Overview of the MOEJ's Study Programme and Financing Programme in 2013

Case Study

JAPAN PAVILLION SIDE EVENT at COP19, WARSAW

Development of the Joint Crediting Mechanism (JCM) project and its methodology through JCM Promotion Schemefor FY 2013

11th November 2013, Warsaw

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Global Environment Centre Foundation (GEC)
as the Secretariat of the JCM FS Programme

Overview of JCM Model Project and Planning/Demonstration/Feasibility Studies in 2013

Global Environment Centre Foundation

● -- JCM Model Project
◆-- JCM Project Planning Study (PS)
■-- JCM Methodology Demonstration Study (DS)
△-- JCM Feasibility Study (FS)

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

Bangladesh:
- ●Brick Production based on Non-Firing Solidification Technology
- △High-Efficiency Rice Husk Based Cogeneration
- △Solar Power Generation with Long-Life Storage Battery in Non-Electrified Regions

Kenya:
- △Expansion of Geothermal Project

Myanmar:
- △Geothermal Binary Power Generation

Myanmar (and Indonesia):
- △Solar–Diesel Hybrid Power Generation

Sri Lanka:
- △Sustainable Biomass-Based Power Generation

Cambodia:
- ● Small-scale Biomass Power Generation by Using Stirling Engines

Lao PDR:
- ■Promotion of Use of Electric Vehicles (EVs)

Thailand:
- ■Dissemination of High-Efficiency Inverter Air Conditioners
- △Heat Recovery to Generate Both Cooling and Heating Energy

Viet Nam:
- ● Integrated Energy Efficiency Improvement at Beer Factory
- ◆Anaerobic Digestion of Organic Waste for Cogeneration at Market
- ◆Integrated Energy Efficiency Improvement at Beer Factories
- ■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 and Biomass-based Power Generation

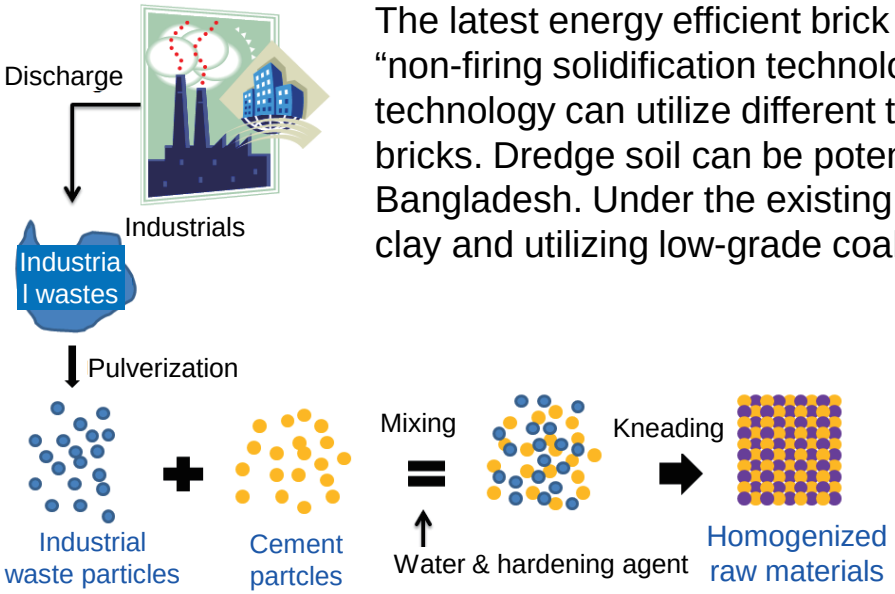
Indonesia:
- ●Energy Saving for Air-Conditioning and Process Cooling at Textile Factory
- ●Energy Savings at Convenience Stores
- ●Energy Efficient Refrigerants to Cold Chain Industry
- ◆Energy Saving by High-Efficiency Centrifugal Chiller
- ◆Power Generation by Waste Heat Recovery in Cement Industry
- ◆Regenerative Burners for Aluminium Melting Furnaces
- △Anaerobic Treatment for Wastewater from Rubber Plants
- △Solar Power System at Off-Grid Cell Towers
- △Improvement of REDD+ Implementation Using IC Technology

Indonesia (and Myanmar):
- △Solar–Diesel Hybrid Power Generation

Brick Production based on Non-Firing Solidification Technology

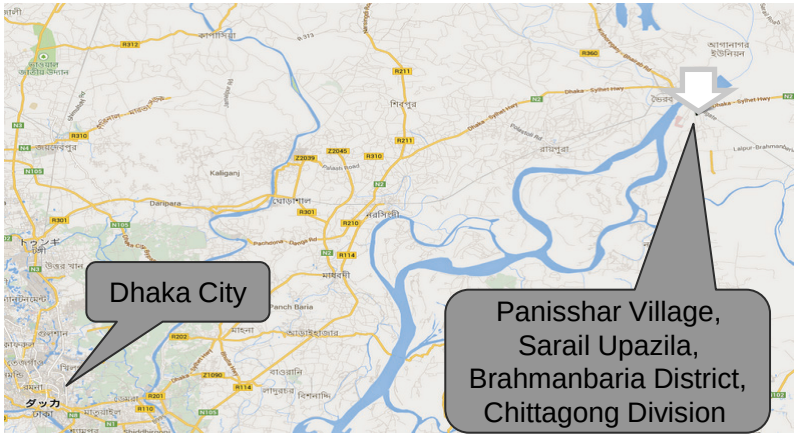
PP form Japan: Tepia Corp. Japan, Kamei Seito, Alcedo / PP from Bangladesh: Kamei Ceramics Bangladesh

Outline of GHG Mitigation Activity



The latest energy efficient brick manufacturing method based on the Kamei's patented "non-firing solidification technology" will be introduced. The non-firing solidification technology can utilize different types of industrial wastes as raw materials to manufacture bricks. Dredge soil can be potentially utilised because flood damage is rampant in Bangladesh. Under the existing method, bricks are produced by dehydrating and calcining clay and utilizing low-grade coal in the calcination process. In lieu of this existing method, the non-firing technology makes bricks by pulverizing raw materials, mixing them with cement particles and other hardening agents to get them solidified, and kneading them into the homogenized raw materials. This technology will thereby reduces GHG emissions from the existing brick making industry, a major source of GHG emissions in Bangladesh, by avoiding use of coal in the calcination process.

