Progress of Flagship Projects
- Activities of SteelEcosol -

25th August 2023
The 5th Government-Private Forum
on the Cleaner Energy Future Initiative for ASEAN

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The Japan Iron and Steel Federation

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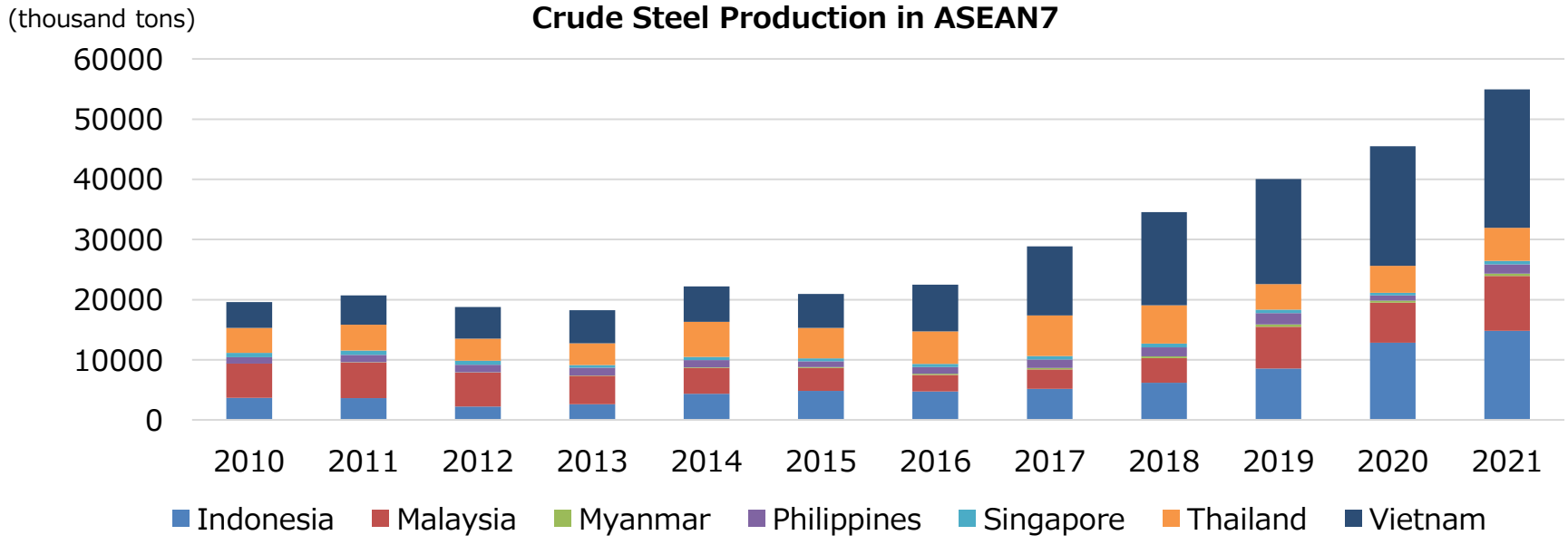
SteelEcosol's Mission: Promote the Diffusion of BAT in ASEAN Steel Industry

- Steel sector is responsible for about **8% of global final energy demand** and **7% of global direct energy-related CO_2 emissions***
- Innovative technologies (e.g., hydrogen steelmaking) are being developed to achieve carbon neutrality in the steel sector, but these technologies will not be available immediately
- Until such innovative technologies become available**, improving energy efficiency through Best Available Technologies (BAT) will play an important role in the ASEAN steel industry**, where steel making capacity is/will be increasing
- **<u>SteelEcosol aims to promote energy conservation in the ASEAN steel industry by BAT adoption and operational improvement</u>**

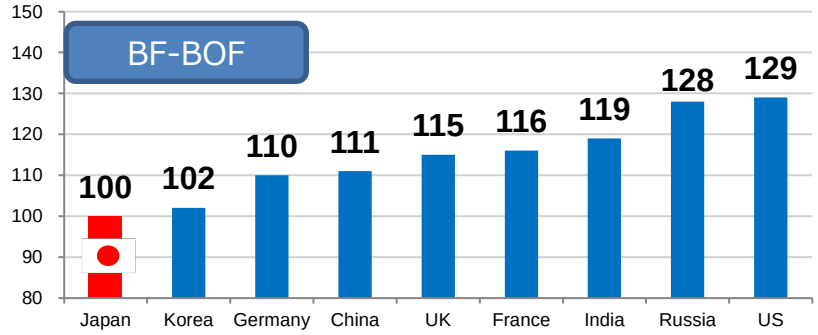


*Source: Iron and Steel Technology Roadmap, IEA (2020) https://www.iea.org/reports/iron-and-steel-technology-roadmap

