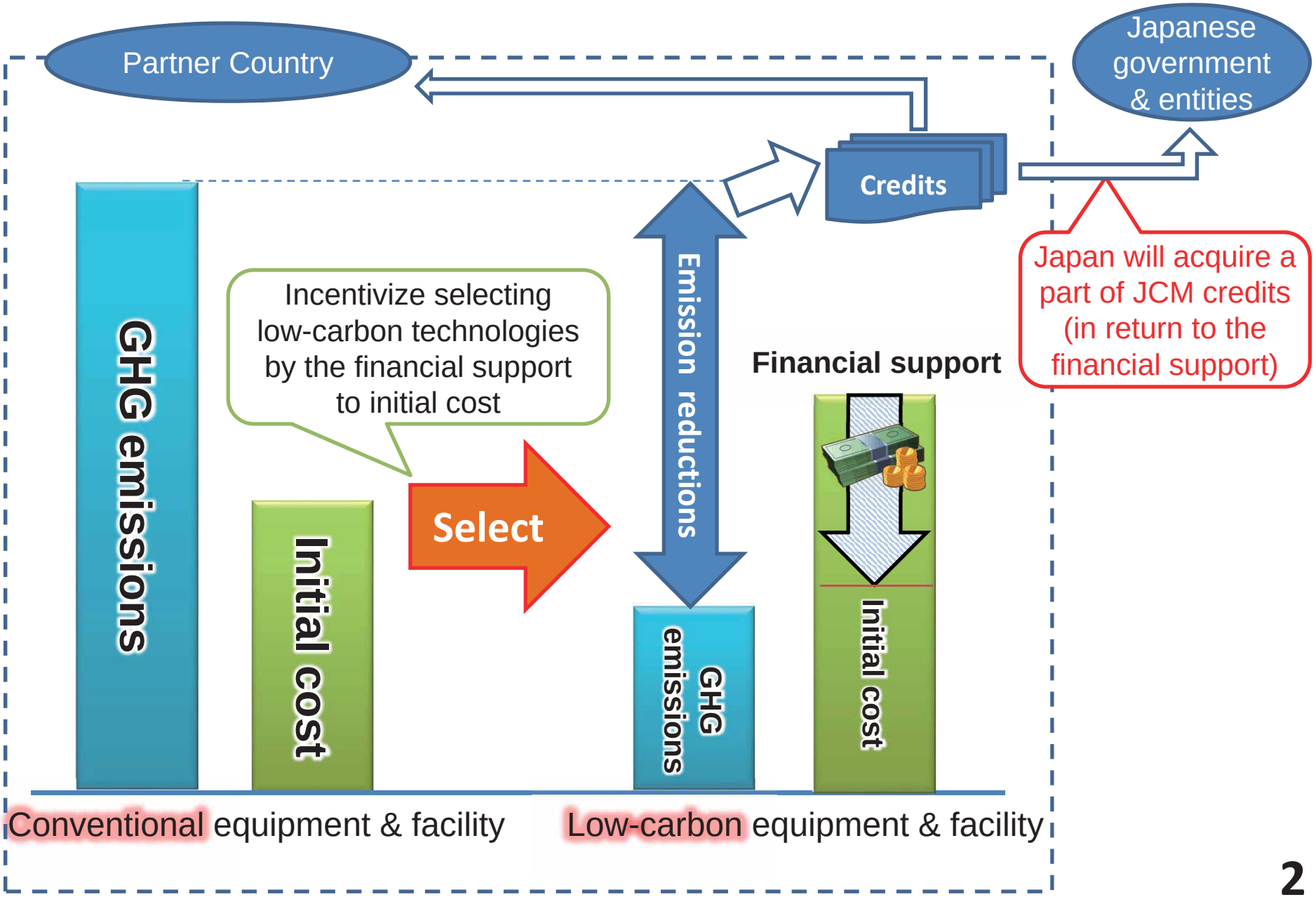
Recent Development of the JCM

Kazumasa NAGAMORI
Ministry of the Environment
July 2019

Contributions from Japan



JCM Model Projects by MOE

Budget for projects starting from FY 2019 is 9.9 billion JPY (approx. USD 99 million) in total by FY2021

(1 USD = 100 JPY)

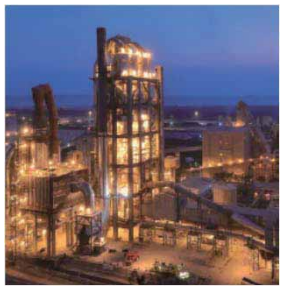
※Includes collaboration with projects supported by JICA and other governmental-affiliated financial institute.

Government of Japan

Finance part of an investment cost (**less than half**)

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

International consortiums
(which include Japanese entities)



- 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.

ADB Trust Fund: Japan Fund for Joint Crediting Mechanism (JFJCM)