Site of JCM Model Project



Expected GHG Reductions

12,557tCO2/year

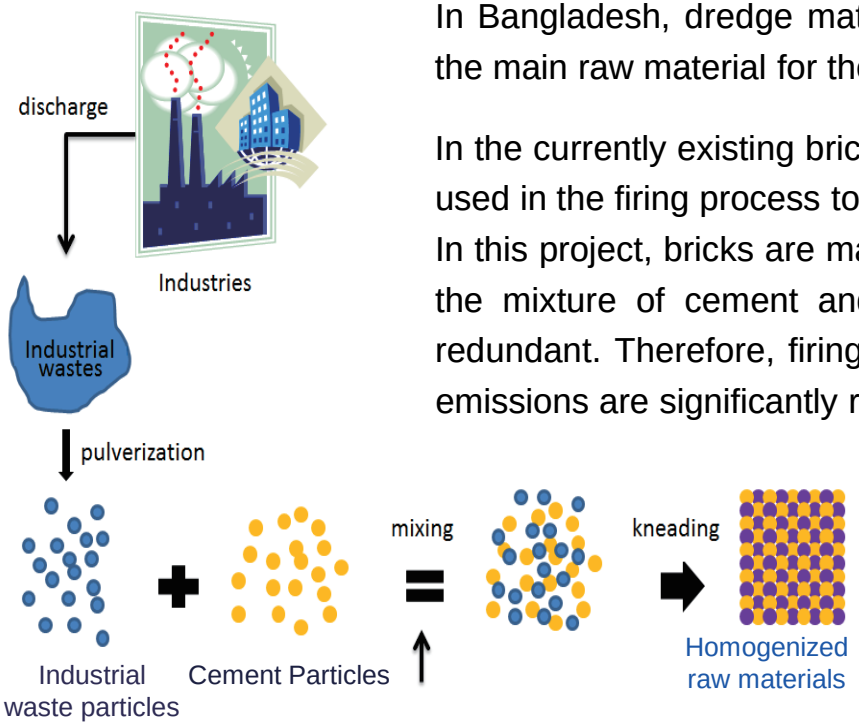
- Reference Emissions：14,717tCO2/yr
  - Brick production specific emission factor (0.203tCO2/t-brick) X Productions (72,500t-brick/yr)
- Project Emissions：2,160tCO2/yr
  - 322tCO2/yr for electricity consumptions for the non-fired brick production (taking into account the transmission loss of 22%)
  - 1,838tCO2/year for cement consumptions for Non-fired brick production

Non-fired Brick Project

Summary of the Project

Non-fired brick project aim to mitigate GHG gas emissions by introducing energy efficient brick manufacturing technology “Non-fired Brick Solidification Technology” patented to Kamei Ceramics. New production unit will be launched in Bangladesh by the project participants from Japan which are Tepia Corporation Japan, Kamei Ceramics, and Alcedo Corporation. It is estimated that an average of about 25 million bricks will be manufactured and sold annually.

With Non-firing Solidification Technology, various types of industrial wastes, sewage sludge, coal ash, waste plastic, unutilized resources, recyclable materials etc. can be used to manufacture bricks, tiles and road bed materials.



In Bangladesh, dredge material including soil from rampant flood will be utilized as the main raw material for the brick manufacturing.

In the currently existing brick making process in Bangladesh, huge amount of coal is used in the firing process to dry and bake the bricks made up of clay.
In this project, bricks are manufactured by pulverizing the raw materials together with the mixture of cement and hardening agents, such that firing process becomes redundant. Therefore, firing process and usage of coal is avoided and hence, GHG emissions are significantly reduced.

Moreover, to improve the employment situation and labor environment in Bangladesh, the manufactured bricks will be used for making residential for low income group so that the business can be expanded as a concept of BOP business.

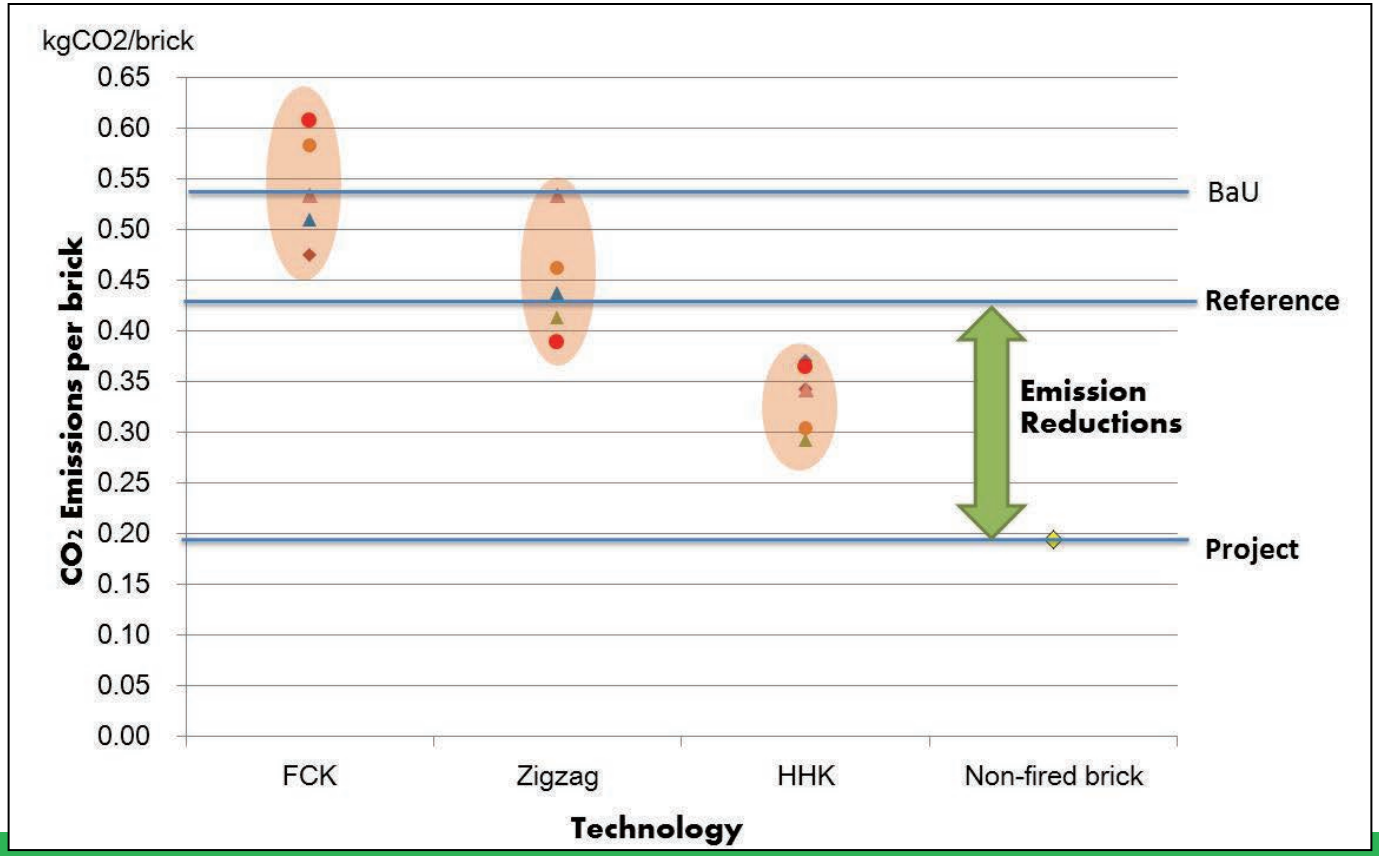
Current situation of Bick Industry in Bangladesh

- Brick is the major source of building and construction material in Bangladesh.
- About 1 million people are directly involved in the brick industry which accounts for about 1% of the GDP.
- Demand for bricks has increased due to the economic development. The rate of increase is 5.6%.
- Clay is used as the main raw material and excessive amount of coal is used for making bricks. This have caused decrease in fertile soil for agriculture and air pollution has become a serious problem.
- Absent of decent employment /labor situation because of poor labor condition such as discrimination against women, child labor and so on.
- Low quality of bricks and 10% of the manufactured bricks are defective.
- Technological innovation is lagged behind and inefficient Fixed Chimney Kiln (FCK) accounts for about 70%.
- Due to inefficient combustion in FCK, emissions of pollutants and GHG is considerably high. Emissions of soot (SPM) reach to 1,000 mg/m3.

