



Installation of Co-Generation Plant for On-Site Energy Supply in Motorcycle Factory

NS-OG Energy Solutions (Thailand) Ltd. (“NSET”)
Dr. Go TAKEI | Managing Director

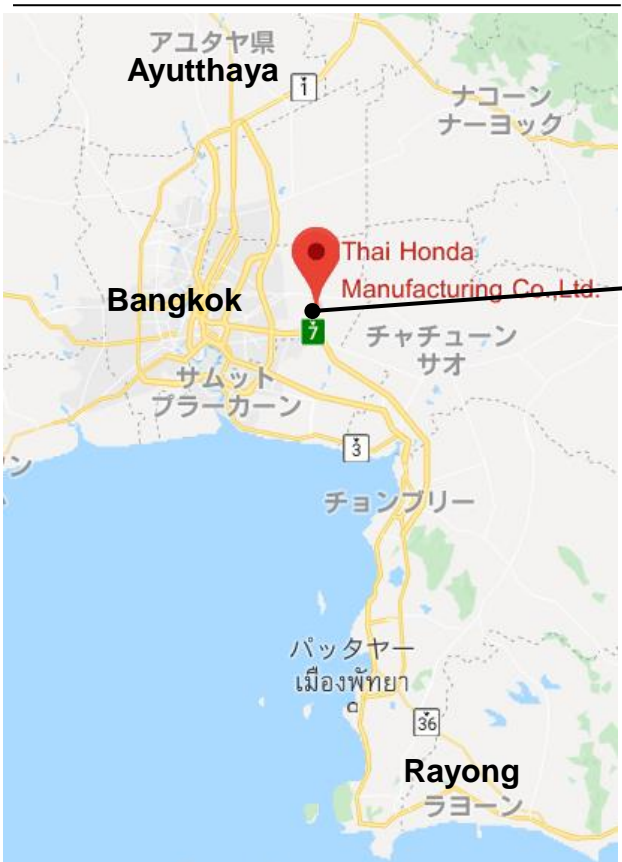
- **Project overview**

- Project implementation
- GHG emission reduction and MRV

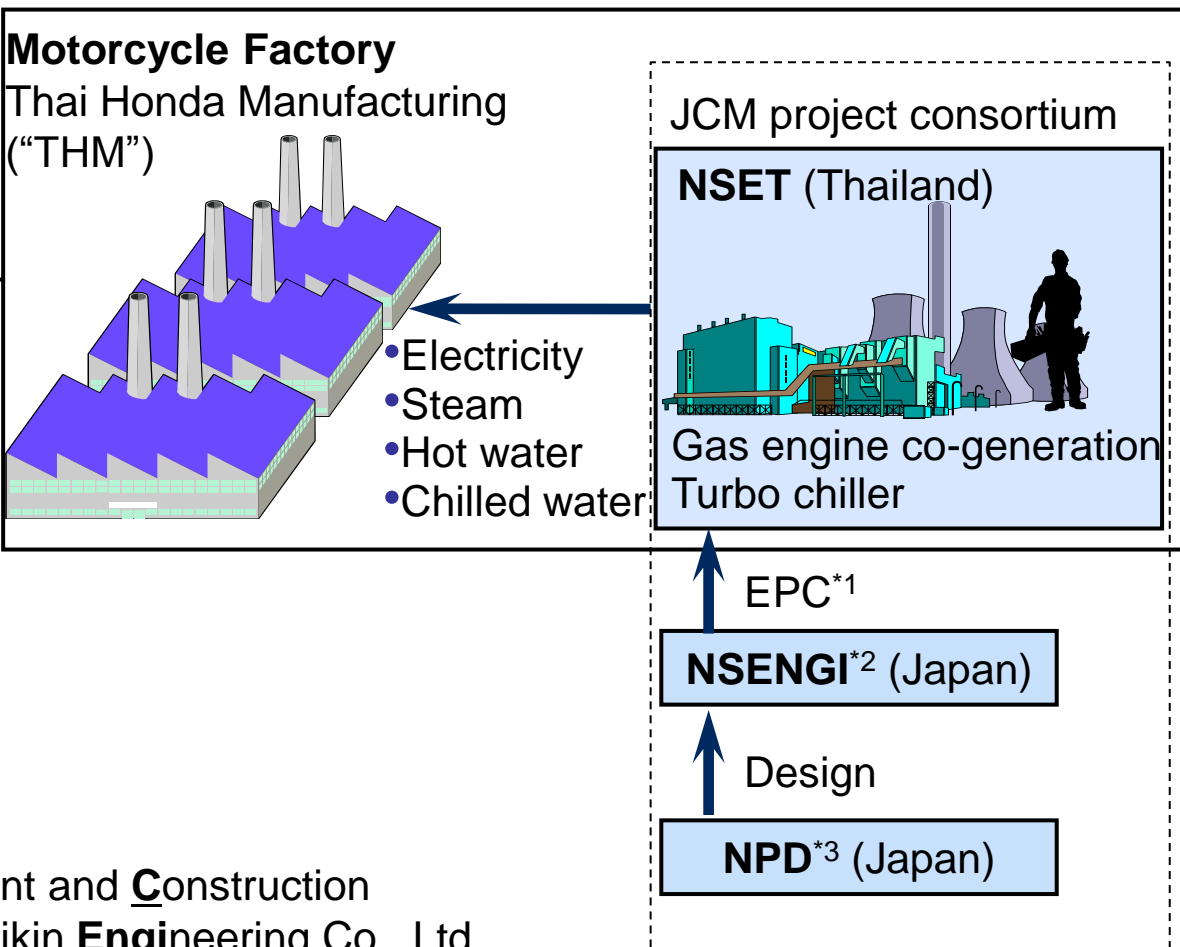
Project description

NSET installs gas engine co-generation and turbo chiller for onsite energy supply in Thai motorcycle factory.

Location



Implementation structure



