Overview of JCM methodologies

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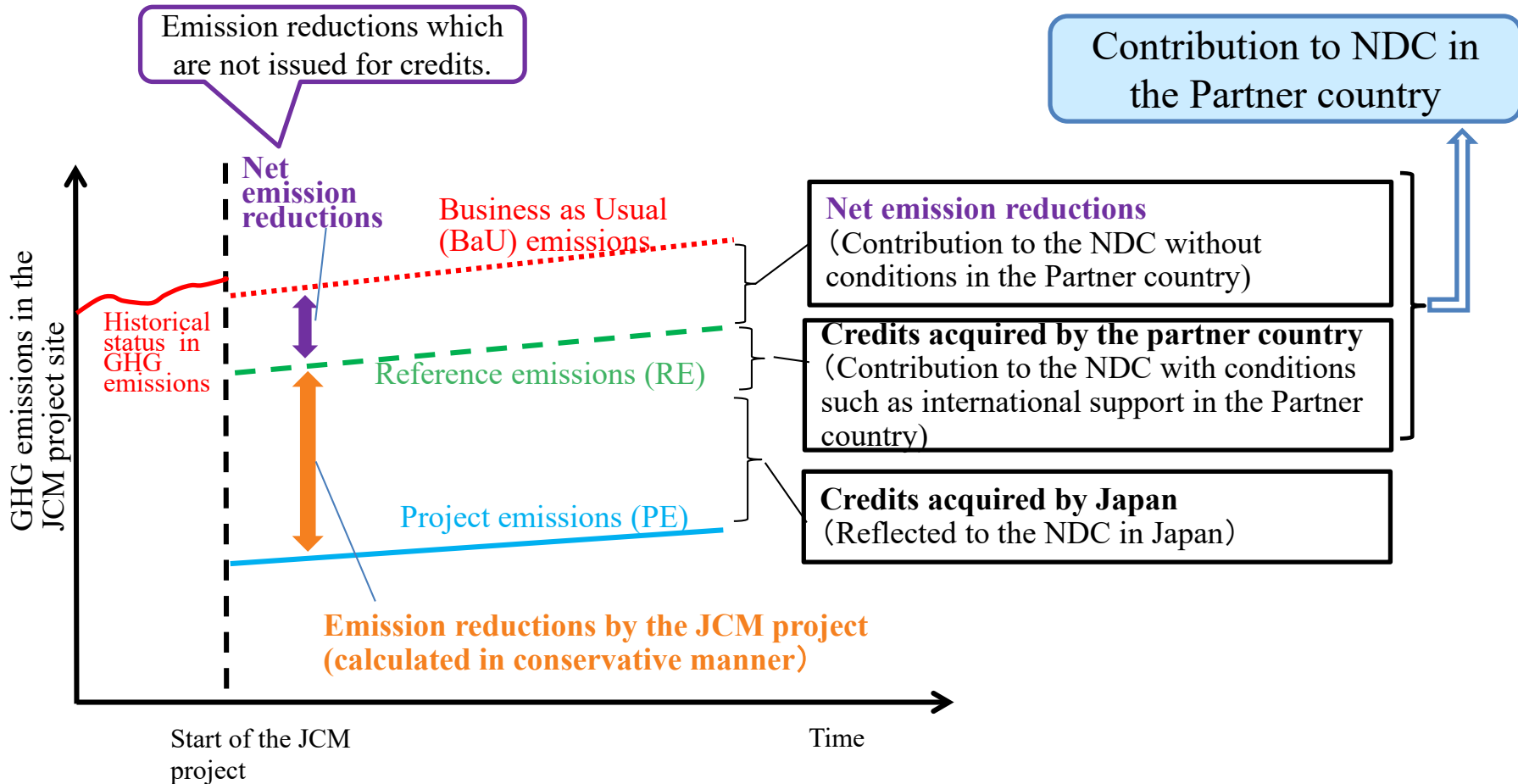Institute for Global
Environmental Strategies

Project Cycle in JCM
- MRV(Measurement, Reporting and Verification) procedures-

➢ Line of procedures for crediting emission reductions by implementing JCM projects.