Non-fired Brick Project

GHG Quantification Methodology

- In July 2013, the government enforced policies to forbid the use of the FCKs.
- After the policy to forbid the use of FCK has been enforced, in the coming days, possibility of incensement of improved Zigzag kilns are relatively higher than other technologies.
- Due to relatively inexpensive investment cost for the upgrade, Zigzag kilns will become prevalent to become the next-generation technology and replace the FCKs. Therefore, Zigzag kilns can be considered as reference scenario.
- To exclude the lower quality cement brick and to maintain the strength of the manufactured bricks, they need to meet the national standard “A Grade” as the eligibility criteria in the methodology.



Non-fired Brick Project

Estimated amount of GHG reductions

Reference emissions = Total number of bricks manufactured ×GHG emissions factor
= 25,000,000 [bricks/y] × 0.4363*10^{-3} [tCO_2/brick]
= 10,907 [tCO_2/y]

Project emissions = (Consumption of grid electricity × Emissions factor of the electricity)
+ (Consumption of diesel for back up generator × Emissions factor of diesel)
+ (Amount of cement used ×Emissions factor of cement)
= (380.448 [MWh/y]×0.67 [tCO_2/MWh])
+ (31,477 [L]×0.03626*10^{-3} [TJ/L]×74.1 [tCO_2/TJ])
+ (5,200 [t-cement]×0.87 [tCO_2/t-cement])
= 4,864[tCO_2/y]

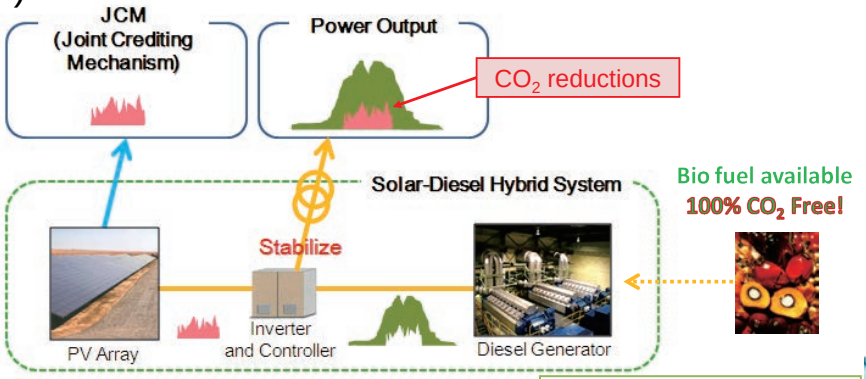
Emissions reduction = Reference emissions - Project emissions
= 10,907 [tCO_2/y] - 4,864 [tCO_2/y]
= 6,043 [tCO_2/y]

Solar-Diesel Hybrid System to Stabilize Solar Power Generation

FS Entity: Mizuho Bank

Outline of GHG Mitigation Activity

A PV/Diesel Engine Hybrid System of 4MW capacity will be installed to replace a micro-grid-connected power (Myanmar) or island-grid-connected power (Indonesia), both of which are generated by fossil fuels (diesel).
By combining a diesel engine with solar power, utilizing IT technology (software), the power output can be levelised and stabilised with minimum usage of batteries.



Site of JCM Project

- Myanmar: Mogok City, Mandalay Region.

- Indonesia: Nias Island → Last year's FS showed a very good result.

Draft JCM Methodology

Reference emissions [tCO2/yr]
= Project power generations (A) [MWh]
x Grid CO2 emission factor (B) [t-CO2/MWh]
Project emissions [tCO2/yr]
= Consumption of fossil fuel in the hybrid system (C) [unit/yr]
x Calorific value (D) [GJ/unit] x CO2 emission factor (E) [tCO2/GJ]

(A)(C): Monitoring in the project
(B) : Default values set by taking in various factors in a conservative manner
(D)(E): Default values

Expected GHG Reductions

- **Myanmar: 6,100tCO2/yr**
- **Indonesia: 7,200tCO2/yr**

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F.S. Background / Motivation

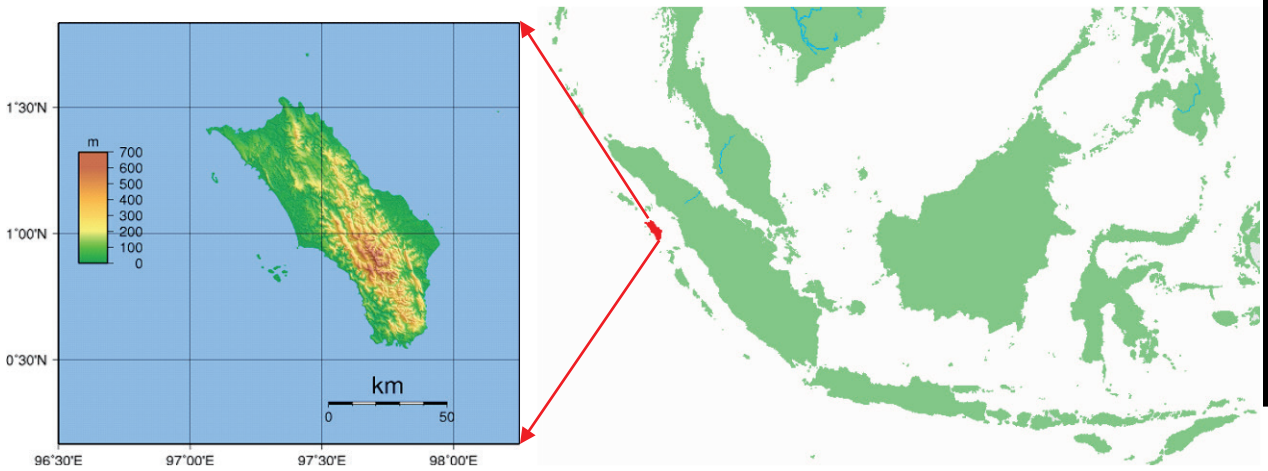
Concerning electricity generation on isolated islands,

PT. PLN, national electricity company of Indonesia, wishes to

- Reduce the amount of diesel fuel used
- Introduce solar power as much as possible

However, voltage and frequency are already unstable, making the integration of solar power into the island grid is challenging.

