



# Energy Saving Practices A Japanese Steel Industry Case

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Chair, Energy Technology Committee

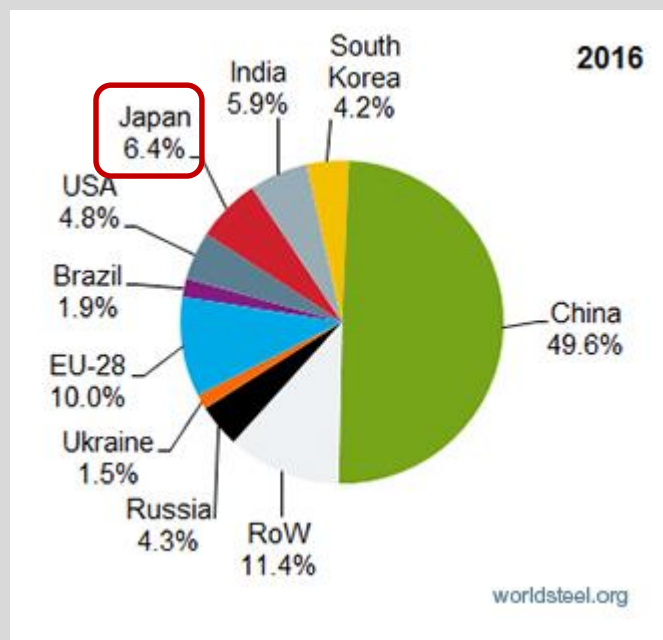
Japan Iron & Steel Federation

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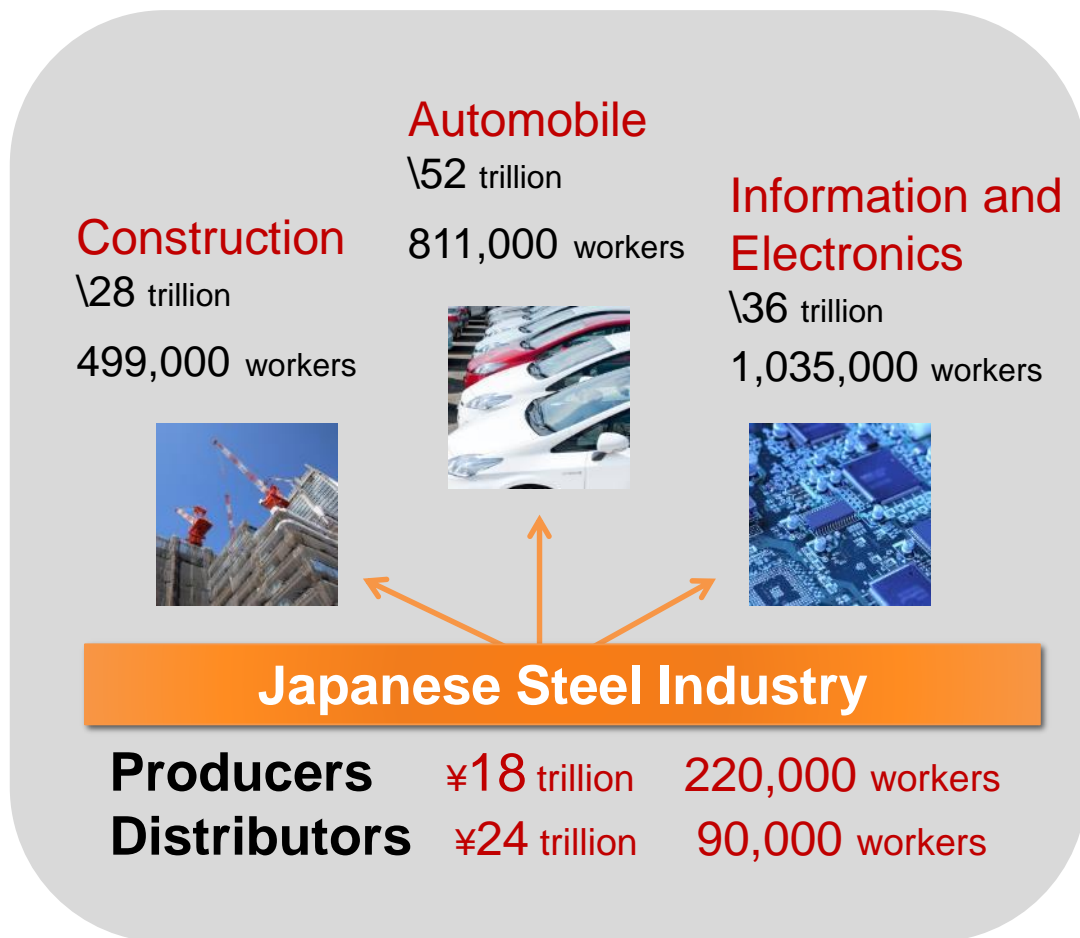
JFE Steel Corporation

# Japanese steel industry - Overview

- Second largest steel-making country
- Contribute to manufacturing sectors in Japan by supplying high grade steel