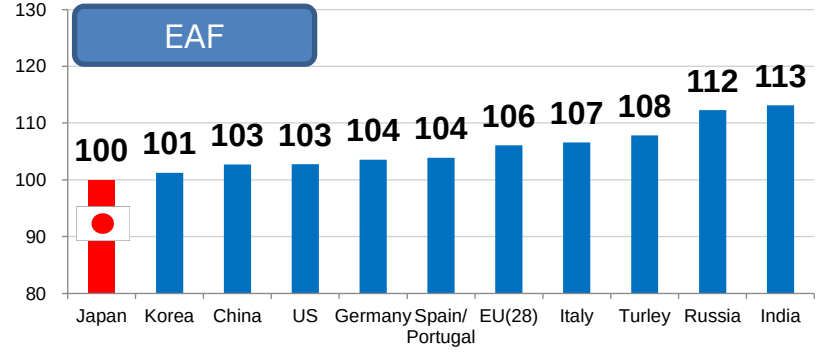
How cooperation with Japan benefits ASEAN Steel Industry

- **Japan's steelmaking process is the most energy-efficient** in the world by deployment of the Best Available energy-saving Technologies (BAT)
- Knowledge of the Japanese steel industry will be beneficial in promoting energy conservation in the ASEAN steel industry

Energy efficiency by country/region (2019)
Indexed as Japan 100



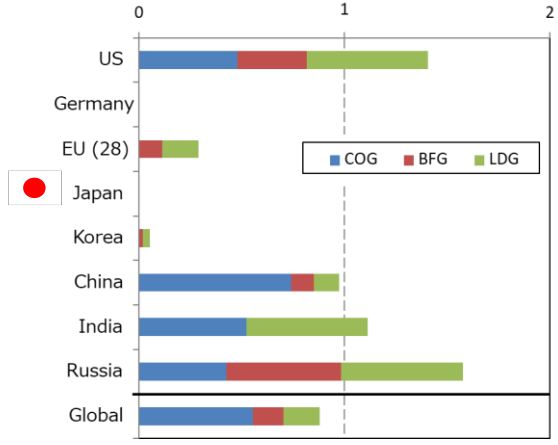
Source: RITE, "Estimation of Energy Intensity as of 2019 (Steel Sector – Blast Furnace – Basic Oxygen Steel).



Source: RITE, "Estimation of Energy Intensity as of 2019 (Steel Sector - Electric Furnace Steel).

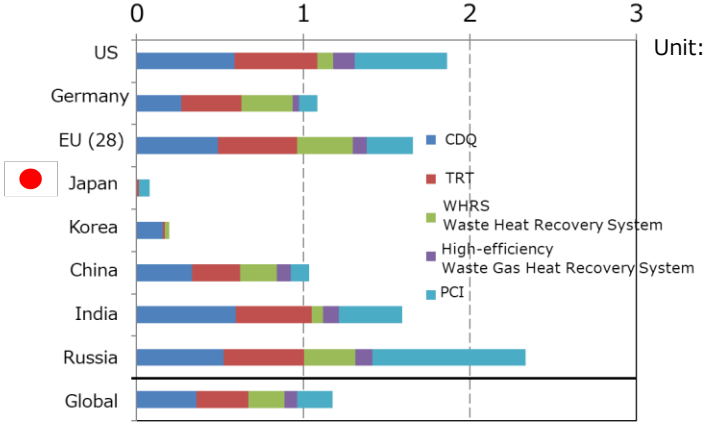
Potential of Energy Saving Technologies(2019)

【Potential for the recovery and efficient use of by-product gases】



Source: RITE estimates based on IEA Energy Balance Table (2021).