Project Site: Nias Island (Island grid)



Population	760,000
Area	4771 km^2
Electrification Ratio	47%
Power supply capability	20MW

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Power facilities at Nias island

PLN ENGINE
（Gunungsitoli）

RENTAL ENGINE
（Gunungsitoli）

POWER PANEL
（Gunungsitoli）

PLN ENGINE
（TelukDalam）

Maintenace work
（TelukDalam）

Tank yard
（Gunungsitoli）

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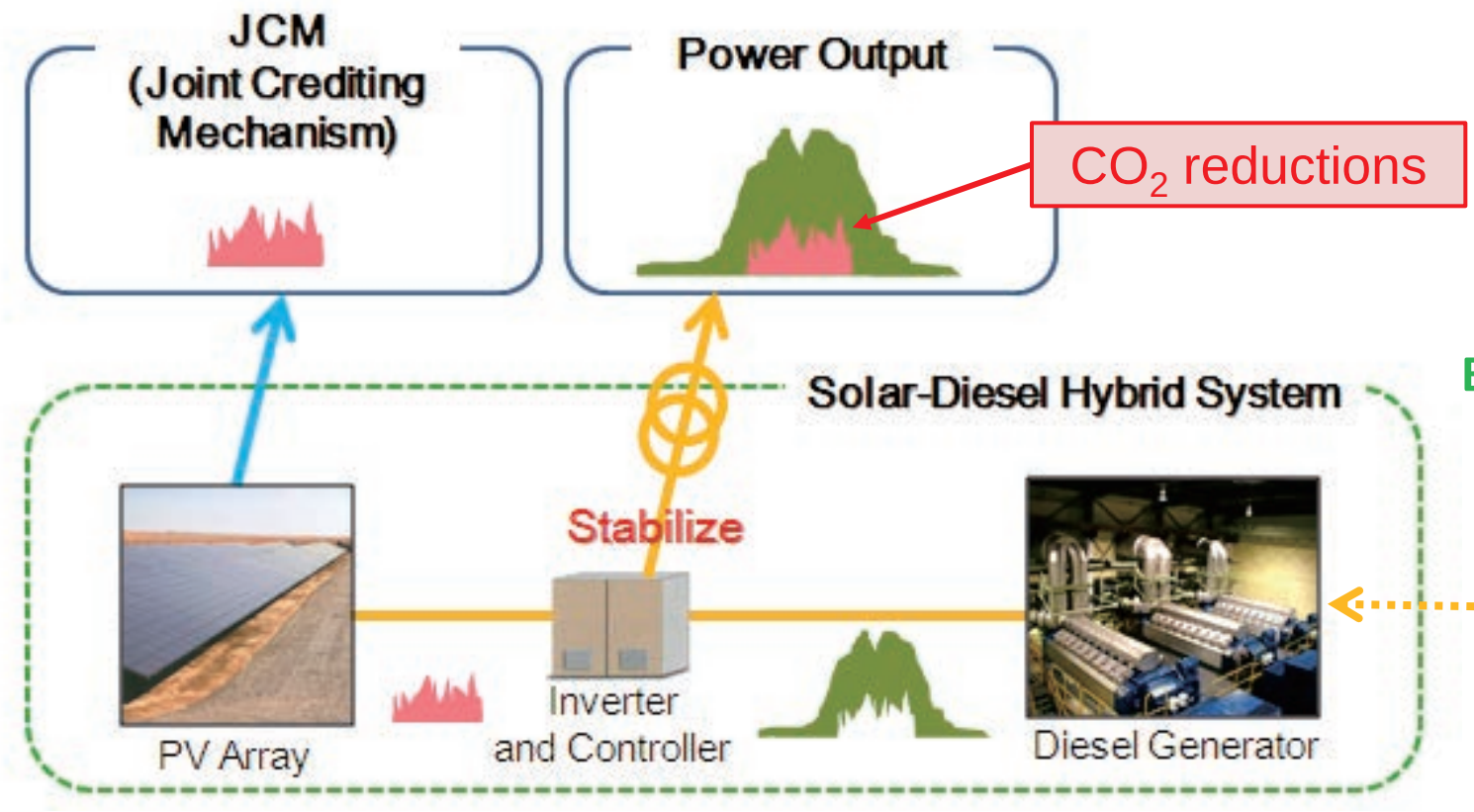
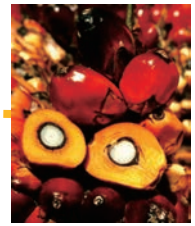
Solar-Diesel Hybrid System

Solar power systems can reduce CO_2 emissions, but their power fluctuates in proportion to solar irradiation.
Diesel engines are able to catch-up quickly to **compensate the solar power** fluctuation.
By combining a diesel engine, short-term storage and solar power, utilizing an inverter and a **hybrid system controller**, the total power output can be **stabilized**.



Bio fuel available
100% CO_2 Free!