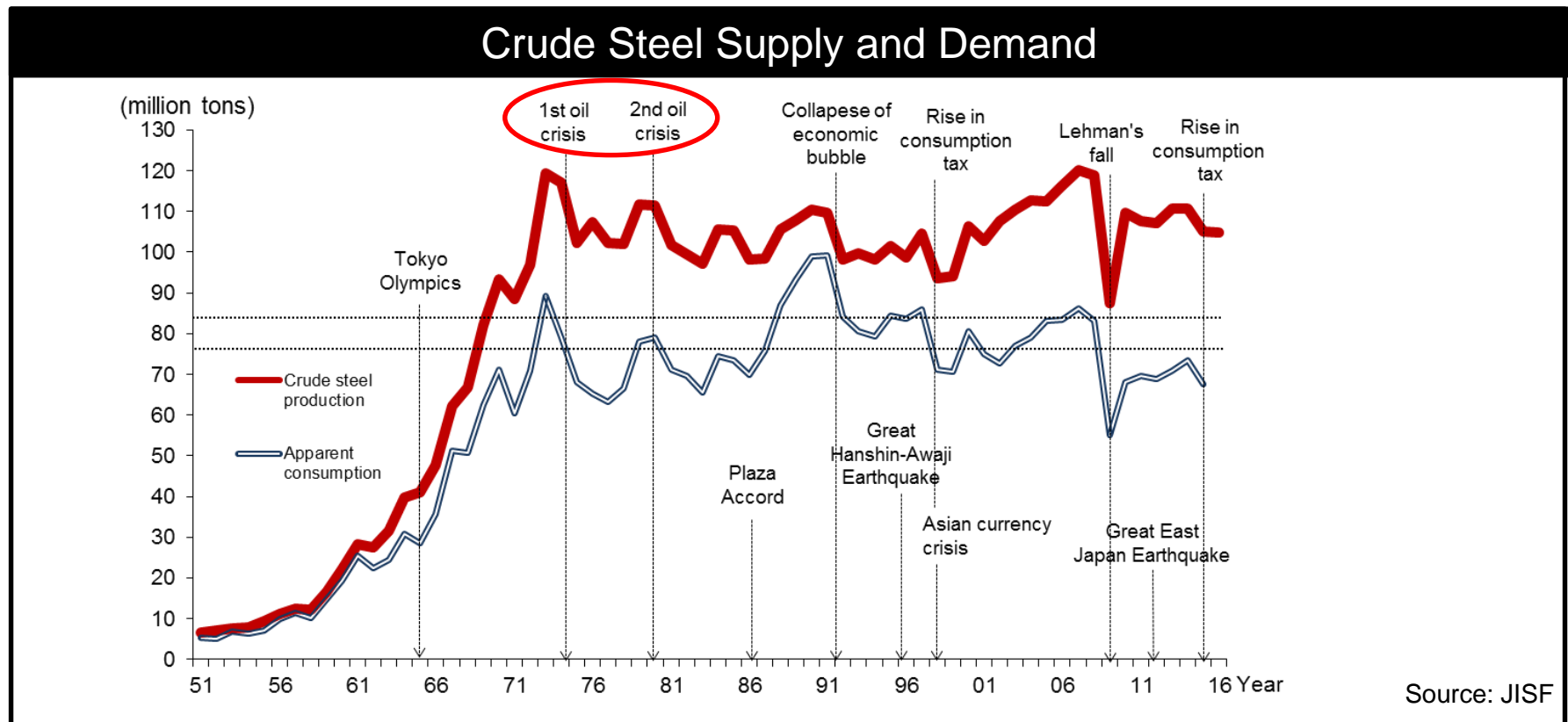


**Crude steel production in 2016**  
Total production: 1,629 Mt



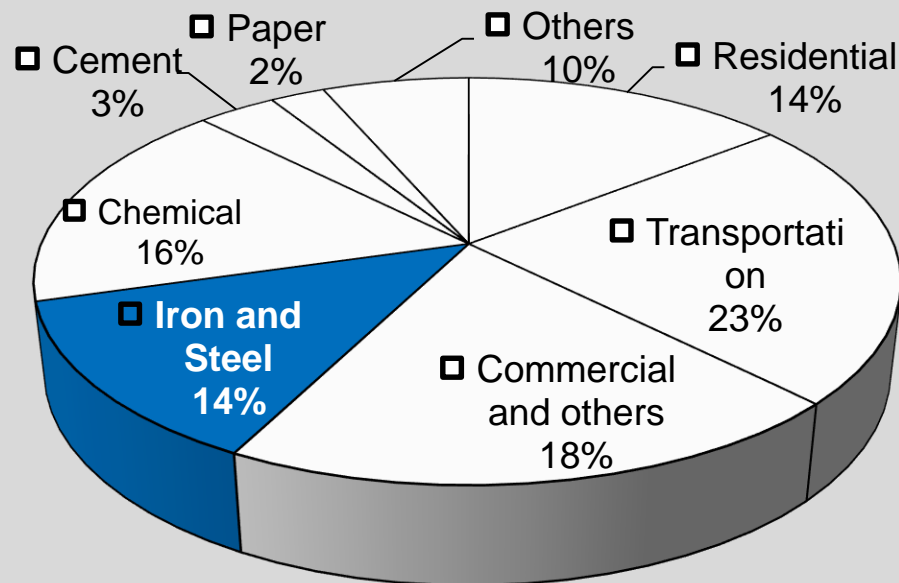
# Crude Steel Production in Japan

- Japan's crude steel production increased rapidly as demand for steel rose during Japan's period of strong economic growth in the postwar years.
- Steel demand in Japan stopped growing when the first oil crisis occurred in 1973. Since then, annual crude steel