Budget for FY2019

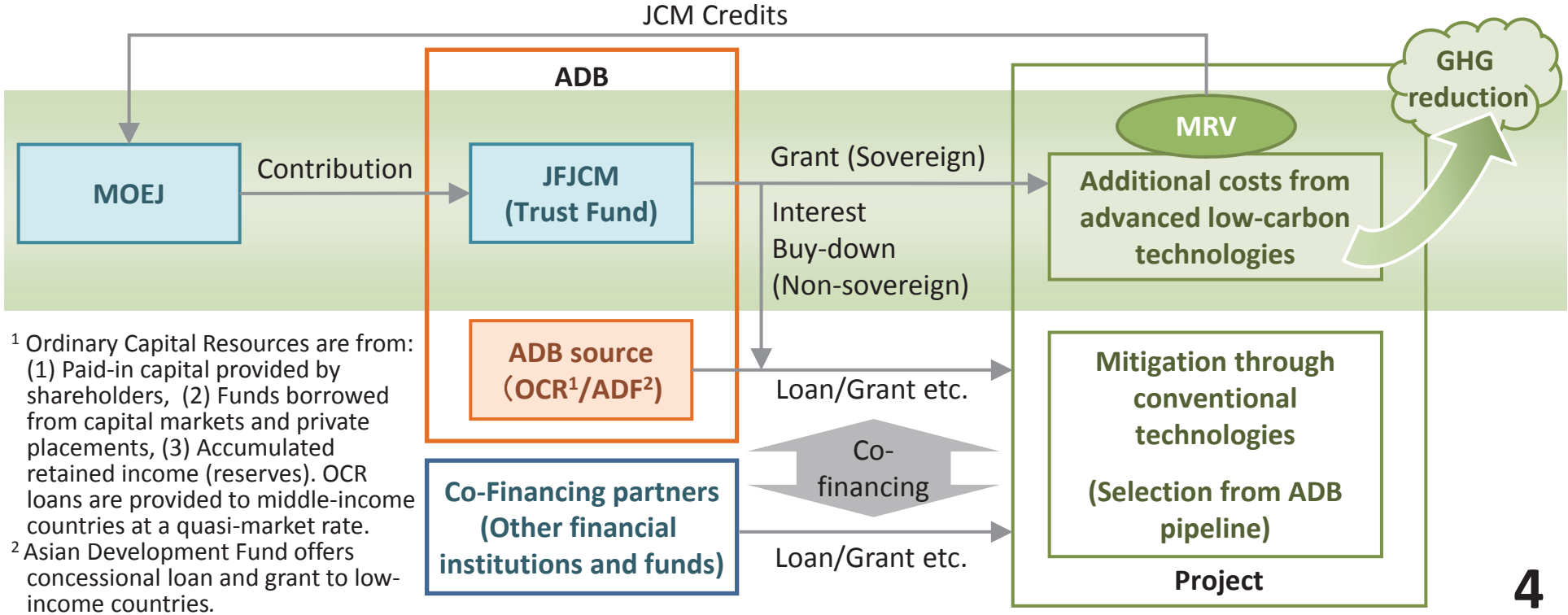
•JPY 1 billion (approx. USD 10 million

Scheme

To provide the financial incentives for the adoption of advanced low-carbon technologies which are superior in GHG emission reduction but expensive in ADB(Asian Development Bank)-financed projects

Purpose

To develop ADB projects with sustainable and low-carbon transition perspective by introducing advanced low-carbon technologies as well as to acquire JCM credits



[1] Ordinary Capital Resources are from: (1) Paid-in capital provided by shareholders, (2) Funds borrowed from capital markets and private placements, (3) Accumulated retained income (reserves). OCR loans are provided to middle-income countries at a quasi-market rate.

[2] Asian Development Fund offers concessional loan and grant to low-income countries.

JCM F-gas Recovery and Destruction Model Project by MOE

【Budget for FY 2019】
41 million JPY (approx. 0.41 million USD) (1 USD = 100 JPY)

Government of Japan

Finance part of the cost in flat-rate (up to 40 million JPY/year)

Conduct MRV to estimate GHG emission reductions.
At least half or ratio of financial support to project cost (larger ratio will be applied) of JCM credits issued are expected to be delivered to the government of Japan

International consortiums (which include Japanese entities)

Manufacturers of equipment which uses F-gas	Users of equipment which uses F-gas	Entities for recovery and transportation of used F-gas (recycling or scrap entities)	Entities for destruction of used F-gas (may use existing facility for destruction)

Purpose

To recover and destroy F-gas (GHG except for energy-related CO2, etc) from used equipment instead of releasing to air, and reduce emissions

Scope of Financing

- Establish scheme for recovery and destruction
- Install facilities/equipment for recovery/destruction
- Implementation of recovery, transportation, destruction and monitoring

Project Period

Three years in maximum (Ex. 1st year for scheme, 2nd year for facilities, 3rd year for recovery/destruction)

Eligible Projects

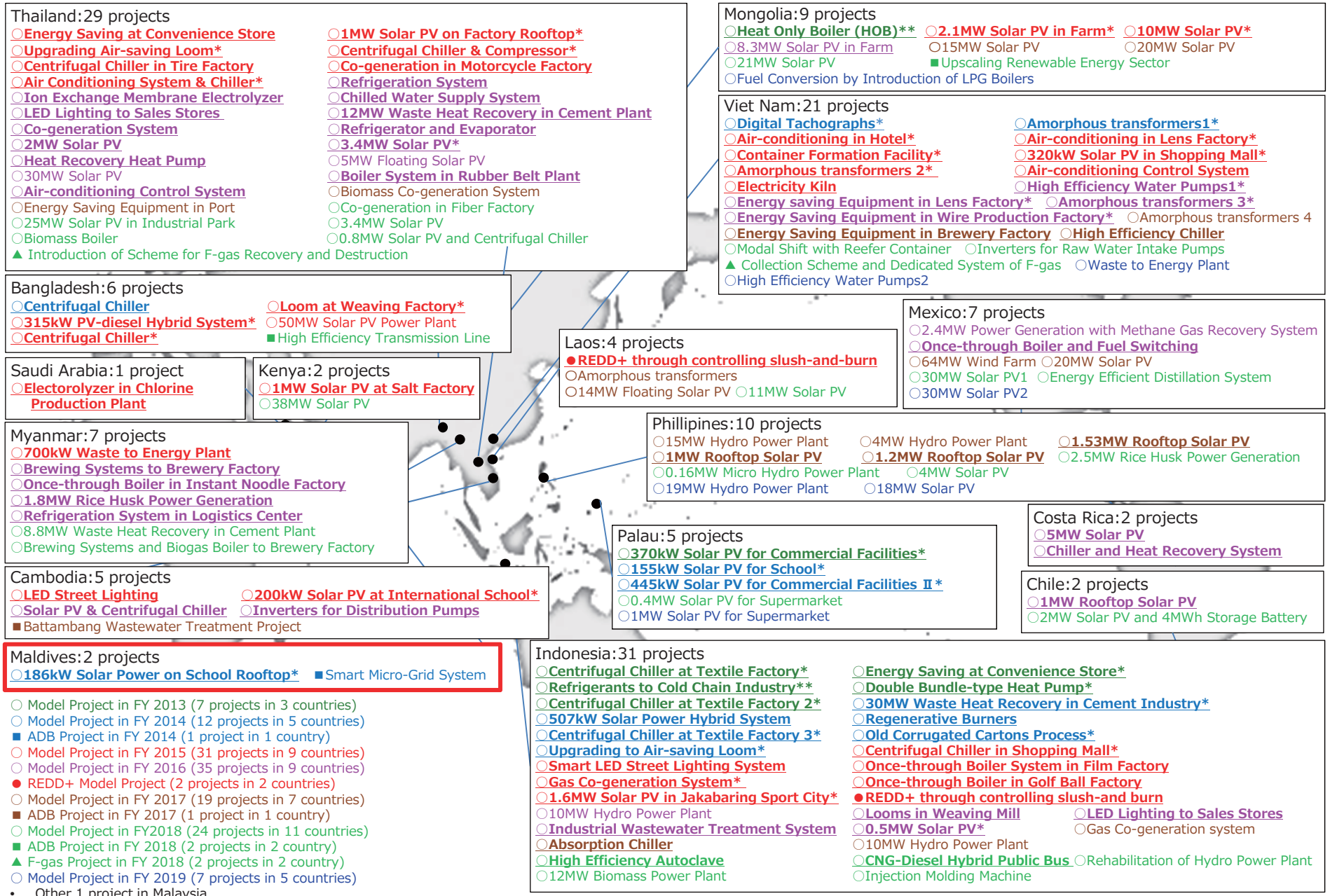
- After the adoption of financing, start implementation of recovery/destruction within three years
- Aim for the registration as JCM project and issuance credits