➢ JCM scheme is designed to secure eligibility for JCM , credibility and transparency through acceptance of public comments, audit by 3rd party entity and review by Joint Committee, so that GHG emission so that JCM credits can be recognize internationally.、
　← （broadly similar to CDM）

➢ 1st process of these procedures is to develop proposed methodology. The methodology approved methodology by Joint Committee takes a responsibility for the following processes up to credit issuance.

		JCM Procedures	Each Project proponent
(1) Process for approving proposed methodology	1	Develop a proposed methodology	● Project proponent (business operator) ● supporting organization
	2	Submit the proposed methodology	● Project proponent (business operator)
	3	Approve the proposed methodology	● Joint Committee
(2) Process for registration of proposed project as JCM	4	Prepare a Project Design Document (PDD)	● Project proponent
	5	Validation	● Third-party entity
	6	Registration	● Joint Committee
(3) Process for credits issuance by implementing JCM project	7	Monitoring	● Project proponent
	8	Verification	● Third-party engity
	9	Credits issuing	● Joint Committee decides the volume of credits to be issued ● Each government issues credits

Imaging emission reductions by JCM project

Emission reductions which are not issued for credits.

Contribution to NDC in the Partner country

Net emission reductions

Business as Usual (BaU) emissions

Historical status in GHG emissions

GHG emissions in the JCM project site

Reference emissions (RE)

Net emission reductions
（Contribution to the NDC without conditions in the Partner country）

Credits acquired by the partner country
（Contribution to the NDC with conditions such as international support in the Partner country）

Project emissions (PE)

Credits acquired by Japan
（Reflected to the NDC in Japan）

Emission reductions by the JCM project (calculated in conservative manner）

Start of the JCM project

Time

Parameters for equations calculating Reference emissions and Project emissions

Parameters to be monitored ex post (Monitoring parameters)

> Requested to monitor

Option A	Based on public data which is measured by entities other than the project participants (Data used: publicly recognized data such as statistical data and specifications)
Option B	Based on the amount of transaction which is measured directly using measuring equipments (Data used: commercial evidence such as invoices)
Option C	Based on the actual measurement using measuring equipments (Data used: measured values)

Parameters fixed ex ante

> Not requested to monitor

Parameters in case that the value is already fixed in the approved methodology.	Efficiency of Reference boiler, Reference COP, Reference CO_2 emission factor for electricity system (in renewable energy power generation project) etc.
Parameters in case that the value is not yet fixed in the approved methodology. (The value will be identified at the Validation.)	Efficiency of Project boiler, Project COP, Net calorific value (NCV) / CO_2 emission factor of project fuel, Specific enthalpy of supplied steam etc.

Distinction of JCM methodology

	CDM methodology	JCM methodology
(1) General versatility	Each methodology is generally applied to all host countries in common.	In view of the circumstances in the partner country, methodologies are prepared for each partner country.
(2) Equations calculating Emission reductions	Emission reduction (ER_y) = Baseline emissions (BE_y) - Project emissions (PE_y) - Leakage (LE_y)	Emission reduction (ER_p) = Reference emissions (RE_p) - Project emissions (PE_p)
(3) Ensuring conservativeness in calculation of emission reductions	(Although case by case,) Conservativeness is often ensured by setting conservative values for parameters in calculation equations.	(In order to ensuring **net emission reductions**,) Emission level for Reference in JCM is set more conservatively (lower than Baseline in CDM as a whole).
(4) Parameters	A lot of parameters are generally requested to monitor. (Many developer had given up planning CDM projects because of huge burden.) Makar specifications/catalogue values cannot be often applied to parameters fixed ex ante, because data/values fixed based of actual measurement are fundamentally used.	(To reduce a burden on JCM project participants,) These are designed so as to **reduce the number of monitoring parameters whenever possible**. And then, these focus on setting values for parameters fixed ex ante. Makar specifications/catalogue values can be often applied to parameters fixed ex ante.
(5) Limitation regarding employed technology	Although it is not necessarily to employ high performance technologies, there are often some limutations to existing status at the project site.	(To ensure effectiveness for actual emission reductions,) Employed technologies for the JCM project may be limited to some facilities of **high performance** to some degree.