production has remained at an average of about 100 million tons.



# Japanese steel industry – Energy consumption

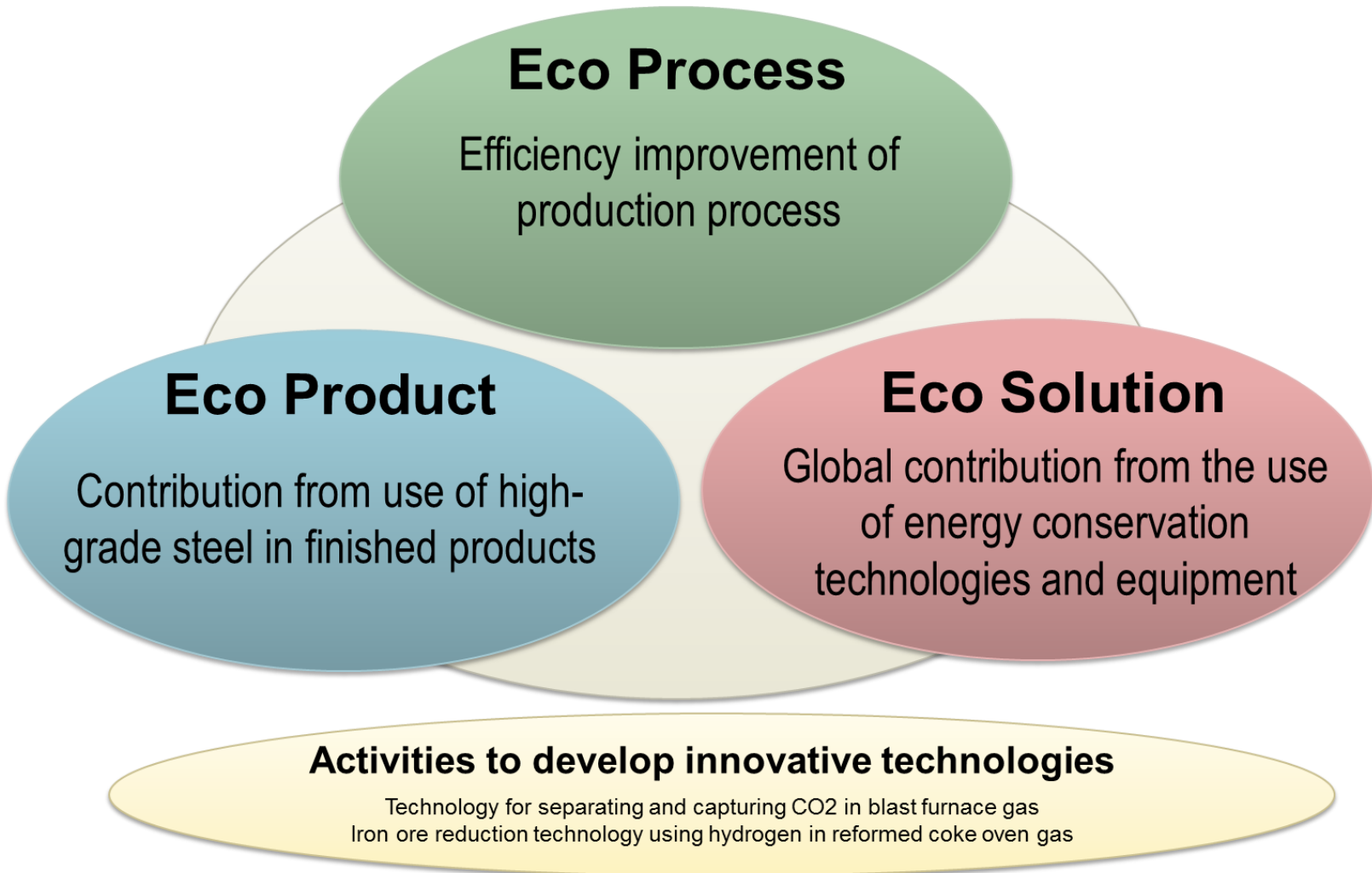
- Steel industry is one of the energy-consuming industries in Japan and accounts for 14% of energy consumption in Japan in FY2014
- Energy consumption is regulated by *Energy Conservation Act* since 1970s and Japanese steel industry has been engaging in several energy saving actions