*1 EPC: **E**ngineering, **P**rocurement and **C**onstruction
*2 NSENGI: **N**ippon Steel & **S**umikin **E**ngineering Co., Ltd.
*3 NPD: **NS** **P**lant **D**esigning Corporation

Who is NSET?

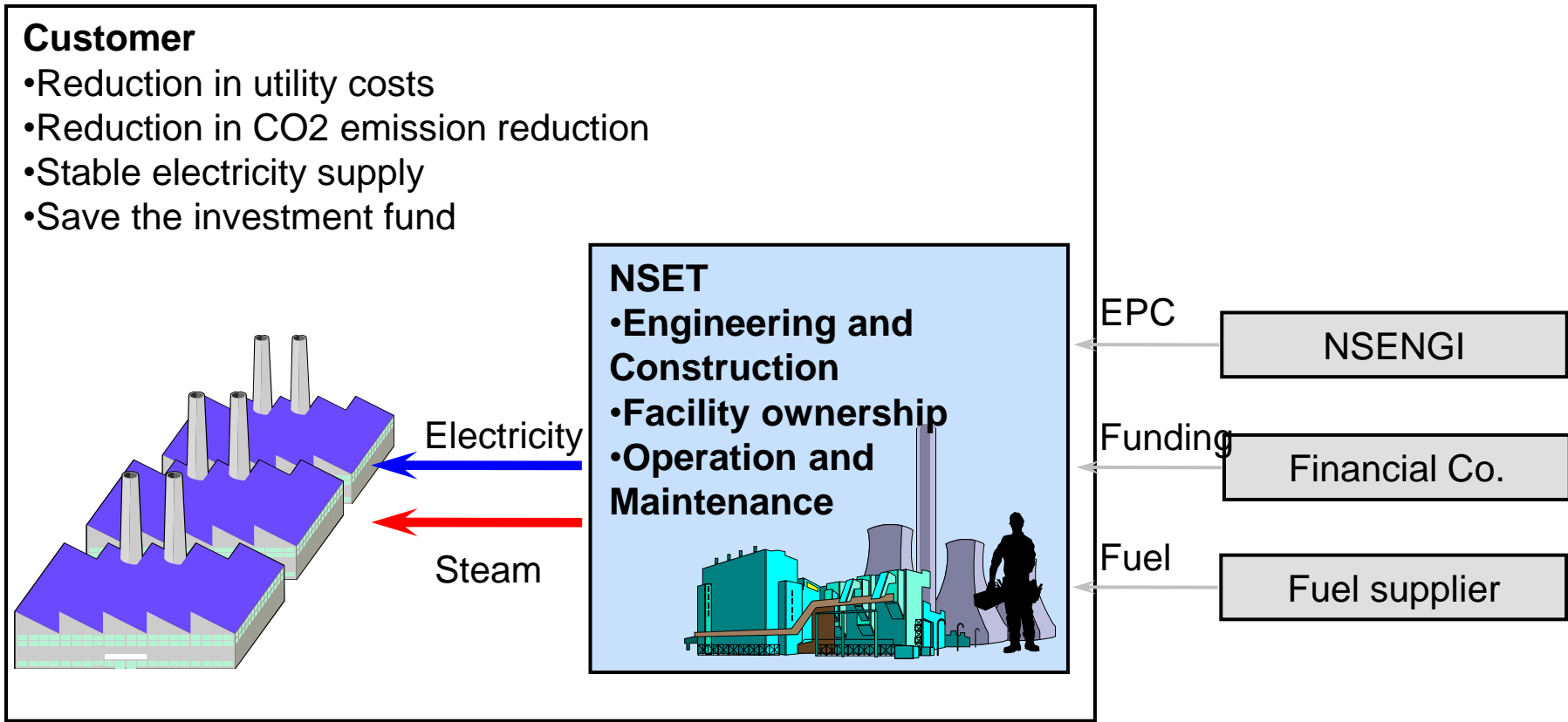
Company	NS-OG Energy Solutions (Thailand) Ltd. “NSET”
Establishment	June 2012
# of employees	66 (as of Aug 2018)
Business	Production and supply of electricity, steam and water.
Capital	380 MMTHB
Shareholder	Nippon Steel & Sumikin Engineering (70%)
	Osaka Gas Singapore (30%)