【Potential for the major energy saving technologies】



Note :PCI is evaluated based on Steel Federation "Steel Statistics Handbook 2021" and German Steel Federation (2013).The other four technologies are based on the 2015 penetration rate (based on Arens et al. (2017), Schulz et al. (2015), China Iron and Steel Industry Yearbook (2016), etc.) and the actual installations

ASEAN and Japan Steel Industries started exchanges in energy conservation in 2014

- **ASEAN-Japan Steel Initiative (AJSI)**, started in 2014, contributes to energy saving and environmental protection in ASEAN through mutual and collaborative platform

Purpose

- Exchange knowledge and experiences and thereby contribute to the energy saving and environmental protection in ASEAN
- Encouraging technology transfer from Japan to ASEAN steel industry

Participants

Public Sector
Ministries and governmental institutions related to steel industry and energy saving in ASEAN and Japan

Collaboration

Private sector
ASEAN Iron and Steel Council (AISC), national association in ASEAN, JISF and its member companies, Engineering Companies

Main Activities

1 **Steel Plant Diagnosis**

2 **Technologies Customized List**

3 **Public and Private Collaborative Seminar**

We have conducted steel plant diagnoses at 16 EAF plants in ASEAN

Outline

- Check operation and energy consumption status in the steel plant
- Evaluate energy efficiency level of the steel plant using ISO14404*.
- **Visualize the effect of CO_2 reduction** and provide **feedback for operational improvement and technology introduction** by Japanese experts

*ISO14404 is an international standard for calculating CO2 emissions from a steel plant .

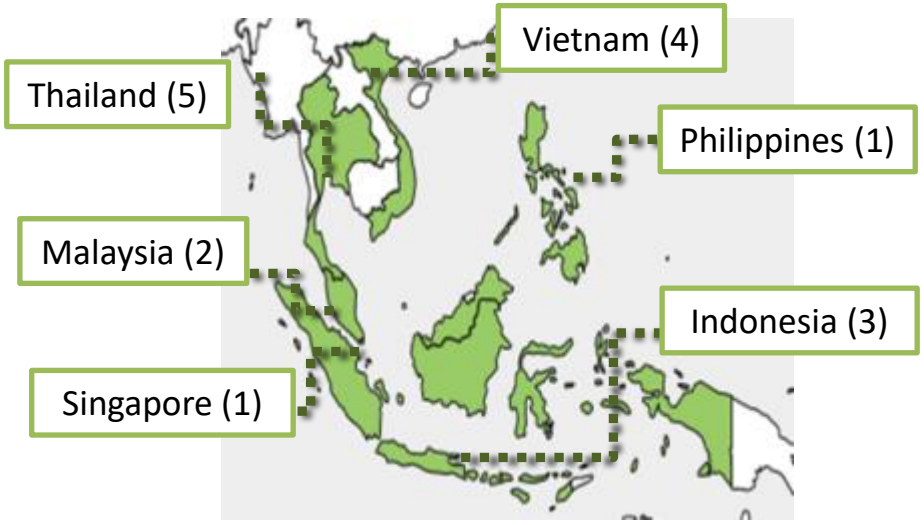
Benefit

- The steel plant can understand their current energy consumption status and CO2 emissions
- The Japanese experts will recommend energy conservation measures specifically for that plant

Steel plants who participates in the diagnosis can receive a lot of information from Japanese experts about current operation.

Steel plant diagnosis history in ASEAN

Diagnosis can be executed both on-line and off-line



Example schedule for on-site diagnosis

	Day1	Day2	Day3	Day4
AM	Greeting, Introduction, & Confirmation of the energy data	Continuous Cast Diagnosis	Discussion & Summarize the results	Reporting & Discussion
PM	Electric Arc Furnace Diagnosis	Hot Rolling Diagnosis	Discussion & Summarize the results	Additional information

SteelEcosol started in 2022, and will focus on plant diagnosis in 2023

- The Japan Iron and Steel Federation leads the communication and information sharing with ASEAN steel industry through the CEFIA platform from 2022FY