**Energy consumption in Japan (FY2014)**

Total consumption: 13,558PJ

# Energy Saving Activities of Japanese Steel Industry



2008~ 2012

**Voluntary Action Plan**

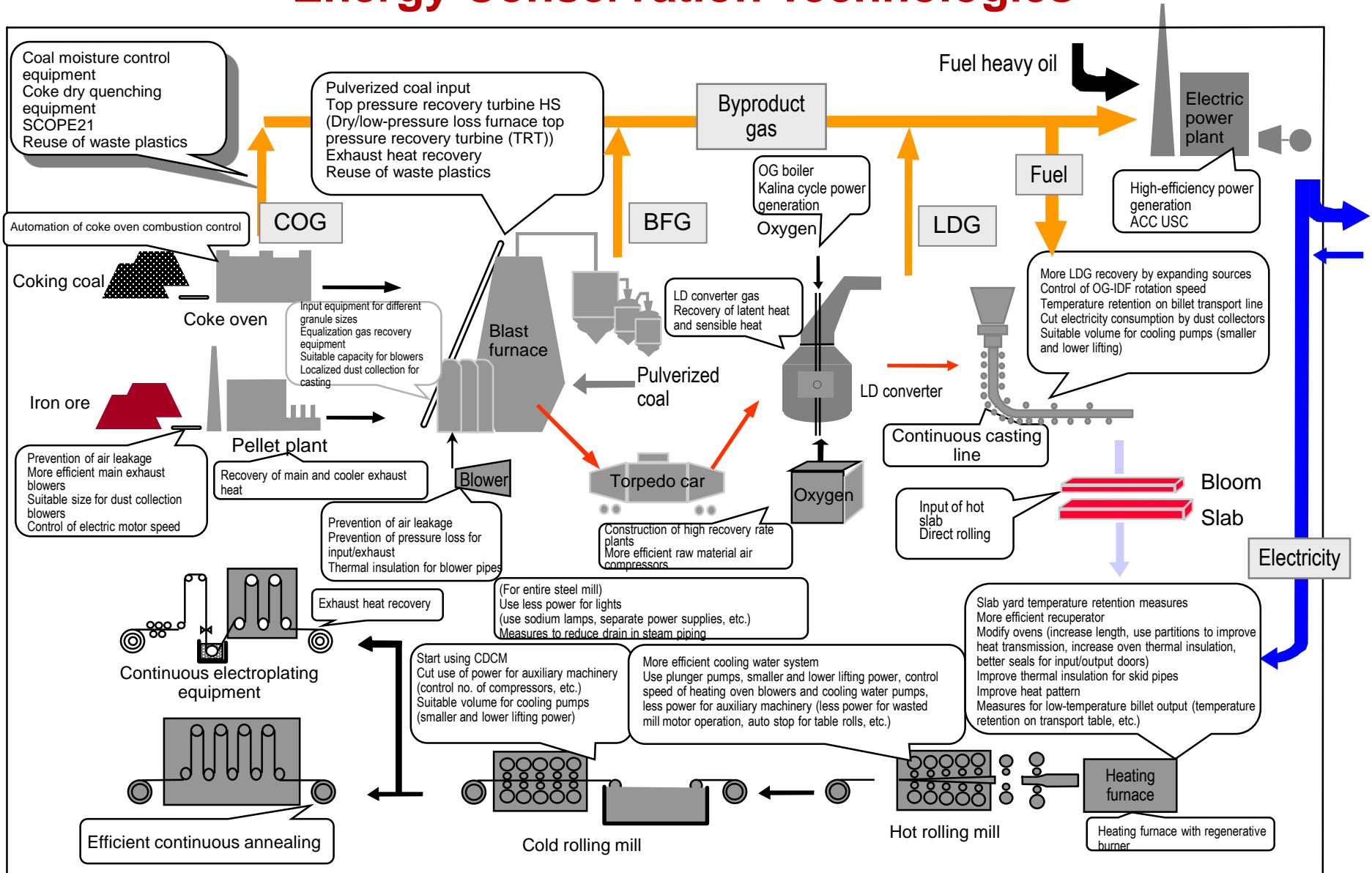
2013~ 2020

JISF's **Commitment to a Low Carbon Society – Phase I**

2021~ 2030

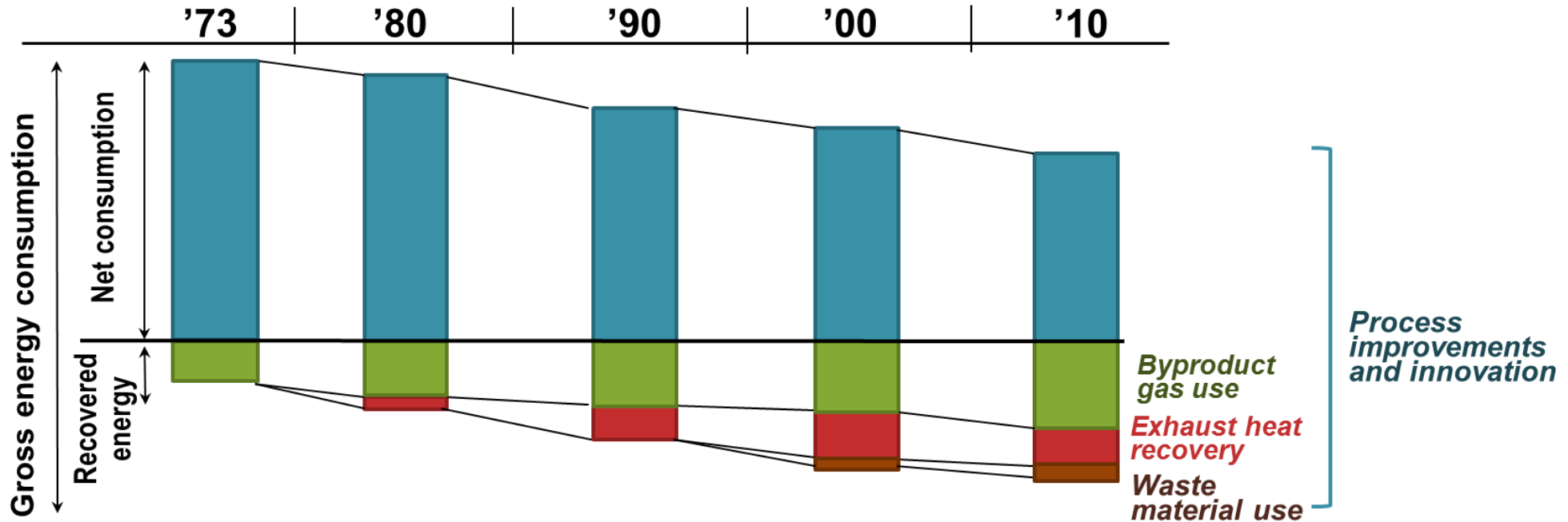
JISF's **Commitment to a Low Carbon Society – Phase II**

# Steel Production Processes and Development and Use of Energy Conservation Technologies



# Utilization of