Expected schedule of JCM financing programme in FY2019

[JCM Model Project]

Items	Date
・Starting date for request ・Deadline for entities to submit their application	From 2019, Application is open from 5th April through 29th November. (It may close before the deadline due to the availability of remaining budget.)
Announcement of selection	At any time upon selection

JCM Financing Programme by MOEJ (FY2013～2019) as of June 27, 2019



Thailand:29 projects

- ○Energy Saving at Convenience Store
- ○Upgrading Air-saving Loom*
- ○Centrifugal Chiller in Tire Factory
- ○Air Conditioning System & Chiller*
- ○Ion Exchange Membrane Electrolyzer
- ○LED Lighting to Sales Stores
- ○Co-generation System
- ○2MW Solar PV
- ○Heat Recovery Heat Pump
- ○30MW Solar PV
- ○Air-conditioning Control System
- ○Energy Saving Equipment in Port
- ○25MW Solar PV in Industrial Park
- ○Biomass Boiler
- ○1MW Solar PV on Factory Rooftop*
- ○Centrifugal Chiller & Compressor*
- ○Co-generation in Motorcycle Factory
- ○Refrigeration System
- ○Chilled Water Supply System
- ○12MW Waste Heat Recovery in Cement Plant
- ○Refrigerator and Evaporator
- ○3.4MW Solar PV*
- ○5MW Floating Solar PV
- ○Boiler System in Rubber Belt Plant
- ○Biomass Co-generation System
- ○Co-generation in Fiber Factory
- ○3.4MW Solar PV
- ○0.8MW Solar PV and Centrifugal Chiller
- ▲ Introduction of Scheme for F-gas Recovery and Destruction

Mongolia:9 projects

- ○Heat Only Boiler (HOB)**
- ○2.1MW Solar PV in Farm*
- ○10MW Solar PV*
- ○8.3MW Solar PV in Farm
- ○15MW Solar PV
- ○20MW Solar PV
- ○21MW Solar PV
- ■Upscaling Renewable Energy Sector
- ○Fuel Conversion by Introduction of LPG Boilers

Viet Nam:21 projects

- ○Digital Tachographs*
- ○Air-conditioning in Hotel*
- ○Container Formation Facility*
- ○Amorphous transformers 2*
- ○Electricity Kiln
- ○Energy saving Equipment in Lens Factory*
- ○Energy Saving Equipment in Wire Production Factory*
- ○Energy Saving Equipment in Brewery Factory
- ○Amorphous transformers1*
- ○Air-conditioning in Lens Factory*
- ○320kW Solar PV in Shopping Mall*
- ○Air-conditioning Control System
- ○High Efficiency Water Pumps1*
- ○Amorphous transformers 3*
- ○Amorphous transformers 4
- ○High Efficiency Chiller
- ○Modal Shift with Reefer Container
- ○Inverters for Raw Water Intake Pumps
- ▲ Collection Scheme and Dedicated System of F-gas
- ○Waste to Energy Plant
- ○High Efficiency Water Pumps2

Bangladesh:6 projects

- ○Centrifugal Chiller
- ○315kW PV-diesel Hybrid System*
- ○Centrifugal Chiller*
- ○Loom at Weaving Factory*
- ○50MW Solar PV Power Plant
- ■High Efficiency Transmission Line

Laos:4 projects

- ●REDD+ through controlling slush-and-burn
- ○Amorphous transformers
- ○14MW Floating Solar PV
- ○11MW Solar PV

Mexico:7 projects

- ○2.4MW Power Generation with Methane Gas Recovery System
- ○Once-through Boiler and Fuel Switching
- ○64MW Wind Farm
- ○20MW Solar PV
- ○30MW Solar PV1
- ○Energy Efficient Distillation System
- ○30MW Solar PV2

Saudi Arabia:1 project

- ○Electorolyzer in Chlorine Production Plant

Kenya:2 projects

- ○1MW Solar PV at Salt Factory
- ○38MW Solar PV

Phillipines:10 projects

- ○15MW Hydro Power Plant
- ○4MW Hydro Power Plant
- ○1.53MW Rooftop Solar PV
- ○1MW Rooftop Solar PV
- ○1.2MW Rooftop Solar PV
- ○2.5MW Rice Husk Power Generation
- ○0.16MW Micro Hydro Power Plant
- ○4MW Solar PV
- ○19MW Hydro Power Plant
- ○18MW Solar PV

Myanmar:7 projects

- ○700kW Waste to Energy Plant
- ○Brewing Systems to Brewery Factory
- ○Once-through Boiler in Instant Noodle Factory
- ○1.8MW Rice Husk Power Generation
- ○Refrigeration System in Logistics Center
- ○8.8MW Waste Heat Recovery in Cement Plant
- ○Brewing Systems and Biogas Boiler to Brewery Factory

Palau:5 projects

- ○370kW Solar PV for Commercial Facilities*
- ○155kW Solar PV for School*
- ○445kW Solar PV for Commercial Facilities Ⅱ*
- ○0.4MW Solar PV for Supermarket
- ○1MW Solar PV for Supermarket