Table of contents in the form of JCM methodology

Form of JCM methodology (Word file)

A.		Title of the methodology
B.		Terms and definitions
C.		Summary of the methodology
		- GHG emission reduction measures
		- Calculation of reference emissions
		- Calculation of project emissions
		- **Monitoring parameters**
D.		**Eligibility criteria**
E.		Emission Sources and GHG types
F.		**Establishment and calculation of reference emissions**
	F.1	**Establishment of reference emissions**
	F.2	**Calculation of reference emissions**
G.		**Calculation of project emissions**
H.		Calculation of emissions reductions
I.		**Data and parameters fixed ex ante**

Spreadsheet (Excel file)

◦ Sheet calculating Reference emissions, Project emissions and Emission Reductions
◦ Sheet imputing values of Parameters to be monitored ex post & Parameters to be fixed ex ante

Table for Parameters to be monitored ex post

- Estimated value/Monitored value
- Monitoring option
- Source of data
- Measurement methods and procedures
- Monitoring frequency
etc.

Additional Information

Section D. Eligibility criteria (Example)

Condition to which this methodology can be applied

MN_AM002:
"Replacement and Installation of High Efficiency
Heat Only Boiler (HOB) for Hot Water Supply Systems"

Criterion 1	Technology to be employed in this methodology is coal-fired heat only boiler (HOB) for hot water supply system.
Criterion 2	Capacity of the project HOB ranges from 0.10 MW to 1.00MW.
Criterion 3	The project activity involves the installation of new HOB and/or the replacement of the existing coal-fired HOB.
Criterion 4	The project HOB is equipped with an operation and maintenance manual.
Criterion 5	The catalog value of the boiler efficiency for the project HOB is 80% or higher.
Criterion 6	The project HOB has the function to feed coal on the stoker uniformly and is equipped with a dust collector.

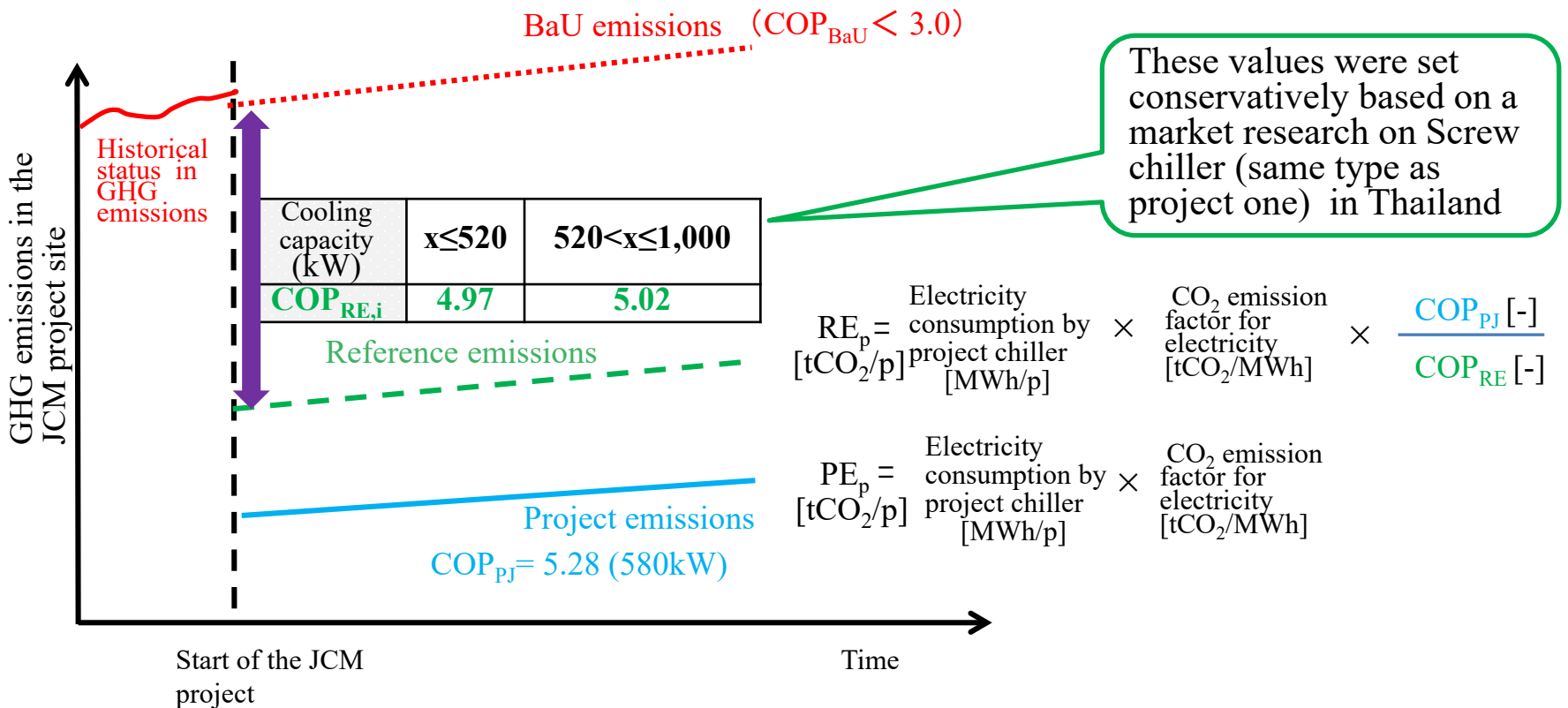Criterion for proposed project activity / installed facility