energy saving technologies

- Japanese steel industry reduced gross consumption by **process improvements**
- **Energy recovery** is contributing to reduce net consumption in recent years



**Process improvements and innovation**  
 continuous casting, PCI, coal moisture control, optimization of logistics, SCOPE21

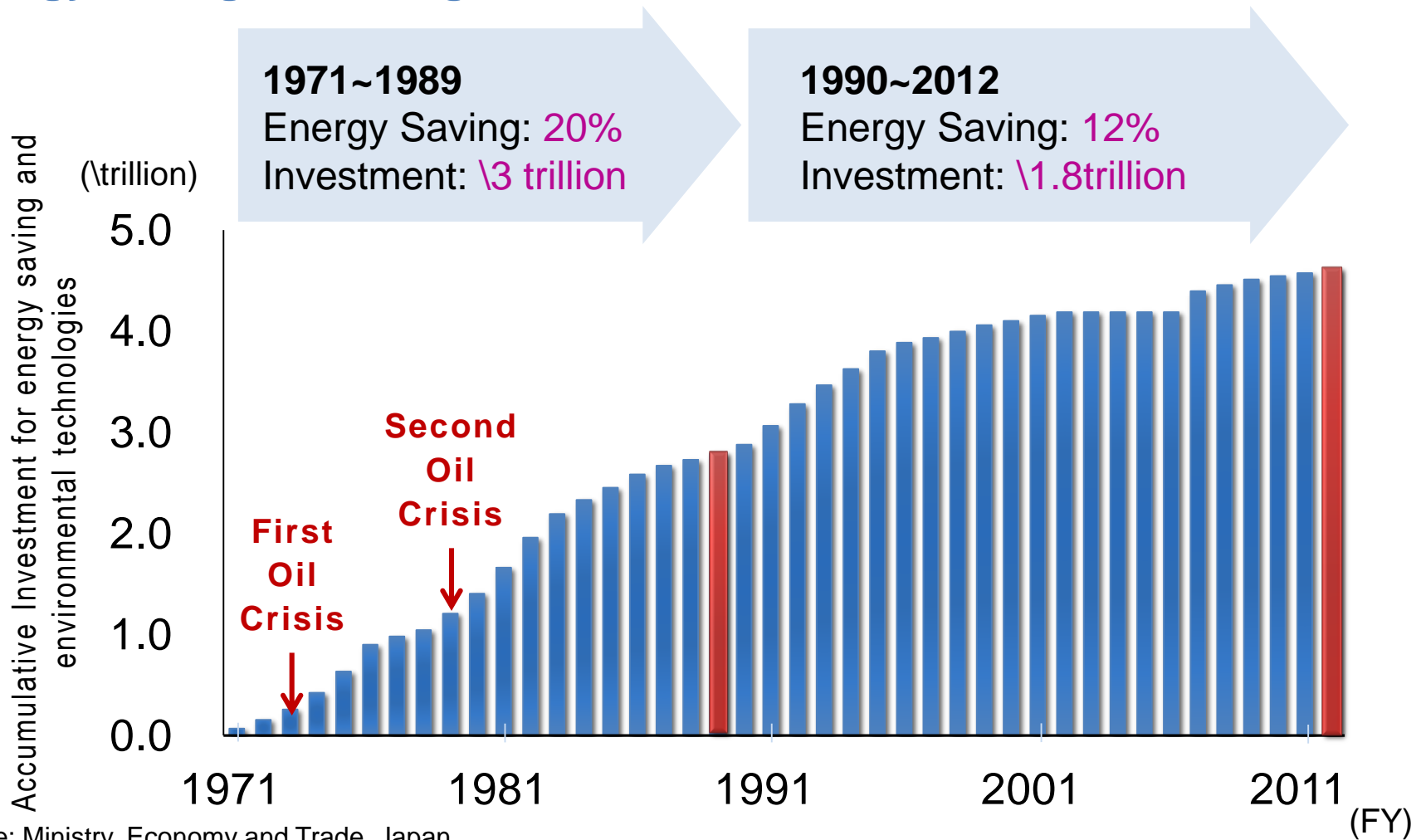
**Byproduct gas use**  
 gas holder, high-efficiency gas turbine combined cycle generation, hydrogen amplification, CO<sub>2</sub> recovery