Costa Rica:2 projects

- ○5MW Solar PV
- ○Chiller and Heat Recovery System

Cambodia:5 projects

- ○LED Street Lighting
- ○Solar PV & Centrifugal Chiller
- ○200kW Solar PV at International School*
- ○Inverters for Distribution Pumps
- ■Battambang Wastewater Treatment Project

Chile:2 projects

- ○1MW Rooftop Solar PV
- ○2MW Solar PV and 4MWh Storage Battery

Maldives:2 projects

- ○186kW Solar Power on School Rooftop*
- ■Smart Micro-Grid System

Indonesia:31 projects

- ○Centrifugal Chiller at Textile Factory*
- ○Refrigerants to Cold Chain Industry**
- ○Centrifugal Chiller at Textile Factory 2*
- ○507kW Solar Power Hybrid System
- ○Centrifugal Chiller at Textile Factory 3*
- ○Upgrading to Air-saving Loom*
- ○Smart LED Street Lighting System
- ○Gas Co-generation System*
- ○1.6MW Solar PV in Jakabaring Sport City*
- ○10MW Hydro Power Plant
- ○Industrial Wastewater Treatment System
- ○Absorption Chiller
- ○High Efficiency Autoclave
- ○12MW Biomass Power Plant
- ○Energy Saving at Convenience Store*
- ○Double Bundle-type Heat Pump*
- ○30MW Waste Heat Recovery in Cement Industry*
- ○Regenerative Burners
- ○Old Corrugated Cartons Process*
- ○Centrifugal Chiller in Shopping Mall*
- ○Once-through Boiler System in Film Factory
- ○Once-through Boiler in Golf Ball Factory
- ●REDD+ through controlling slush-and burn
- ○Looms in Weaving Mill
- ○0.5MW Solar PV*
- ○10MW Hydro Power Plant
- ○CNG-Diesel Hybrid Public Bus
- ○Rehabilitation of Hydro Power Plant
- ○Injection Molding Machine
- ○LED Lighting to Sales Stores
- ○Gas Co-generation system

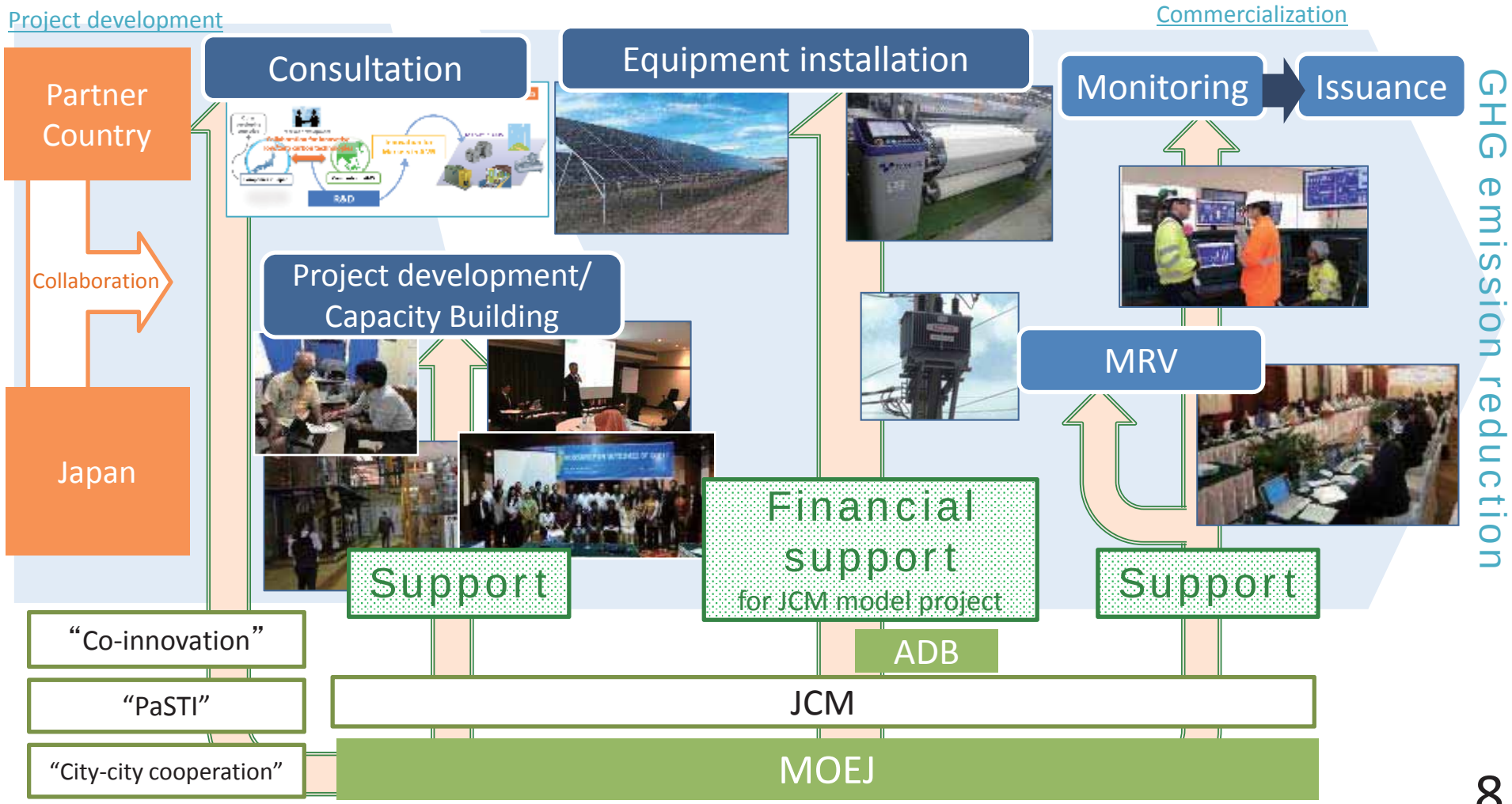
○ Model Project in FY 2013 (7 projects in 3 countries)
○ Model Project in FY 2014 (12 projects in 5 countries)
■ ADB Project in FY 2014 (1 project in 1 country)
○ Model Project in FY 2015 (31 projects in 9 countries)
○ Model Project in FY 2016 (35 projects in 9 countries)
● REDD+ Model Project (2 projects in 2 countries)
○ Model Project in FY 2017 (19 projects in 7 countries)
■ ADB Project in FY 2017 (1 project in 1 country)
○ Model Project in FY2018 (24 projects in 11 countries)
■ ADB Project in FY 2018 (2 projects in 2 country)
▲ F-gas Project in FY 2018 (2 projects in 2 country)
○ Model Project in FY 2019 (7 projects in 5 countries)
• Other 1 project in Malaysia

Total 143 projects in 16 partner countries

Underlined projects have started operation (90 projects)
Projects with * have been registered as JCM projects (42 projects)

Total support for JCM by MOEJ and more

- MOEJ provides total support for the JCM project from idea to action and implementation.