Project name	Customer	Facility	COD
HATC	Honda Automobile (Thailand)	Chiller, boiler	2015
LTC	Luckytex (Thailand)	6MW Gas turbine CHP	2016
YRT	Yokohama Tire Manufacturing (Thailand)	6MW Gas turbine CHP	2017
HATC2	Honda Automobile (Thailand)	7MW Gas engine CHP	2017
THM	Thai Honda Manufacturing	7MW Gas engine CHP	2018

On-site energy service business

NSET offers on-site energy service, where CHP facilities are designed, constructed, owned, operated and maintained, and Customers enjoys benefits without any significant investment burden.

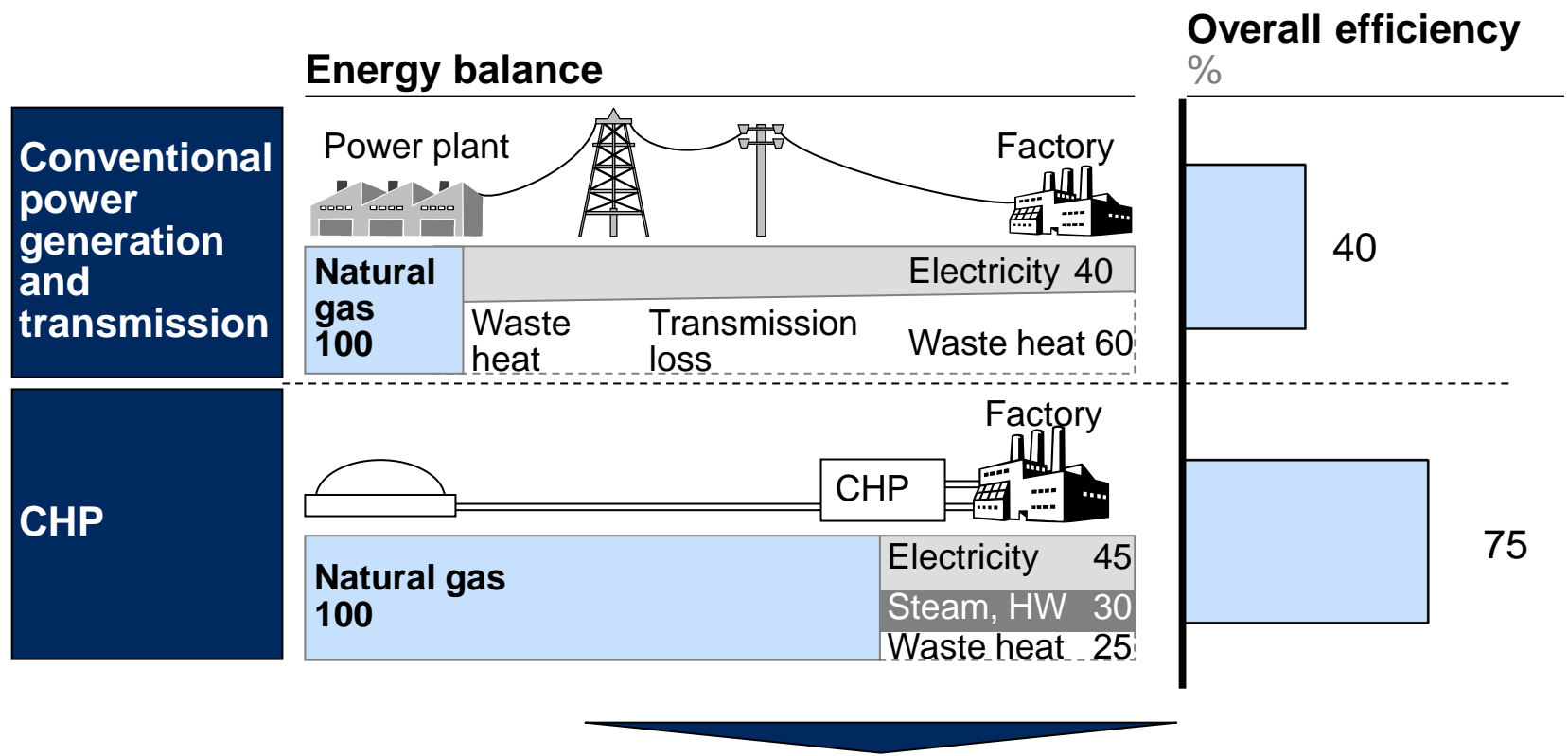
On-site energy service business model



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CHP attains highly efficient energy use by the maximum use of waste heat generated in power generation process.

Schematic illustration



- Cost reduction caused by energy saving
- CO2 emission reduction

7MW gas engine co-generation plant for THM

Gas engine co-generation is installed in this project.