**Exhaust heat recovery**  
 TRT, CDQ, regenerative burners, mid-low temp. heat recovery

**Waste material use**  
 waste plastics and tires

# Energy saving since 1970s

- After the two oil crises in the 1970's, Japanese steel industry improved the energy efficiency by **promoting investment for R&D and implementation of energy saving technologies**

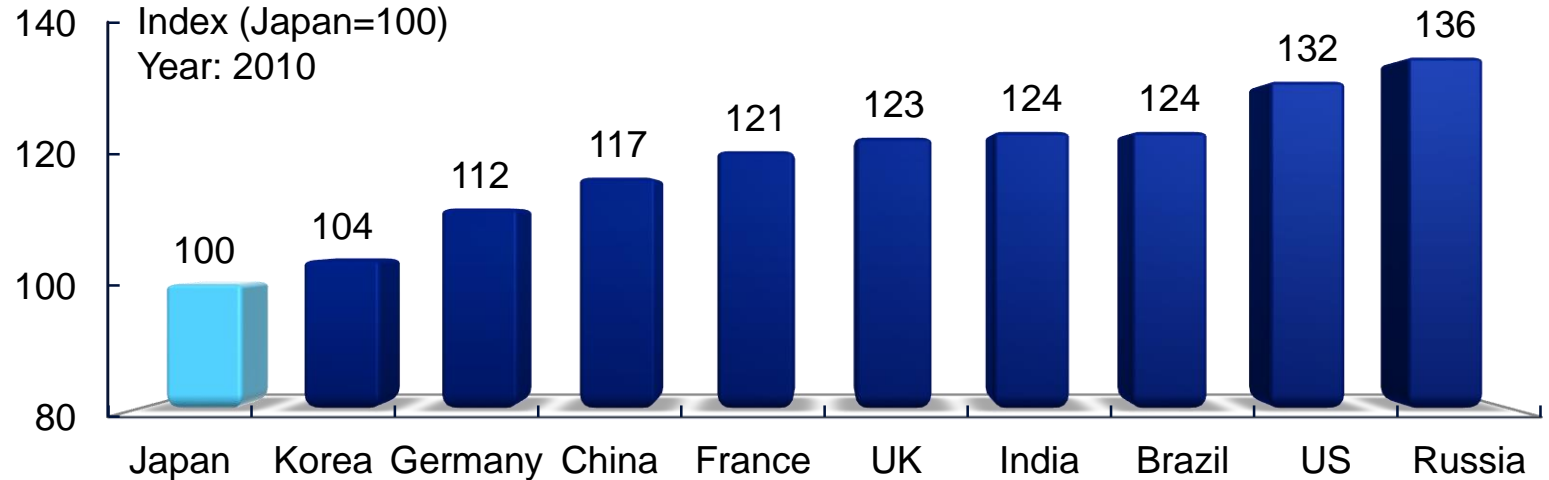




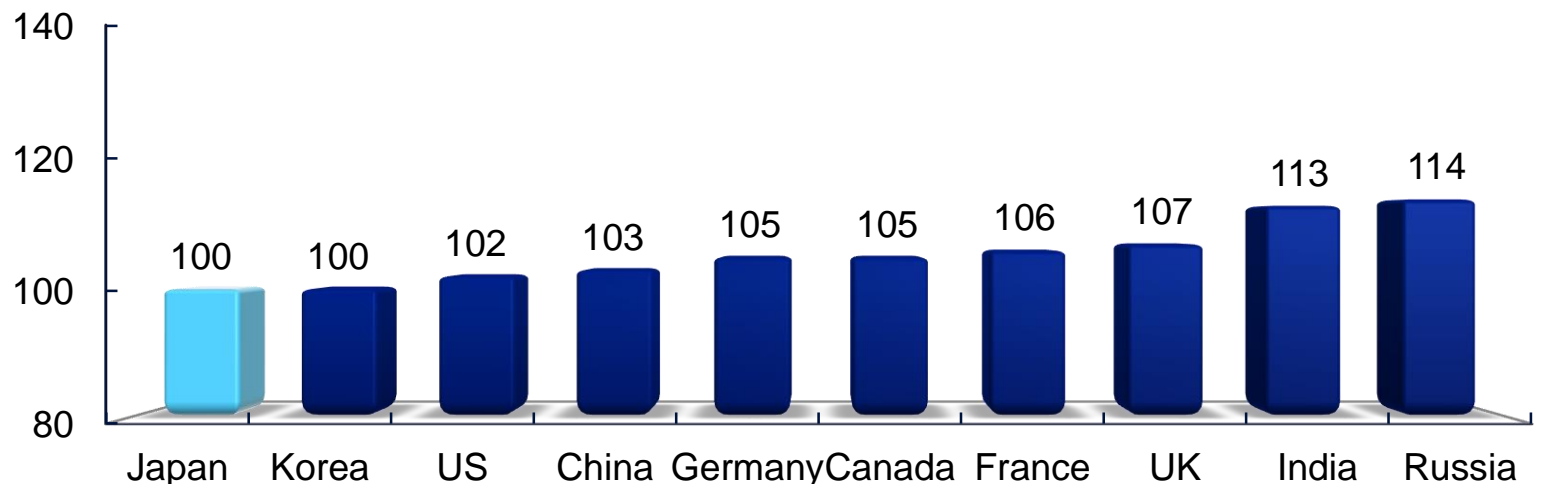
# Energy intensity of major steel producing countries

Japanese steel industry achieves the **lowest energy intensity** (unit energy consumption per ton of crude steel) among the world's major steel producing countries.

Energy intensity of Integrated steel mills



Energy intensity of EAF



# Emission Reductions with Japanese Energy Saving Technologies

- CDQ, TRT and other major types of equipment, which were **commercialized and sold by