In case that performance of the installed facility is different according to capacity scale , applicable range is often listed for criterion in JCM.

Criterion to ensure effectiveness for actual emission reductions and avoid negative impact by the project

Example for ensuring net emission reductions (Example1-1)

TH_AM013 ver02: "Energy Saving by Introduction of High Efficiency Screw Chiller for freezing and refrigeration"
for project "Introduction of High Efficiency Chilled Water Supply System in Milk Factory"

BaU emissions （COP_{BaU} < 3.0）

These values were set conservatively based on a market research on Screw chiller (same type as project one) in Thailand

Historical status in GHG emissions

GHG emissions in the JCM project site

Cooling capacity (kW)	x≤520	520<x≤1,000
$COP_{RE,i}$	4.97	5.02

Reference emissions

$$RE_p = \frac{\text{Electricity consumption by project chiller [MWh/p]}}{} \times \frac{CO_2 \text{ emission factor for electricity [tCO_2/MWh]}}{} \times \frac{COP_{PJ} [-]}{COP_{RE} [-]}$$

[tCO_2/p]

Project emissions
COP_{PJ}= 5.28 (580kW)

$$PE_p = \text{Electricity consumption by project chiller [MWh/p]} \times CO_2 \text{ emission factor for electricity [tCO_2/MWh]}$$

[tCO_2/p]