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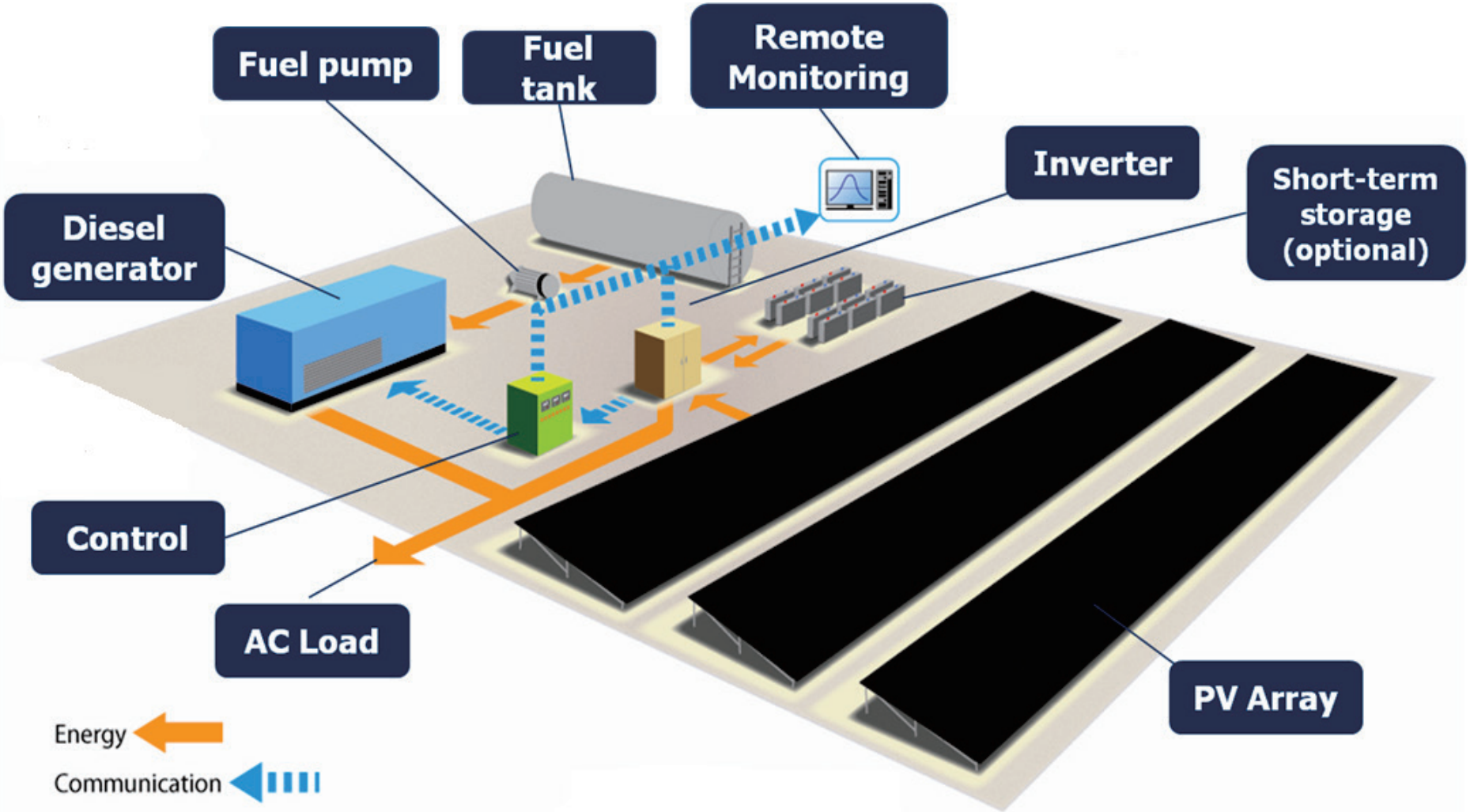
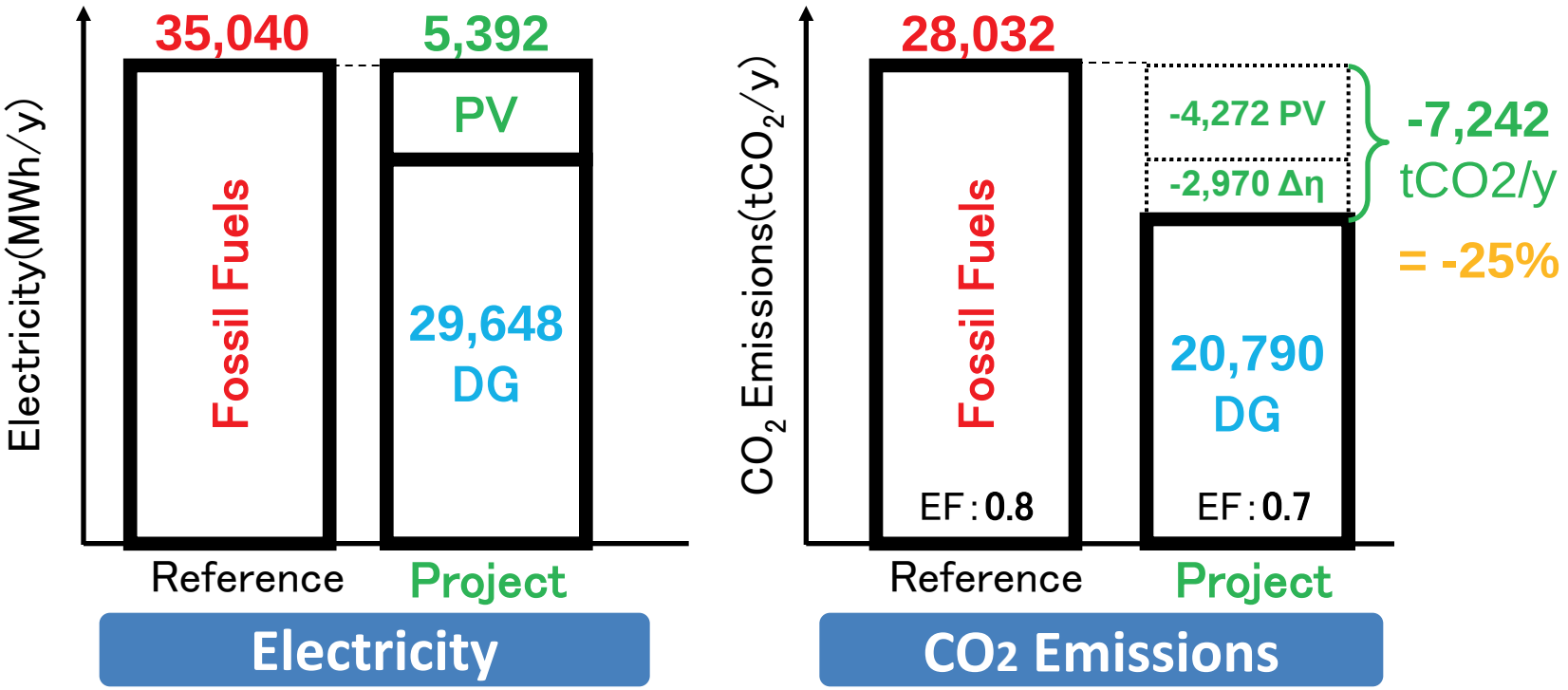
Solar-Diesel Hybrid Installation



Conclusion / Future Outlook

- According to our F.S., by introducing our 4MW hybrid system, the annual CO_2 emissions are reduced by roughly **25%/year**.



DG: Diesel Generator, EF: Emissions Factor, $\Delta\eta$: Efficiency Improvement of DG

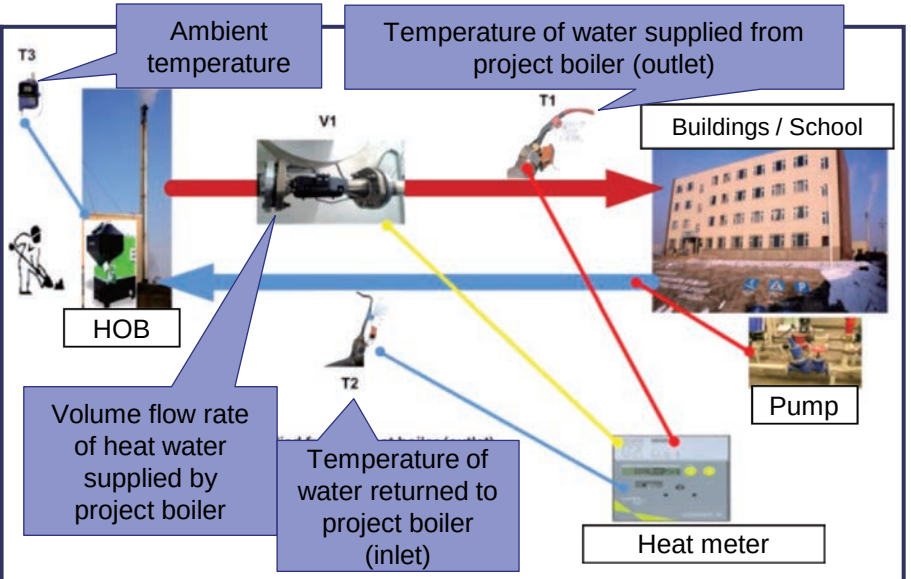
- We need to discuss details about project execution scheme, technical requirements and operational guidelines.
- Most importantly, the people of Nias Island strongly support the installation of the hybrid system to improve their standard of living.

Upgrade and Installation of Centralized Control System of High-Efficiency HOB

PP from Japan: Suuri-Keikaku / PP from host country: Anu-Service

Outline of GHG Mitigation Activity

1) The project is the infrastructure building in Bornuur sum, composed of the installation of heat only boilers (HOBs) as well as pipe laying work, electrical construction and boiler building construction. The project will alter the current heat supply system in Bornuur sum of individual building-based heating, under which the low efficiency HOBs and stoves are used. The centralized control system of high efficiency HOBs will be installed in this project.
   The improvement of boiler efficiency leads to CO_2 emission reductions and other air pollutants, because fuel consumption is reduced.
2) The replacement of low-efficiency old-type boilers with high-efficiency latest model boilers at a school in Ulaanbaatar city. The project also leads to the reduction of coal consumptions to mitigate CO_2 emissions as well as air pollutants.