Solar Power on Rooftop of School Building Project

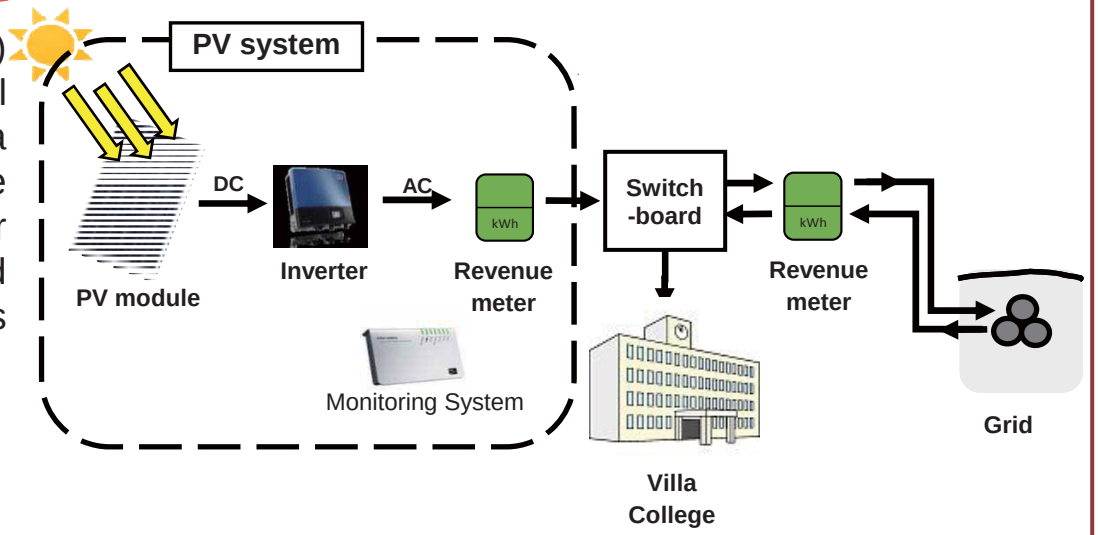
Project Implementer: (Japan) Pacific Consultants Co., Ltd.
(Maldives) Villa Educational Services Private Limited

Overview of the Project

A 186.72kW grid-connected photovoltaic (PV) system was installed on the rooftops of school buildings. Uses high quality PV modules of a Japanese manufacturer and general-purpose inverters with easy maintenance suitable for small-scale applications. The power generated is normally consumed in-house. When there is surplus power, it is supplied to the grid.

156tCO2/year

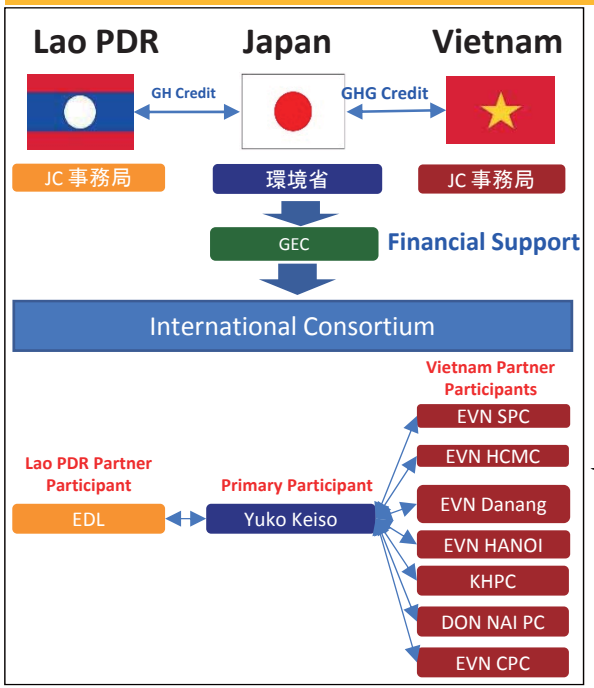
CO2 emission reduction
= PV generation (a) × Grid emission factor (b)
= 293.05 MWh/year × 0.533 tCO2/MWh