Start of the JCM project

Time

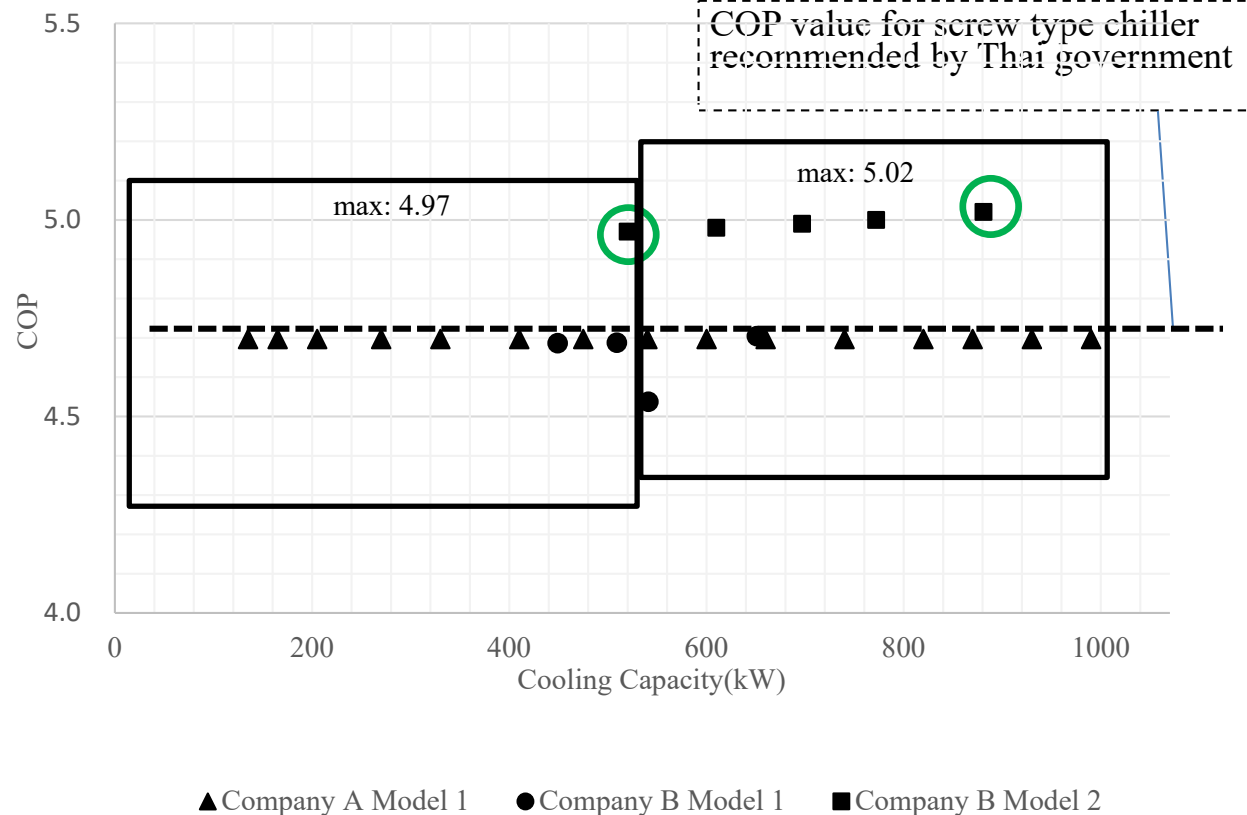# Ensuring net emission reductions (Sample 1-2)

- Based on manufactures of reasonable types for cost performance of distributed manufactures in the market of the host country, the maker specification/catalog value of high performance is often set as the reference value for energy efficiency indicator.

- In case that it is difficult or a hard work to develop the performance value in reference, the performance values for Baseline according to <u>CDM methodologies/ CDM methodology tools</u> are often applied to the one in reference of JCM.

- In case that there are regulations or recommended performance level by the government in the host country, it is requested for the reference value to apply the performance value higher than recommended performance level by the government.

Result of research on COP values In the market of Thailand

Under temperature condition
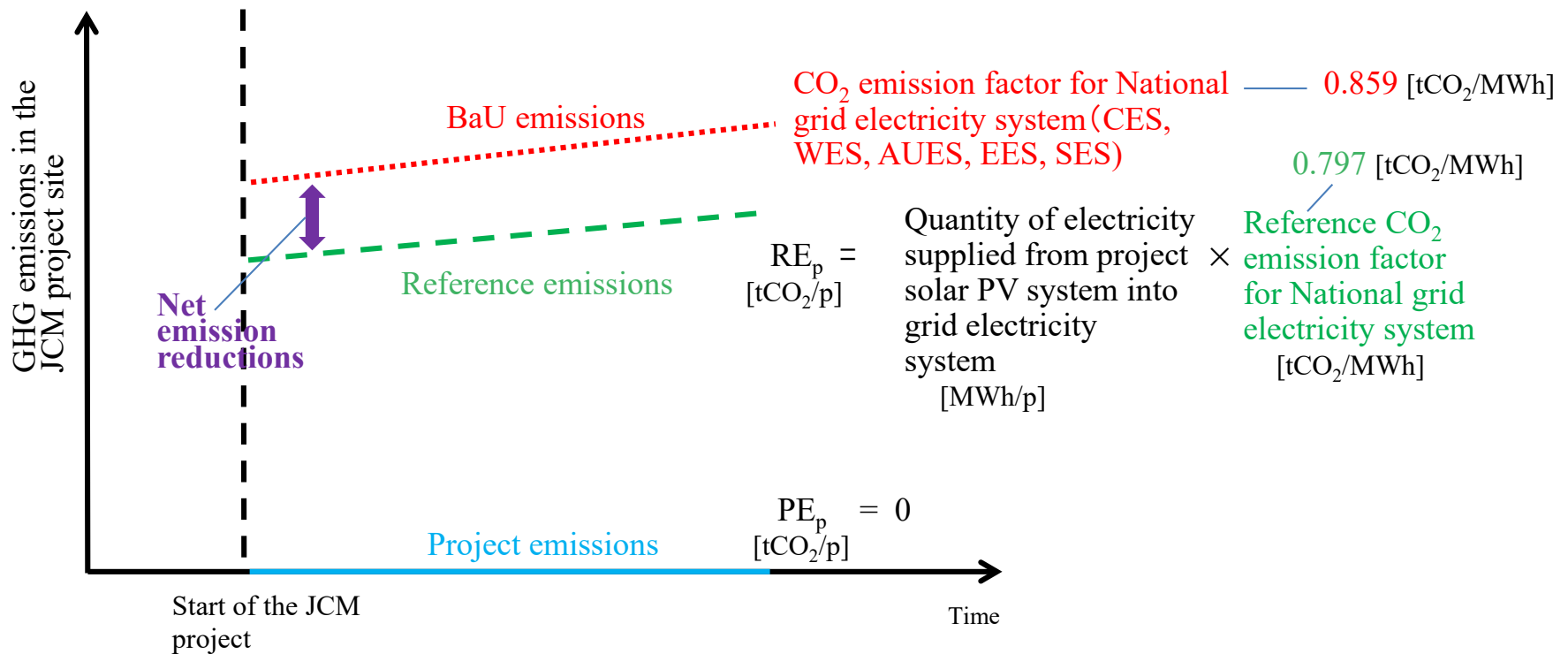(Cooling Water in: 32°C out:37°C   Chilled Water in: 12 °C out 7°C)