Japanese engineering companies**, are already lowering annual aggregate CO<sub>2</sub> emissions in China, Korea, India, Russia, Ukraine, Brazil and other countries by approximately **50 million tons**.

	Units	CO <sub>2</sub> reduction
Coke dry quenching (CDQ)	90	16.71Mt
Top-pressure recovery turbines (TRT)	59	10.71Mt
Byproduct gas combustion (GTCC)	47	16.34Mt
Basic oxygen furnace OG gas recovery	21	7.92Mt
Basic oxygen furnace sensible heat recovery	7	0.85Mt
Sintering exhaust heat recovery	6	0.88Mt
<b>Total emission reduction</b>		<b>53.4Mt</b>



# The public and private collaborative meeting between Indian & Japanese iron & steel industry

## Meetings – since 2011



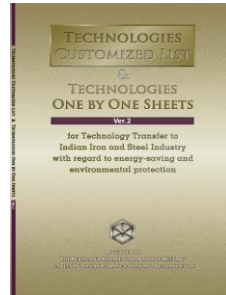
## Three pillars of the energy management in the steel plant

### ISO14404



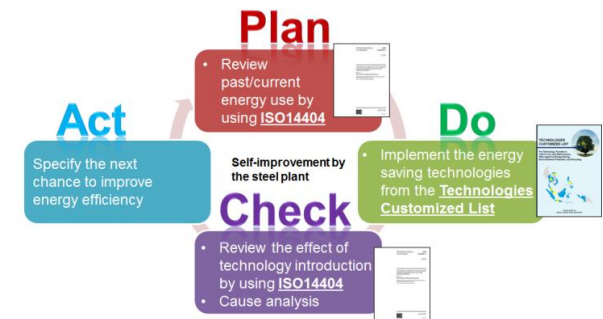
**Steel Plant Diagnosis using ISO14404 (2013-2016)**