Plant overview

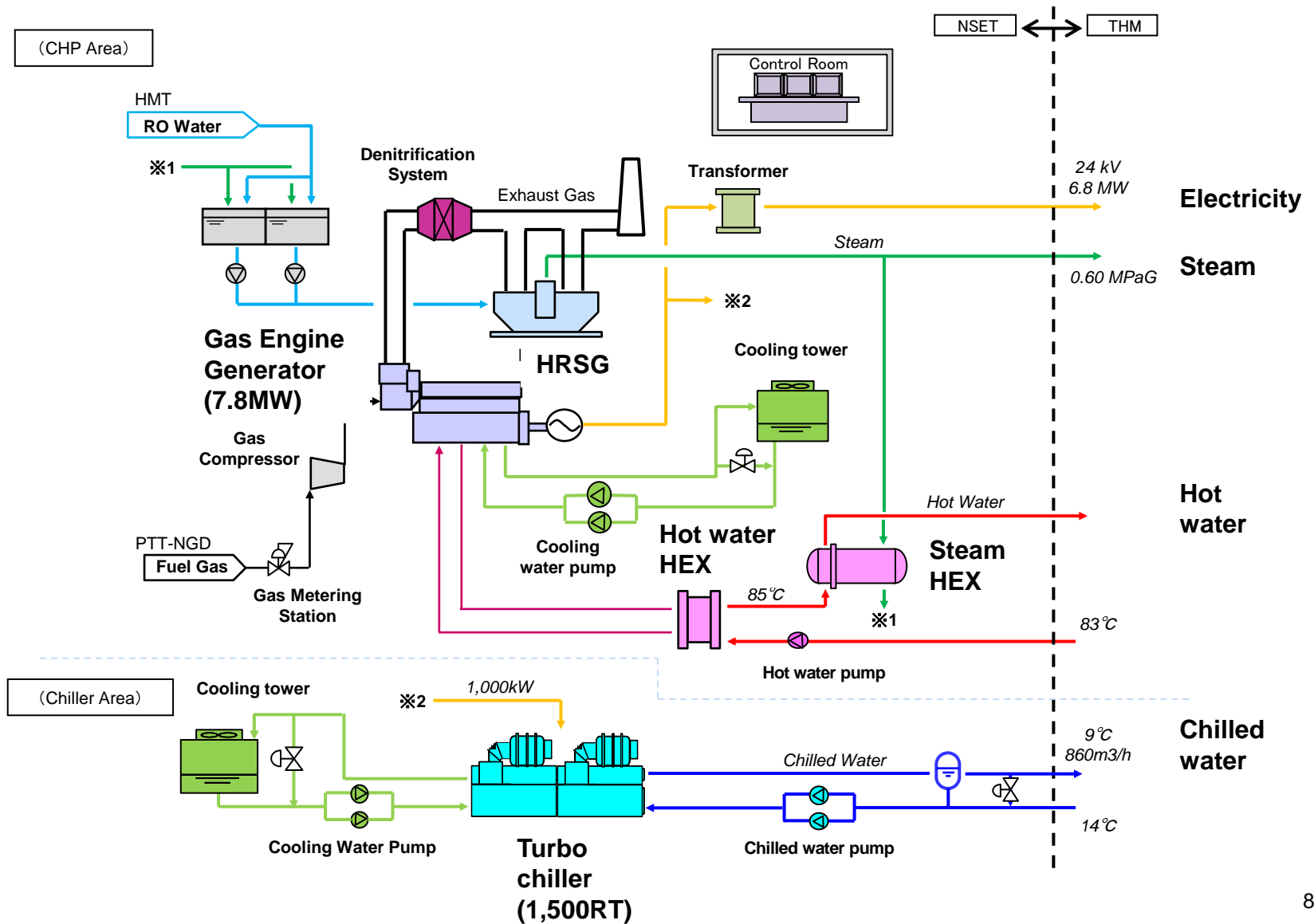


Gas engine



Installed facility

NSET installs 7.8MW Gas engine co-generation and 1,500 RT chiller.