2022FY

①Online Diagnosis at A EAF plant in Thailand Sep-Oct 2022

Results of the diagnosis

	Target process	Type of measures	Proposed measures for energy-saving	CO2 reduction estimation (under an assumed condition)
(1)	EAF	Operational	Reducing heat-loss by shortening TTT (Tap to Tap Time)	Cannot quantify
(2)	EAF	Revamping	Scrap pre-treatment to reduce charging time ・Assumed investment cost: 3.09 million USD, ・Payback time: 2.8 years (assumed shear size; 1,250 t × 2)	5,600 t-CO2/year
(3)	EAF	Operational	Effective use of combustibles in scrap	5,600 t-CO2/year
(4)	EAF	Operational	Reducing air invasion and keeping molten slag layer	7,600 t-CO2/year
(5)	RHF	Operational	Air ratio control	3,800 t-CO2/year
(6)	RHF	Operational	Raising temperature of combustion air	3,000 t-CO2/year

25,000 tCO2/y

②AJSI Webinar

14th February 2023

- ✓ Share Japan's BAT and climate change policies to a wide range of stakeholders
- ✓ More than 180 people attended

2023FY

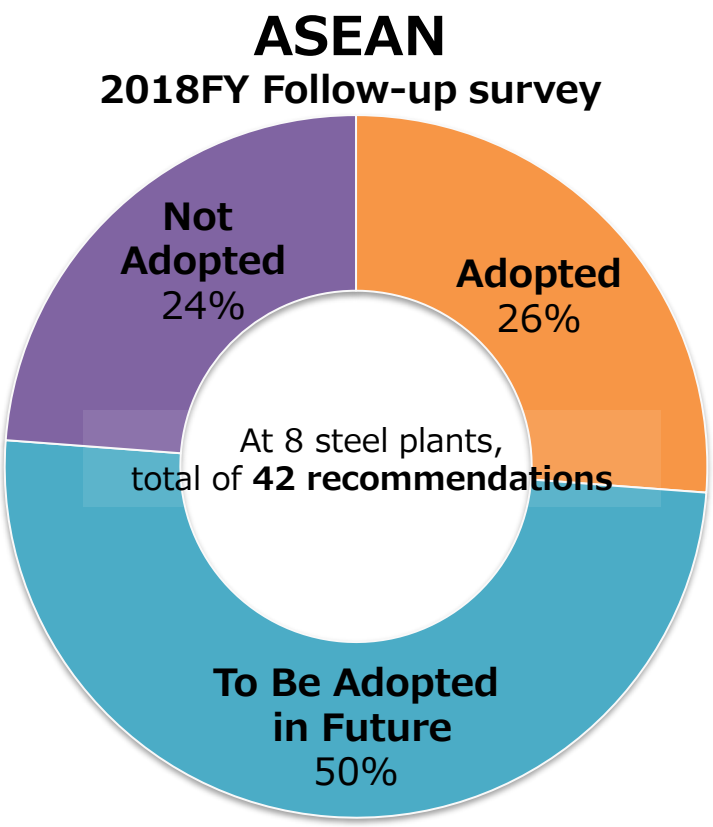
①Follow-up on A EAF plant in Thailand

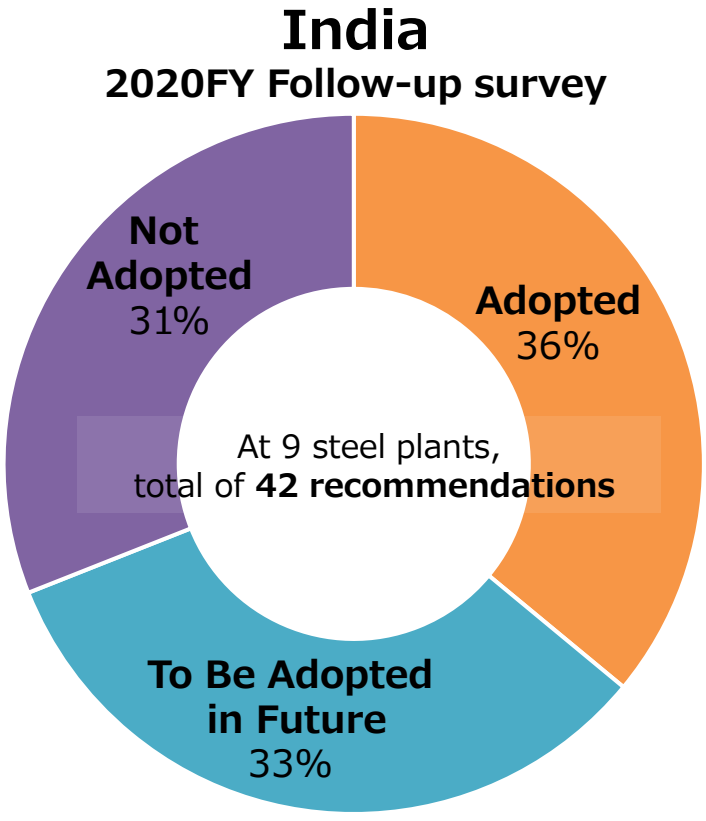
②On-site Diagnosis at B EAF plant in Malaysia Autumn 2023