Expected GHG Reductions

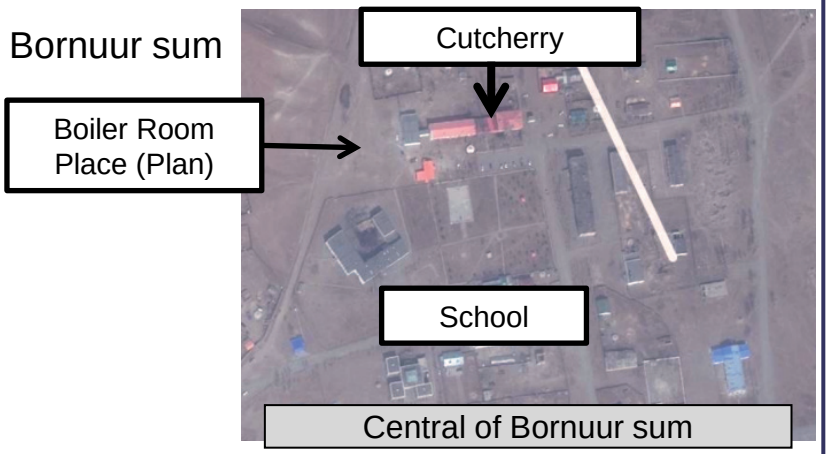
600tCO_2/year

← (Reference Coal Consumptions – Project Coal Consumptions) x Emission Factor (EF)
= (1/Reference Boiler Efficiency – 1/Project Boiler Efficiency) x Amount of Heat Supply x EF

The heat meters for monitoring must meet the Mongolian Standard (MNS 6241).

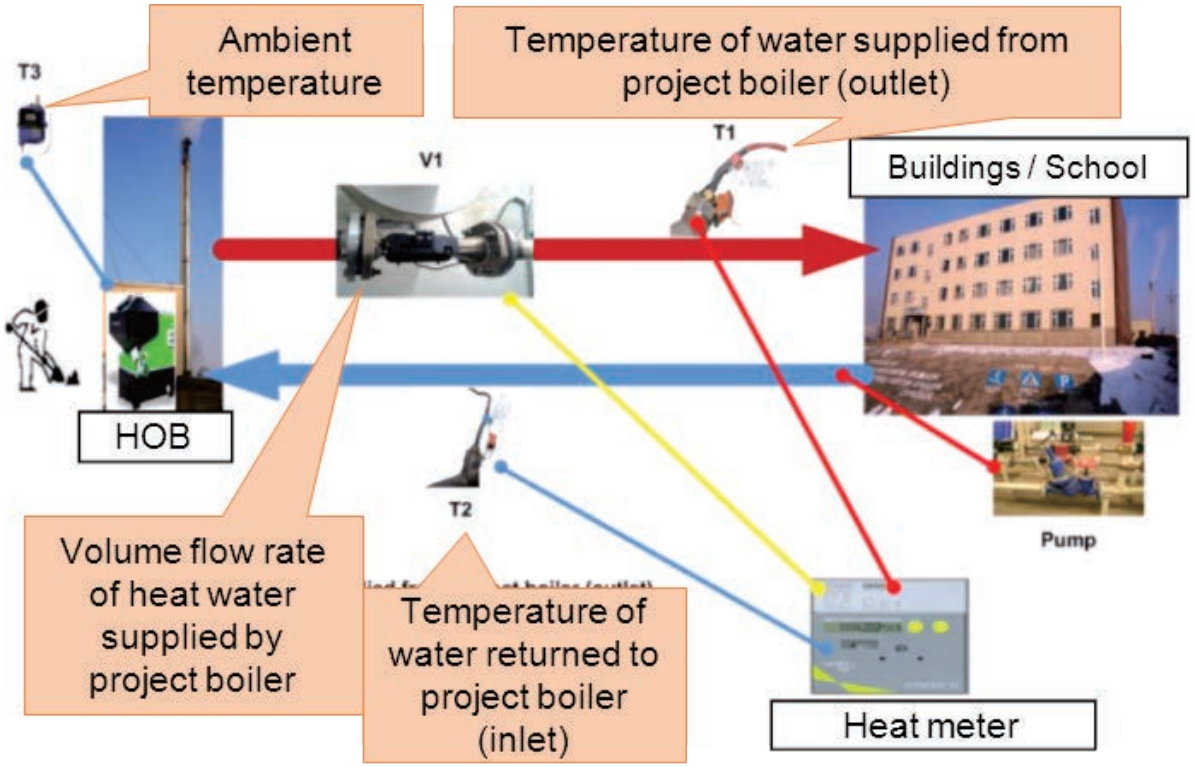
Sites of JCM Model Project

1) Bornuur sum



2) 118th School, in Khan-Uul District, Ulaanbaatar

Basic System of MRV Activity



- Monitoring Item is only the Net heat quantity supplied by the Project HOB. The monitoring method shall meet the industrial standard of the host country (Mongolian National Standard).

Equation of Emission Reductions

This parameter is measured actually by **heat meter with verification in accordance with MNS** for the purpose of **securing accurate measurement (*up to PP*)**

These **default values** are provided by the methodology **(*up to JCM scheme owner (=JC)*)**

By provision of default value , measuring coal consumption by the project HOB is not needed.

=0.101 tCO_2/GJ (Default value) according to "Lignite" from 2006 IPCC Guidelines for National Greenhouse ← This value will be confirmed by actual laboratory analysis of the used coal .

=Max MW value for specification ×Total operating hours of the project HOB

=1.103 tCO_2/MWh (Default value) according to "Combined margin CO_2 emission factor for central energy system in Mongolia (According to CDM National Bureau of Mongolia)

$$ER_p = \mathbf{PH_p} \times (1/\eta_{\mathbf{RE\ BM}} - 1/\eta_{\mathbf{PJ\ HOB}}) \times EF_{CO2,coal} - EC_p \times EF_{CO2,grid}$$

Net heat quantity supplied by the Project HOB during the monitoring period p [GJ/p]

Benchmark value for boiler efficiency of reference HOB [–]

Default value for boiler efficiency of project HOB[–]

CO_2 Emission Factor of the consumed coal [tCO_2/GJ]

Electricity consumption of the project HOB during the monitoring period p [MWh/p]

CO_2 Emission Factor of electricity consumed by the project HOB [tCO_2/MWh]

Default Values

- Boiler Efficiency Investigation: (The Input-Output Efficiency Measurement Method)
  - Measurement of Heat Supply (Using the equipment of Heat meter / Ultrasonic Flow Meter & Thermocouples)
  - Measurement of Coal Consumption
- CO2 Emission Factor
  - Coal Analysis Survey