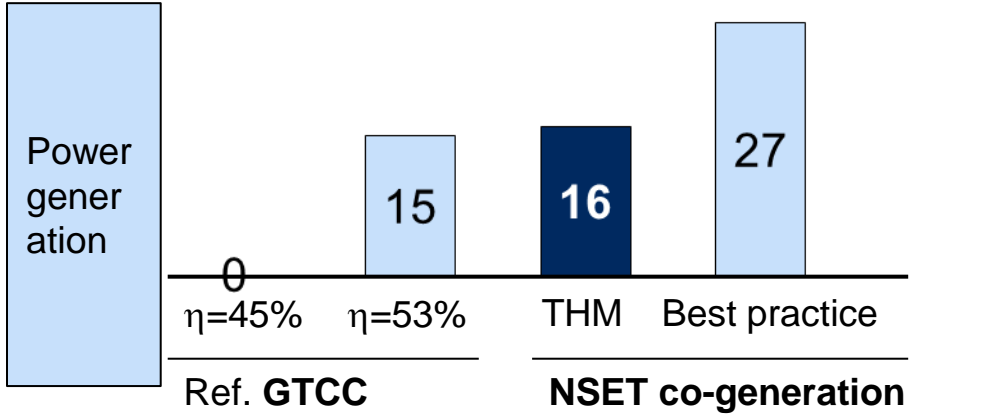
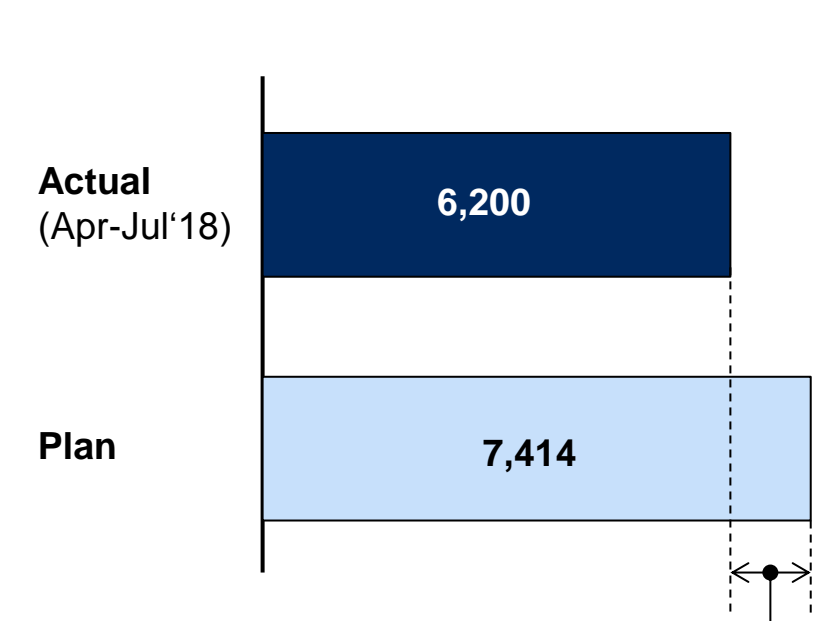
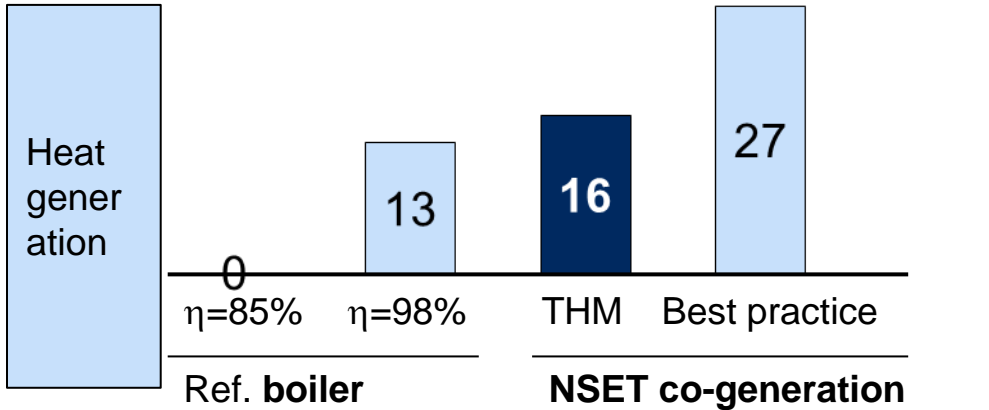