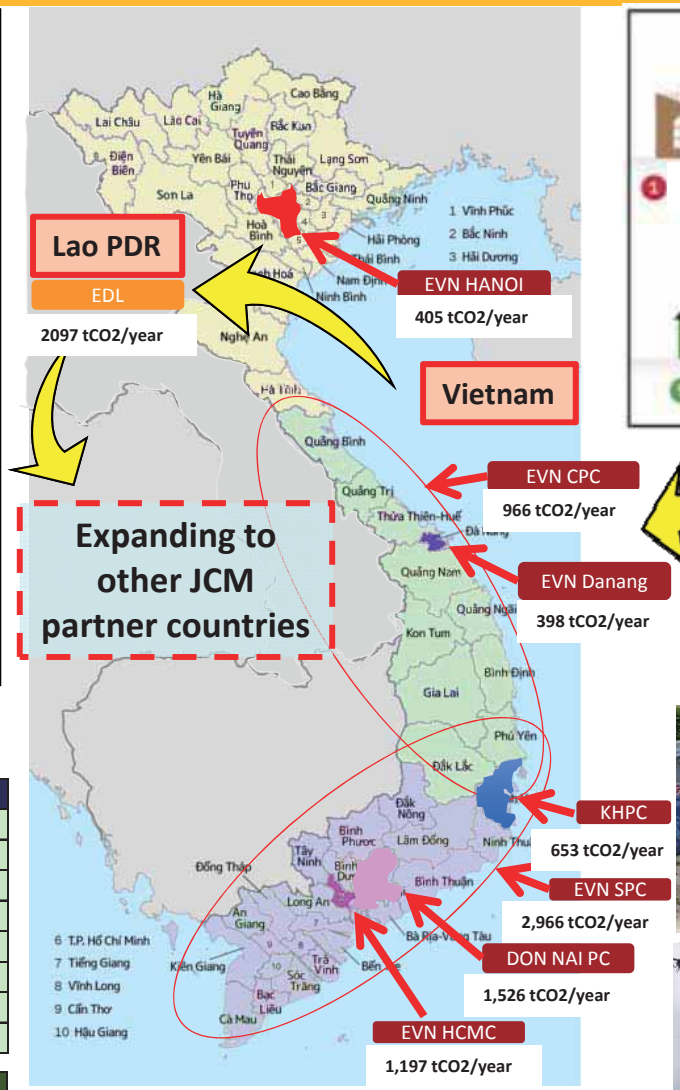


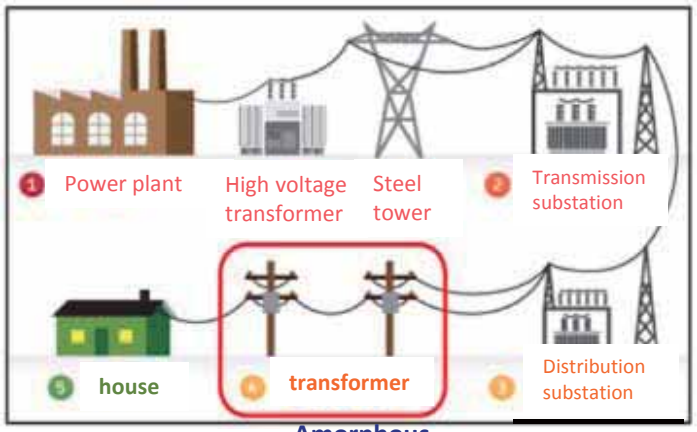
Project site

JCM Expansion Example①：High efficiency amorphous transformers from Vietnam to Lao PDR

★Transformers in Vietnam are being replaced with amorphous high efficiency transformers from 2015 through 2020.
★Succeeded in developing the same product and technology in Lao PDR since 2018. Preparing for expansion to other countries.
★Providing excellent amorphous alloy low carbon technology. A total of 10,000 transformers introduced throughout Vietnam.







Amount of amorphous transformer introduced
（as of JAN2019）

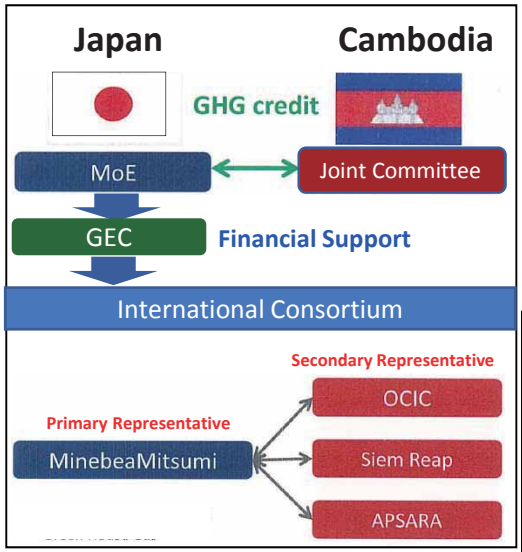
ベトナム	FY2015	FY2016	FY2017	FY2018	Total
EVN SPC	1,618	2,686	2,507		6,811
EVN HCMC		552	340		892
EVN CPC		981			981
EVN Danang		282			282
EVN HANOI		121	65		186
KHPC		111	305	30	446
DON NAIPC		168	580	207	955
Total	1,618	4,901	3,797	237	10,553

ラオス	FY2015	FY2016	FY2017	FY2018	Total
EDL				465	465

TIBIDI (Manufacturers in Vietnam)

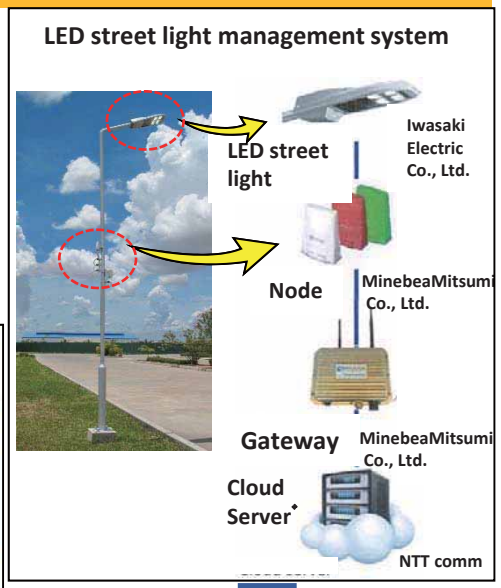
JCM Expansion Example② ：Expansion into smart city environment from LED street light network in Cambodia

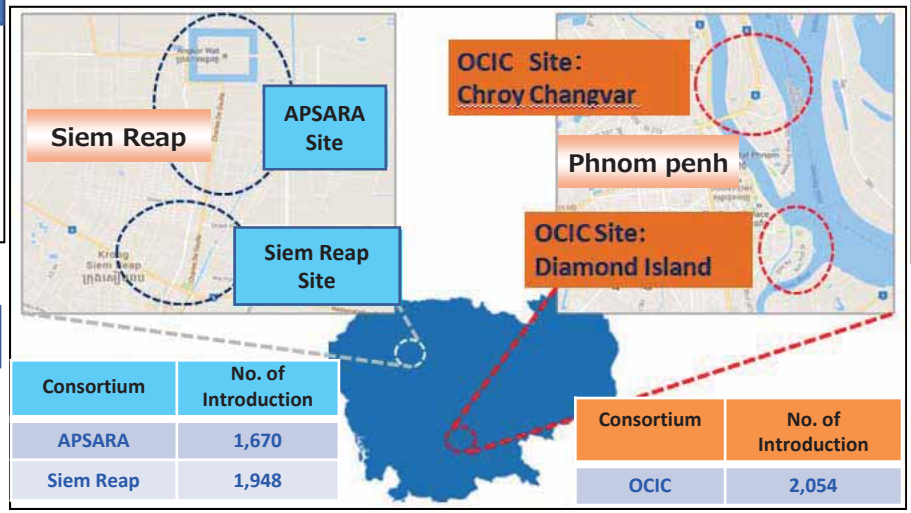
★70% energy saving is achieved by LED street light in emerging city and world heritage .
★Commenced joint study with local partners to build smart city environment by wireless network environment deployment.
★LED street light of 5,600 installed in Cambodia such as Phnom Penh and Angkor Wat (total installation area is 120㎢ in total).