Boiler Efficiency Investigation

- Measurement of Heat Supply

Project Boiler at 79 school

Reference Boiler at 87 school

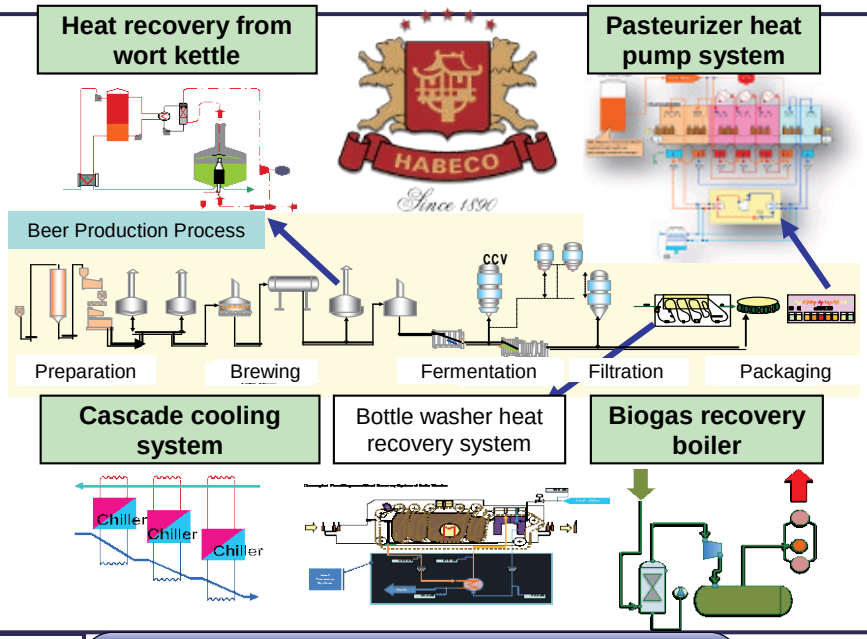
Integrated Energy Efficiency Improvement at Beer Factory

PS Entity: Recycle One

Outline of GHG Mitigation Activity

The project will introduce an integrated energy saving solution to HABECO Me Linh Brewery located in Hanoi, based on the energy consumption diagnosis using the proprietary energy analysis simulator.
The Me Linh Brewery was diagnosed initially in 2012, and a preliminary proposal was presented to the management team of HABECO, which attracted a strong interest and willingness to invest.

Key Technologies
Energy analysis simulator, Integrated energy saving solution, Plant performance maintenance



Draft JCM Methodology

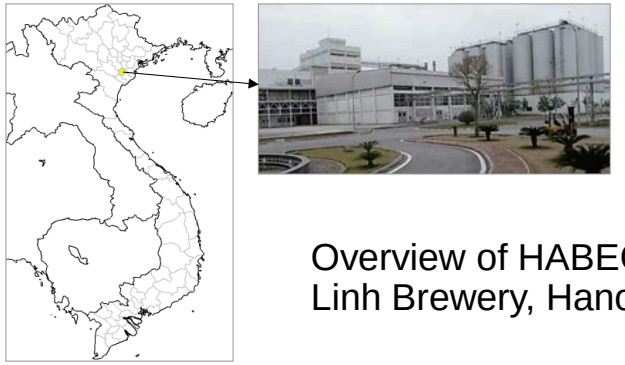
GHG emission reductions are evaluated based on a specific energy consumption method. The simplest option provides a default value, only requiring energy consumption and production data, under project scenario.

Calculation for GHG emission reduction amount

$ER_y = (AEM_{RR,y} - AEM_{PJ,y}) \times PO_y$

ER_y GHG emission reduction amount (tCO_2/year)
$AEM_{RR,y}$ Specific GHG emissions of Reference Scenario (tCO_2/L) → *Default value can be used*
$AEM_{PJ,y}$ Specific GHG emissions of Project Scenario (tCO_2/L)
PO_y Annual beer production volume (L/yr)

Site of JCM Project



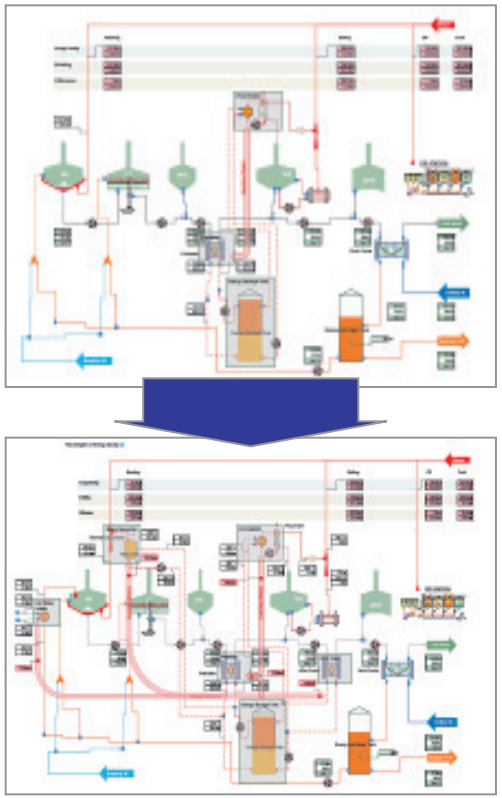
Overview of HABECO Me Linh Brewery, Hanoi

Expected GHG Reductions

5,500 tCO_2/yr (Me Linh Brewery)

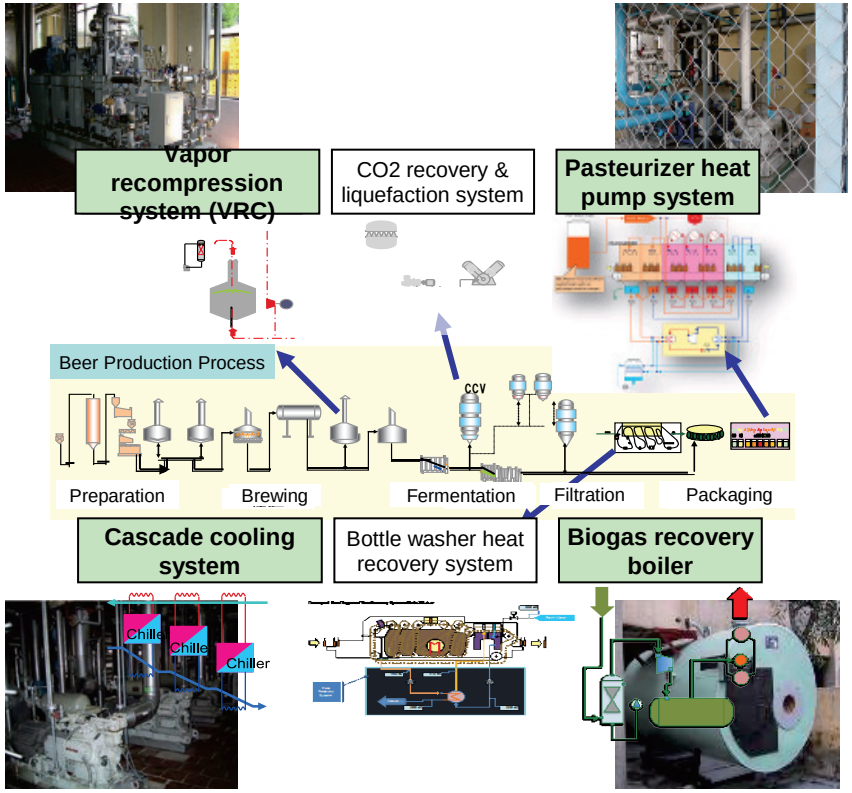
Key Technologies: Simulator and Integrated Energy Saving System

Energy analysis simulator



Structural analysis of energy consumption to identify optimal energy usage in the entire production process. Ample references in Japan and other countries.