COP value for screw type chiller recommended by Thai government

max: 5.02

max: 4.97

COP

Cooling Capacity(kW)

▲ Company A Model 1   ● Company B Model 1   ■ Company B Model 2

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Example for ensuring net emission reductions (Example2-1)

MN_AM003 ver02： Installation of Solar PV System
Project MN003：12.7 MW Solar Power Plant for Power Supply In Ulaanbaatar Suburb
Project MN004：10MW Solar Power Project in Darkhan City
Project MN005：15MW Solar Power System near New Airport

CO_2 emission factor for National grid electricity system（CES, WES, AUES, EES, SES) ——— 0.859 [tCO_2/MWh]

0.797 [tCO_2/MWh]

$$RE_p = \text{Quantity of electricity supplied from project solar PV system into grid electricity system [MWh/p]} \times \text{Reference } CO_2 \text{ emission factor for National grid electricity system [tCO}_2\text{/MWh]}$$

RE_p [tCO_2/p]

$PE_p = 0$ [tCO_2/p]

Example for ensuring net emission reductions (Example2-2)

The way identifying CO_2 emission factor for grid electricity system in Mongolia

CO_2 emission factor for National grid electricity system (CES, WES, AUES, EES, SES)	0.859 [tCO$_2$/MWh]	✓ Published value by Mongolia government ✓ Calculated as **Combined Margin CO_2 emission factor** according to "CDM methodology tool07：Tool to calculate the emission factor for an electricity system" → Applied to for calculation of **reference/project emissions in energy saving JCM projects**
Reference CO_2 emission factor for National grid electricity system	0.797 [tCO$_2$/MWh]	The electric power source of grid electricity systems in Mongolia are mainly occupied by Coal thermal using Lignite. Calculated based on heat efficiency of CHP4 in 2015, the highest value during 2013-2015 in Mongolia, using **0.0909 tCO$_2$/GJ**, the lower value of the value range of CO_2 emission factor（0.0909-0.115 tCO$_2$/GJ）for Lignite according to IPCC 2006 & **29.33TJ/G**, Net calorific value for Lignite according to Mongolia National Standard value. → Applied to for calculation of **reference emissions in renewable energy electricity generation JCM projects**