APSARA (Angkor Wat)


OCIC Chroy Changvar





Consortium	No. of Introduction
APSARA	1,670
Siem Reap	1,948

Consortium	No. of Introduction
OCIC	2,054

Actual number installed in Cambodia

The total footprint of the LED street light is 1.5 times that of Manhattan Island (120㎢)


December 2016
Received Minister of the Environment Award in Cambodia

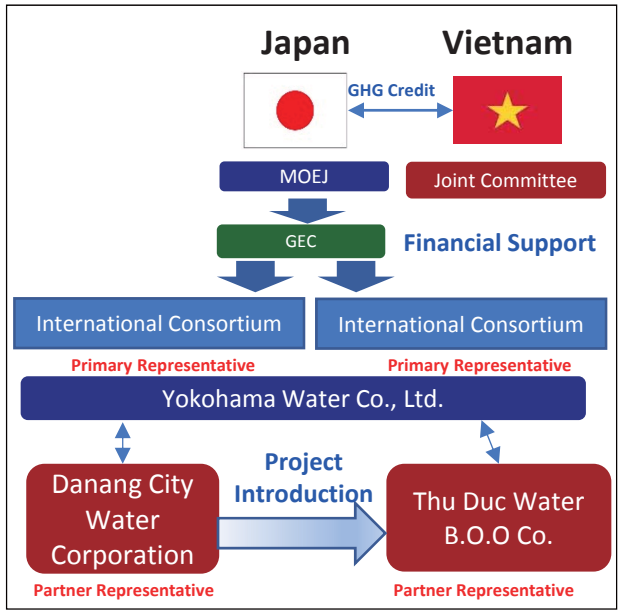

Siem Reap Provincial Hall (SRPH)


OCIC Diamond Island

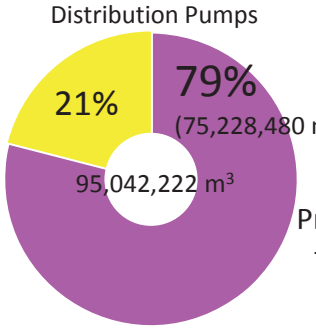
JCM Expansion Example③：Basic infrastructure of water business in Vietnam

★Yokohama City and Da Nang City signed a Memorandum of Understanding on Technical Cooperation for Sustainable Urban Development.
★Representative participant utilized JCM Model Project to Danang municipal water supply corporation, introduced high efficiency pumps and conducted monitoring.
★About 80% of the water treatment volume of Da Nang City is treated by JCM introduction pump.

Introduction of high efficiency pump to Danang municipal water supply corporation (representative Participant: Yokohama Water Co., Ltd.)



Pumps installed through the JCM project process major part of Danang water demand.



Total Water Processed in 2018 for Danang City

Pumps installed through the JCM project

Other pumps

High efficiency pumps (Da Nang City Water Corporation)


Distribution Pumps

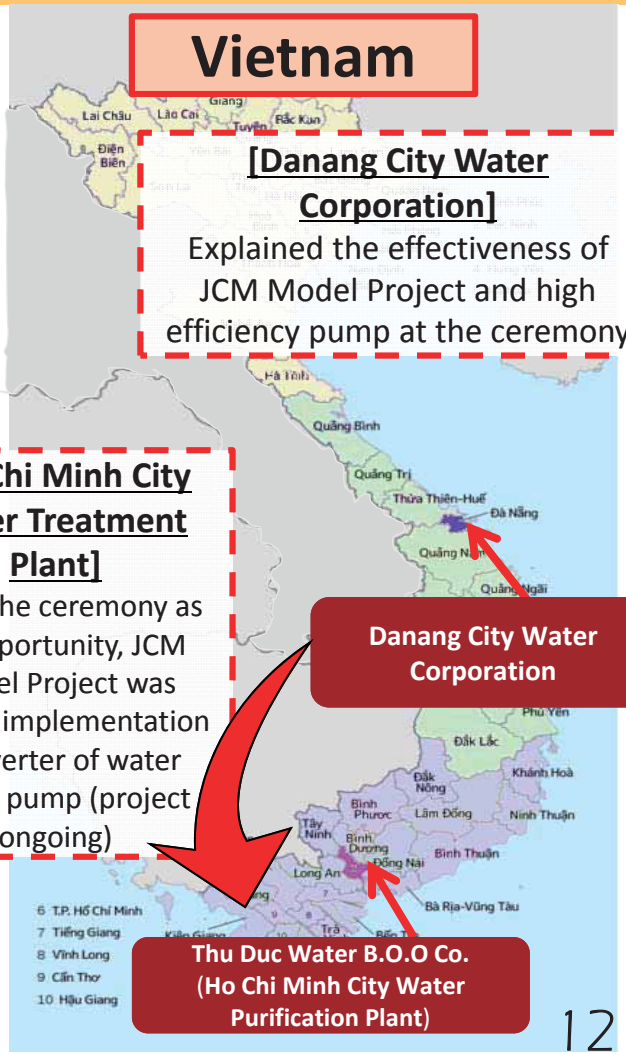

Intake Pumps


Monitoring

Vietnam

[Danang City Water Corporation]
Explained the effectiveness of JCM Model Project and high efficiency pump at the ceremony