Project benefit (1/3) Energy saving and GHG emission reduction

NSET has proven outstanding primary energy saving and GHG emission reduction but still has a room for improvement for waste hot water utilization.

PES: Primary Energy Saving
%

GHG emission reduction
T-CO2/year

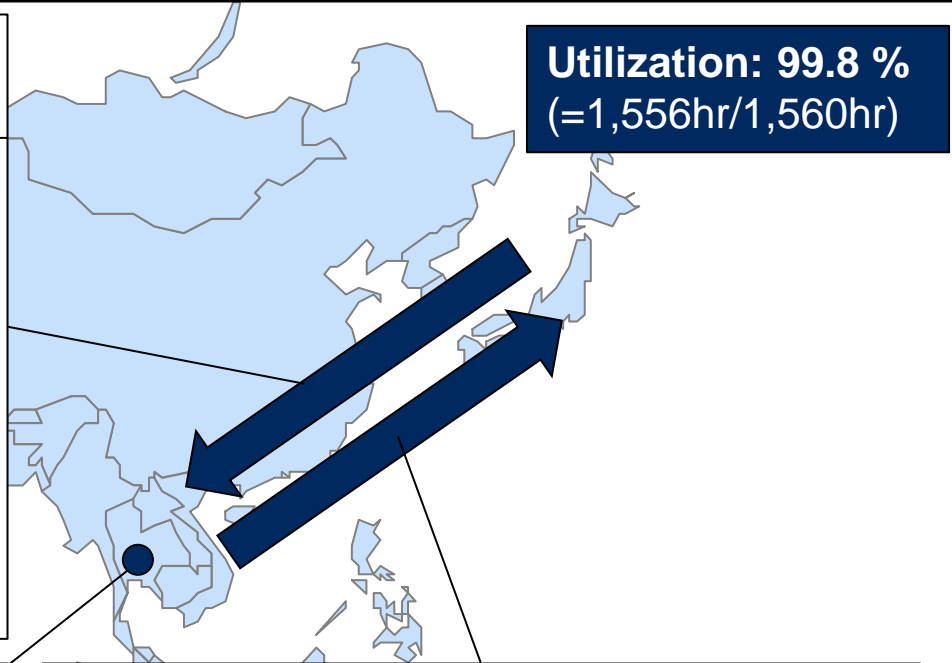


Project benefit (2/3) Stable operation by technology transfer

As a result of successful technology transfer and support, the higher utilization than 99% has been achieved.