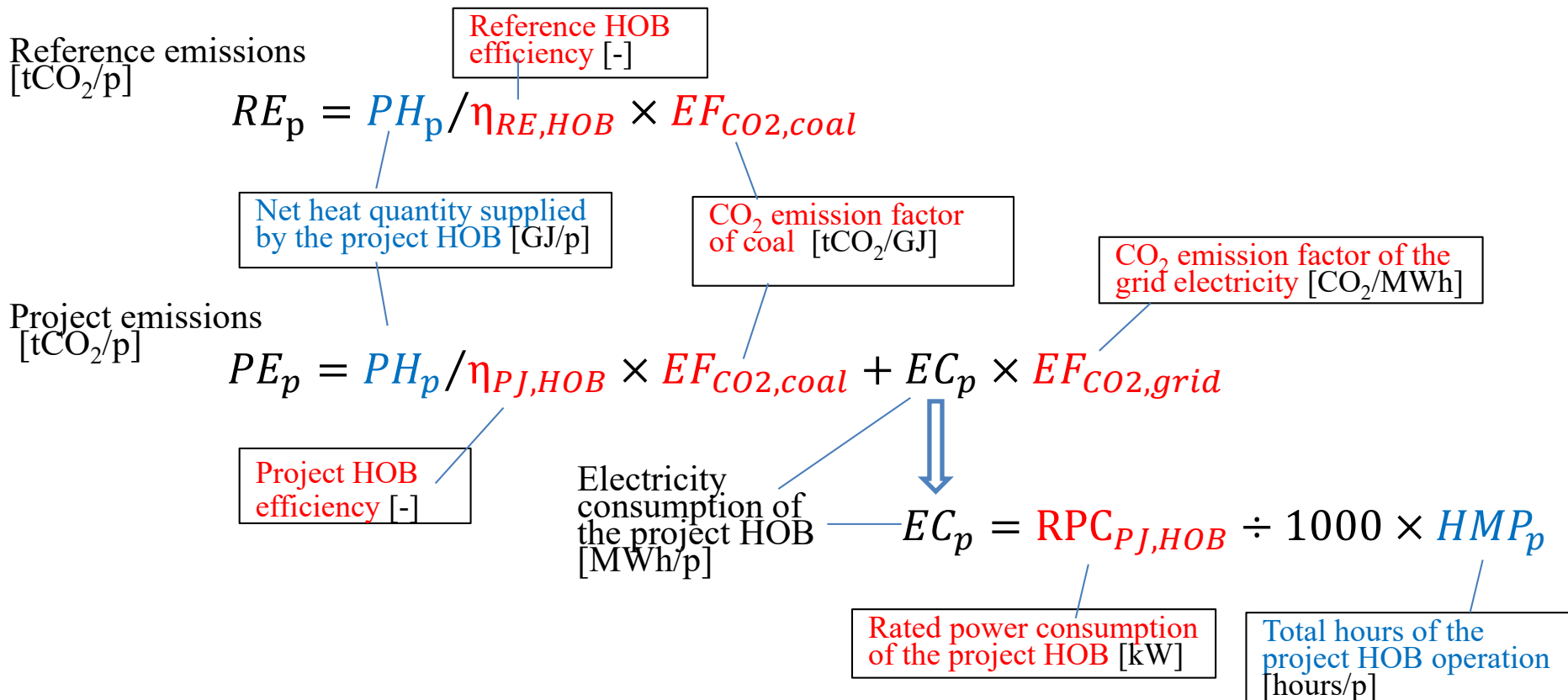Net electricity generation in Mongolia by fuel type (TWh)
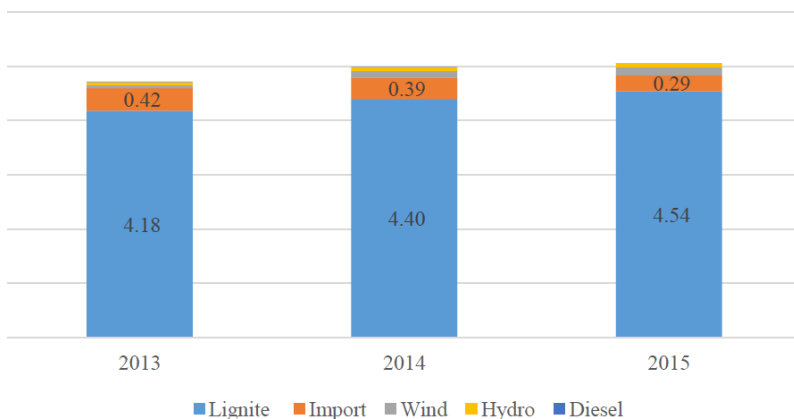
System	Power plant	Plant emission factor (tCO$_2$/MWh)		
		2013	2014	2015
CES	CHP2	1.641	1.669	1.666
	CHP3	0.928	0.965	0.896
	CHP4	0.816	0.808	0.797
	DARKHAN CHP	1.144	1.130	1.178
	ERDENET CHP	0.870	0.866	0.866
EES	Dornod CHP (Choibalsan)	1.773	1.763	1.714
SES	Dalanzadgad	1.822	4.394	4.277
	Ukhaa khudag CHP	2.147	2.082	2.069