Integrated energy saving system



Significant energy savings (up to 40%) achieved at Japanese breweries and other countries. Equipments installed based on simulator to improve energy efficiency and operation ratio.

Overview of Proposed MRV Methodology

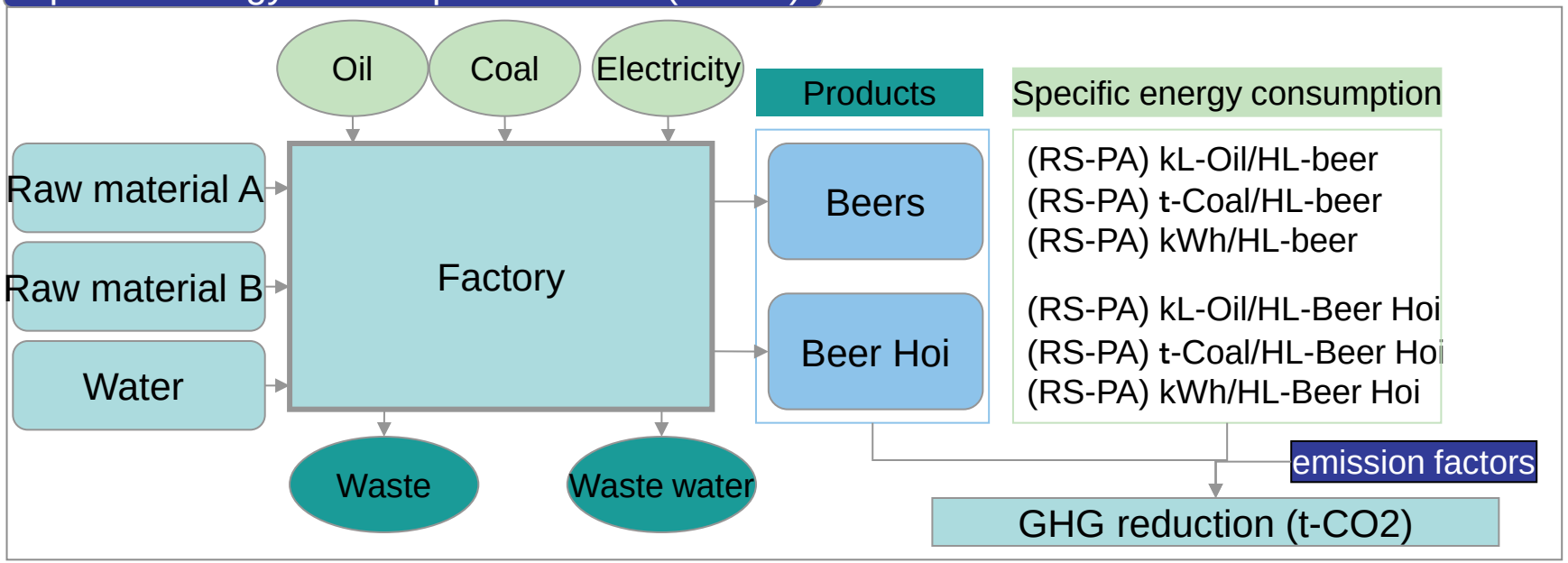
Preliminary

Method of calculating GHG emission reduction

GHG emission reduction
= (GHG emission rate in RS - GHG emission rate in PA) X (Production volume)

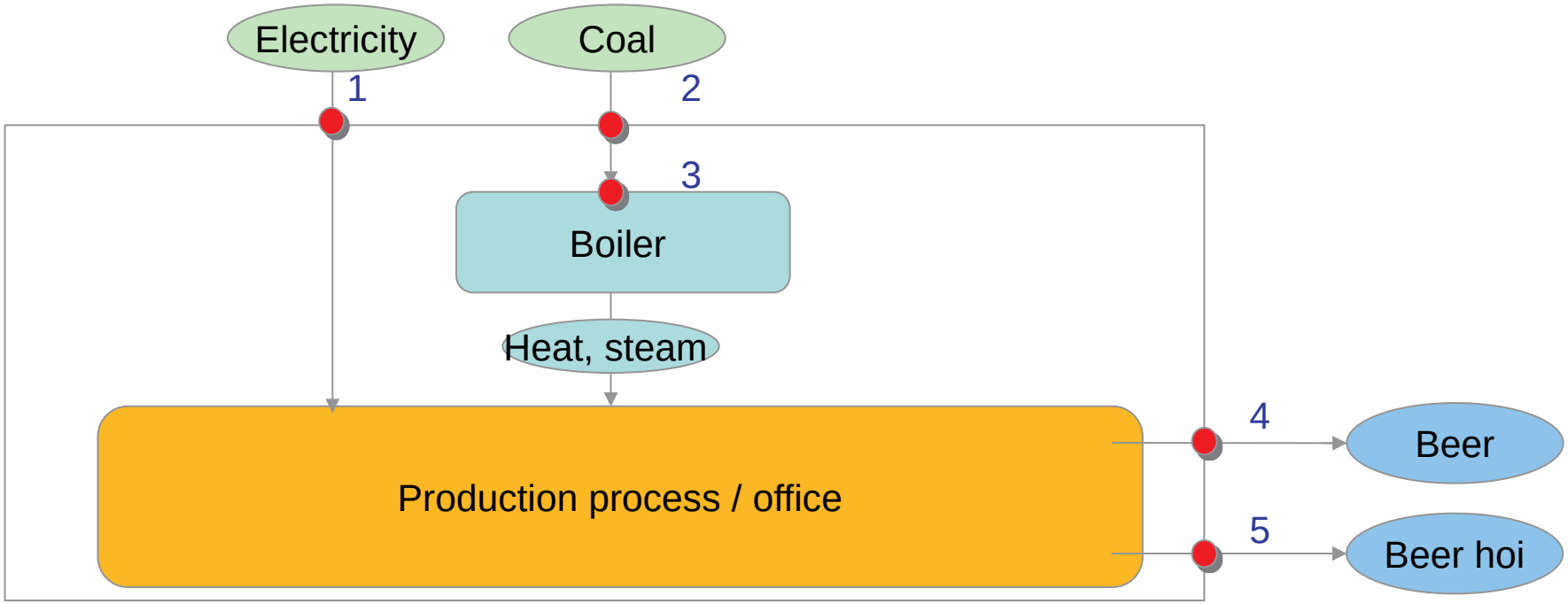
RS: reference scenario, PA: project activity,

Specific energy consumption method (SECM)



Proposed MRV methodology calculates GHG emission reductions from the differences in specific energy consumptions between reference and project scenarios, correcting the effects of production increase or decrease.

Monitoring Points for Data Collection



1: Electricity usage for production process and office.
2: Quantity and type of coal purchased.
3: Quantity of and type of coal used for the boiler.
4: Quantity of beer shipped.
5: Quantity of bia hoi shipped.

Only inputs to and outputs from the factories need to be monitored.
Monitoring is simple and easy since individual equipment
does not need to be monitored.