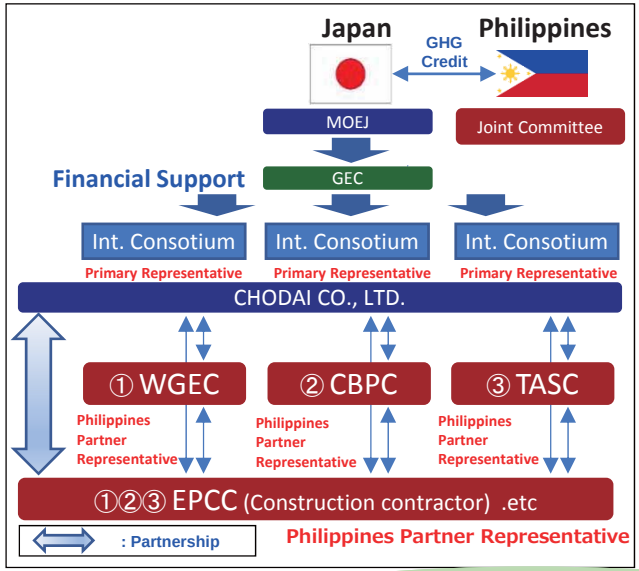
[Ho Chi Minh City Water Treatment Plant]
Using the ceremony as an opportunity, JCM Model Project was utilized implementation of inverter of water intake pump (project ongoing)

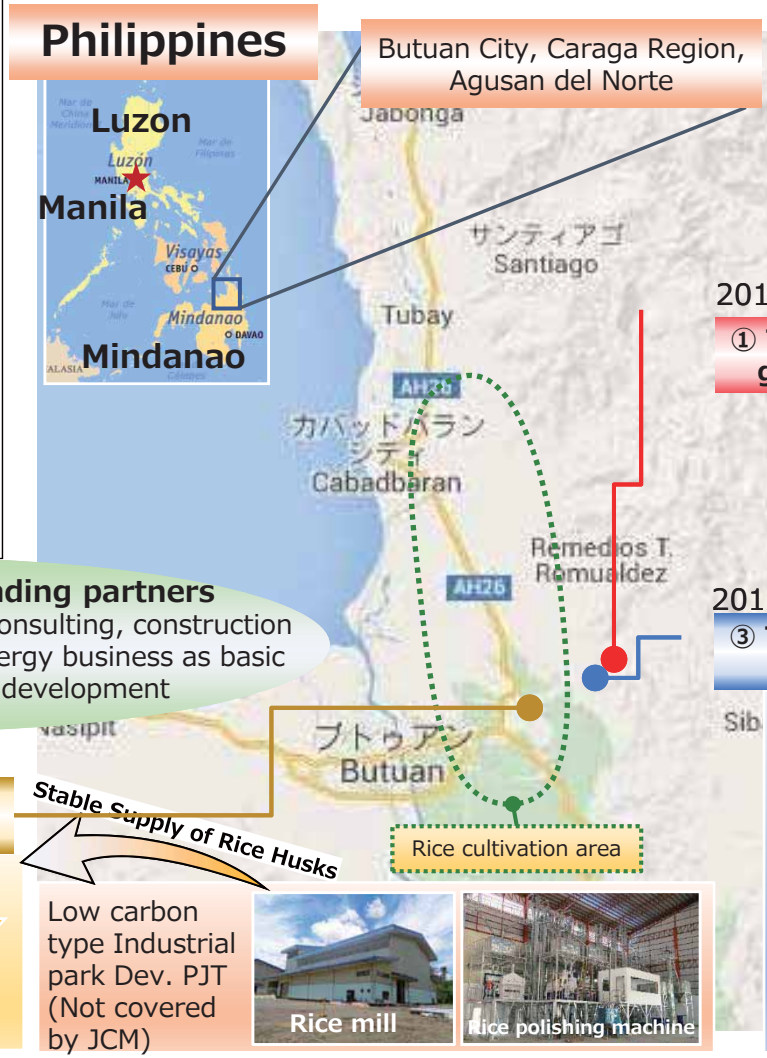


JCM Expansion Example④ : Basic Infrastructure of Regional Development in the Philippines

- The representative participant aims to realize a stable supply of basic infrastructure by participating in and investing in power generation and water supply against the unstable infrastructure of Butuan City.
- Small/micro hydropower generation and biomass power generation are implementing by three JCM Model Projects.
- Partnering with local leading partners, developing three projects. Supply 10% of peak demand in Northern Agusan.

Taguibo River Small Hydroelectric Power Project / Taguibo River Water Treatment Plant Micro Hydro Power Project / Butuan City Rhinoceros Power Generation Project (Representative Participant: CHODAI CO.,LTD.)





Both IPPs to supply 11% power for Agusan del Norte region

Capacity (①+②) **6.5 MW (11%)**

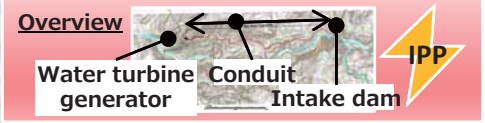
Other sources

Regional Demand: 57 MW (peak)

2017 JCM Model PJT (Implementing)

① Taguibo 4MW small hydropower generation PJT

Small hydro IPP



2019 JCM Model PJT (Implementing)

③ Taguibo River WTP Micro hydro power generation PJT

Micro hydraulic generator

Captive

Water purification plant (30,000tons / day) as part of the In-house power Usage (0.16 MW)

◄ intake dam

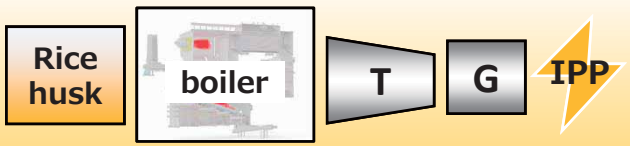
Water supply PJT (Not covered by JCM)

Partnering with local leading partners

Utilizing JCM Model Projects with consulting, construction and O & M, develop renewable energy business as basic infrastructure of regional development

2019 JCM Model Project (Implementing)

② Butuan City 2.5 MW rice husk power generation PJT



Rice husk biomass IPP

JCM Expansion Example⑤：Large-scale photovoltaic power generation projects in Mongolia

★Implemented six large-scale solar power project using Japanese superior technologies in various places in Mongolia from 2015 to 2018. Promoted new private investments triggered by introduction in JCM.
★Sharp Energy Solutions has implemented four projects (currently operating at two locations and introducing at two locations).
★Firm Do has implemented a new model by combining agriculture and PV power generation at Monnaran.