* The power plant did not supply electricity to the grid in the respective year
(Data source: National Dispatching Center, Ministry of Energy Mongolia, 2016)

Parameters fixed ex ante (Example)

MN_AM002: "Replacement and Installation of High Efficiency Heat Only Boiler (HOB) for Hot Water Supply Systems"

> Red font parameters : Parameters fixed ex ante
> Brue font parameters : Monitoring parameters

Reference emissions [tCO_2/p]

Reference HOB efficiency [-]

$$RE_p = PH_p / \eta_{RE,HOB} \times EF_{CO2,coal}$$

Net heat quantity supplied by the project HOB [GJ/p]

CO_2 emission factor of coal [tCO_2/GJ]

CO_2 emission factor of the grid electricity [CO_2/MWh]

Project emissions [tCO_2/p]

$$PE_p = PH_p / \eta_{PJ,HOB} \times EF_{CO2,coal} + EC_p \times EF_{CO2,grid}$$

Project HOB efficiency [-]

Electricity consumption of the project HOB [MWh/p]

$$EC_p = RPC_{PJ,HOB} \div 1000 \times HMP_p$$

Rated power consumption of the project HOB [kW]

Total hours of the project HOB operation [hours/p]

Section I . Parameters fixed ex ante (Example)

MN_AM002: "Replacement and Installation of High Efficiency Heat Only Boiler (HOB) for Hot Water Supply Systems"

Parameter	Description of data	Sourc(e
(1) $\eta_{RE,HOB}$	Boiler efficiency of the reference HOB calculated from published information and measured data [−] Default value of 53.3% is applied.	Actual measured values.
(2) $\eta_{PJ,HOB}$	Boiler efficiency of the project HOB calculated from published information and measured data [−] Default value of 61.0% is applied.	Actual measured values.
(3) $EF_{CO2,coal}$	CO_2 emission factor of coal [tCO_2/GJ]	Default emission factor applied to lignite fuel according to "2006 IPCC Guidelines for National Greenhouse Gas Inventory". Lower value of the default carbon content is applied
(4) $EF_{CO2,grid}$	CO_2 emission factor of the grid electricity consumed by the project HOB [tCO_2/MWh]	The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. The data is sourced from CDM Mongolia unless otherwise instructed by the Joint Committee.
(5) $RPC_{PJ,HOB}$	Rated power consumption of the project HOB [kW]	Catalog value provided by the manufacturer of the project HOB

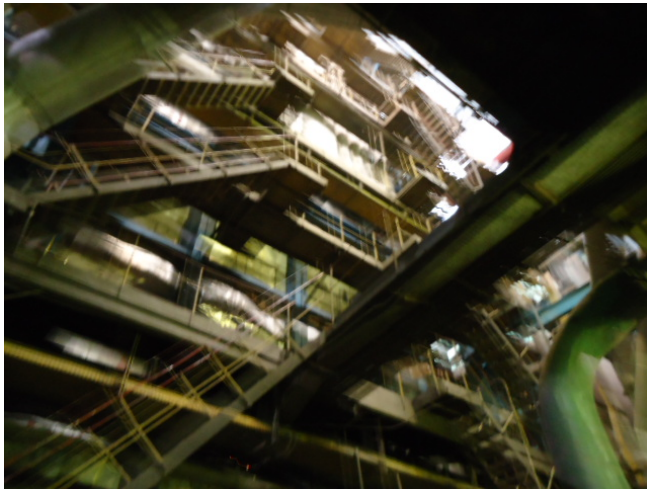# *Thank you so much for your attention !*

CHP & Copper mine in Erdenet

CHP in Darkhan

Boiler in CHP4

Turbine in CHP3