Find potential for **energy conservation / CO2 reduction projects**

Many recommendations made in the steel plant diagnoses have actually been adopted already, or are planned to be adopted in future

- The Japan Iron and Steel Federation (JISF) has conducted steel plant diagnoses at ASEAN EAF plants and Indian BF-BOF plants
- JISF conducted follow-up surveys to these plants, and the results were that 70～80% of the recommended energy conservation measures were adopted or were planned to be adopted in future.





Proposal and Future activities

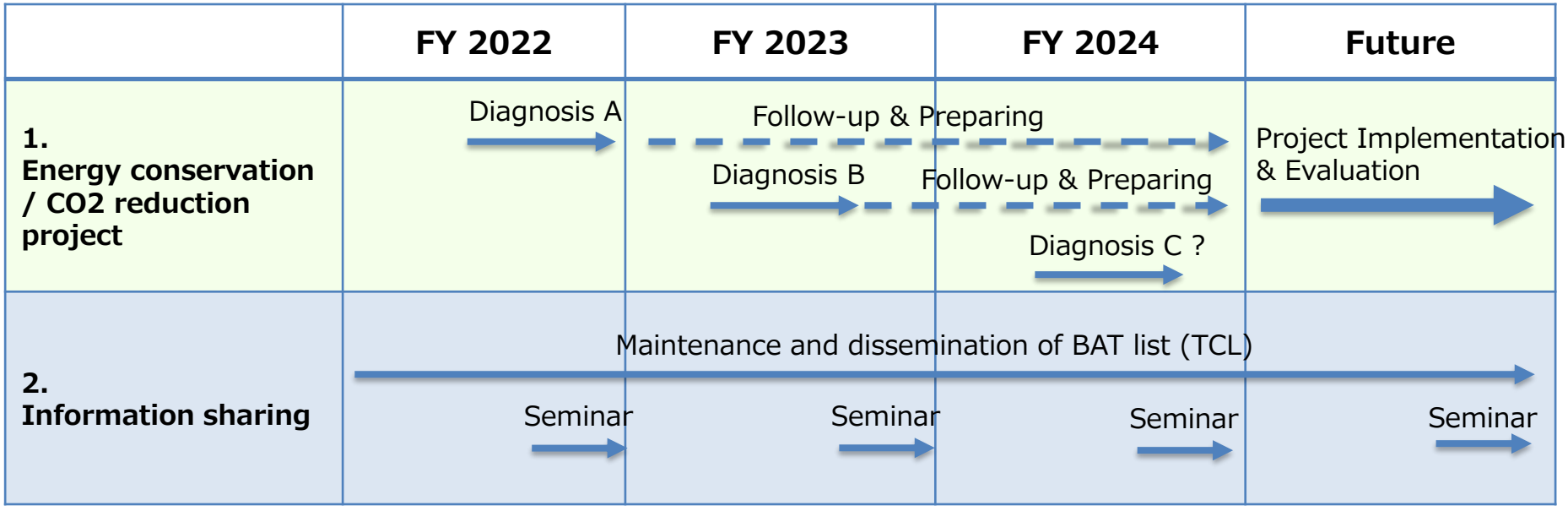
Goal: contribute to energy conservation and CO2 reduction in the ASEAN steel industry

1. Find potential for energy conservation / CO2 reduction projects through steel plant diagnosis (BAT introduction or operational improvements)

→ Support the plant's project implementation (i.e. provide technical and financing information etc.)

→ Evaluate the energy conservation / CO2 reduction results

2. Continue information sharing on energy conservation and decarbonization of steel industry through seminars, and updating/dissemination of BAT List (Technologies Customized List)



We continue to collaborate between ASEAN-Japan steel industry with support of CEFIA.