(1) Transfer of operation management method from Japan

- Management method (Operation manual, check list, training method) has been transferred from Japan to Thailand.



(2) Utilization of NSET Operation and Maintenance (O&M) network in Thailand

- NSET operates 4 sites in Thailand
- NSET conducts root-cause analyses for trouble. Countermeasures against the trouble are deployed to other sites.
- NSET have spare parts of main machines and auxiliaries in common with other sites.

(3) O&M Support via remote monitoring by NSENGI in Japan

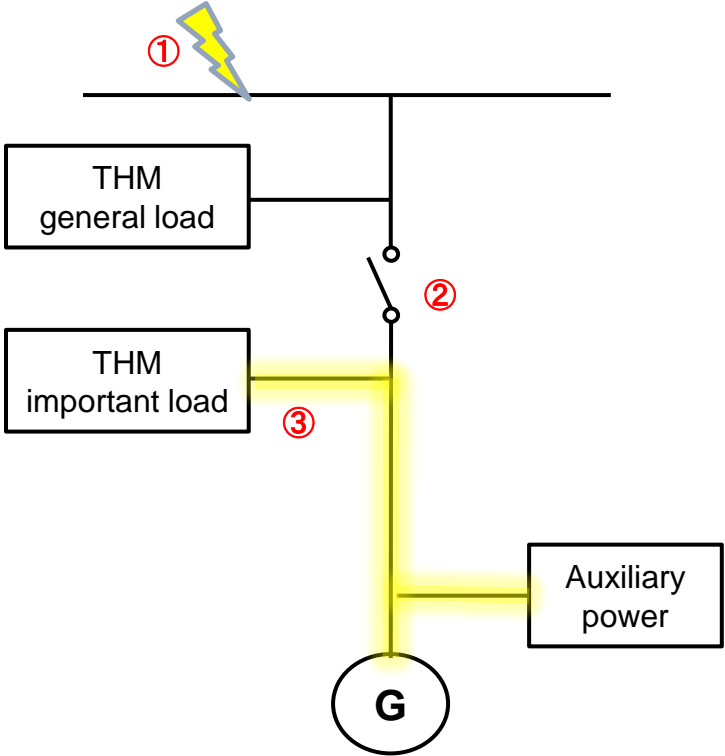
- Remote monitoring and data collection system is installed
- Expert staff at NSET Bangkok Office and NSENGI in Japan can see the current operation status and provide advices

Project benefit (3/3) Stable power supply

NSET's co-generation system can contribute to stable production by continuous power supply at the occasion of power grid trouble.

Schematic illustration of island operation

- ① Voltage drop happens in the grid
- ② Switchgear is activated and open
- ③ GE continues to supply power to THM important load



NSET's track record of stable power supply by island operation

Items	THM	NSET site Best practice
Terms	Apr-Jul '18 (4M)	Aug '17-Jul '18 (12M)
Voltage drop and shutdown [times]	3	32
Successful island operation [times]	3	32
Success ratio	100%	100 %

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MRV progress

We plan to complete the methodology development by October 2018 and the project registration by March 2019.

	Current status	Action plan
Commencement of operation	<ul style="list-style-type: none">• Already started to operate the installed facilities	<ul style="list-style-type: none">• N/A
Methodology development	<ul style="list-style-type: none">• Currently developing with Mitsubishi UFJ Research and Consulting Co., Ltd.	<ul style="list-style-type: none">• Plan to complete developing methodology by October 2018
Project registration	<ul style="list-style-type: none">• Currently developing PDD with Mitsubishi UFJ Research and Consulting Co., Ltd.	<ul style="list-style-type: none">• Plan to complete the project registration by March 2019
Credit issuance	<ul style="list-style-type: none">• Report CO2 actual reduction amount to Japan Ministry of Environment	<ul style="list-style-type: none">• Plan to firstly receive the credit by around June 2019