### Technologies Customized List



**Technology reference of energy saving technologies suitable for each country/region**

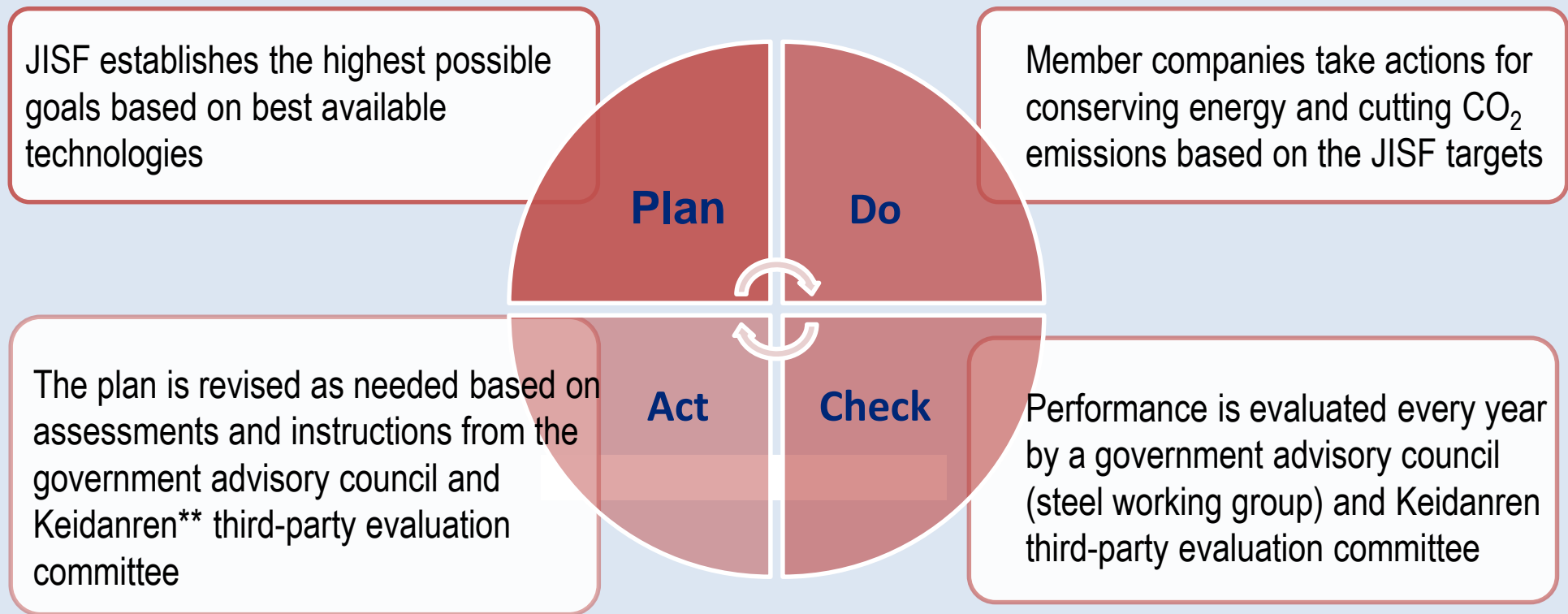
### Energy Management System



**Help steel plants to establish a framework to plan, do, check and act for the energy saving activities**

# Energy Management: PDCA Cycle

- Energy saving/GHG reduction actions of Japanese steel industry is based on **PDCA (Plan, Do, Check and Act) cycle** with the aim to improve the energy performance, which complies with **ISO50001\***.

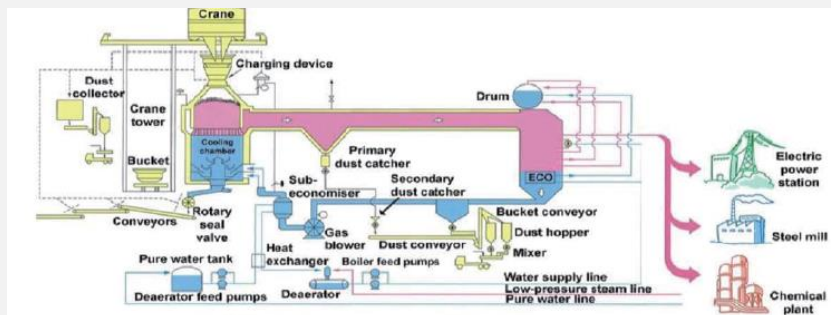


\*ISO50001 is an international standard for energy management systems that was issued in June 2011.

\*\*Keidanren: Japan Business Federation

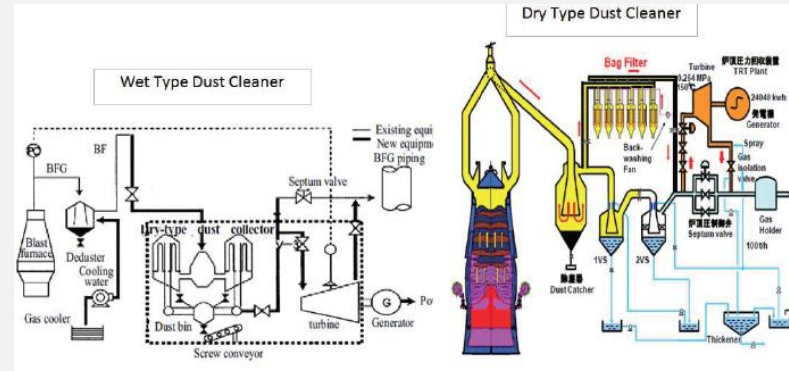
# Emission Reduction by Technology Transfer to Indian Steel Industry

## CDQ (Coke Dry Quenching)



**10 CDQs** have been installed by Japanese engineering companies to India triggered by NEDO model project

## TRT (Top Pressure Recovery Turbine)



**5 TRTs** have been installed by Japanese engineering companies to India

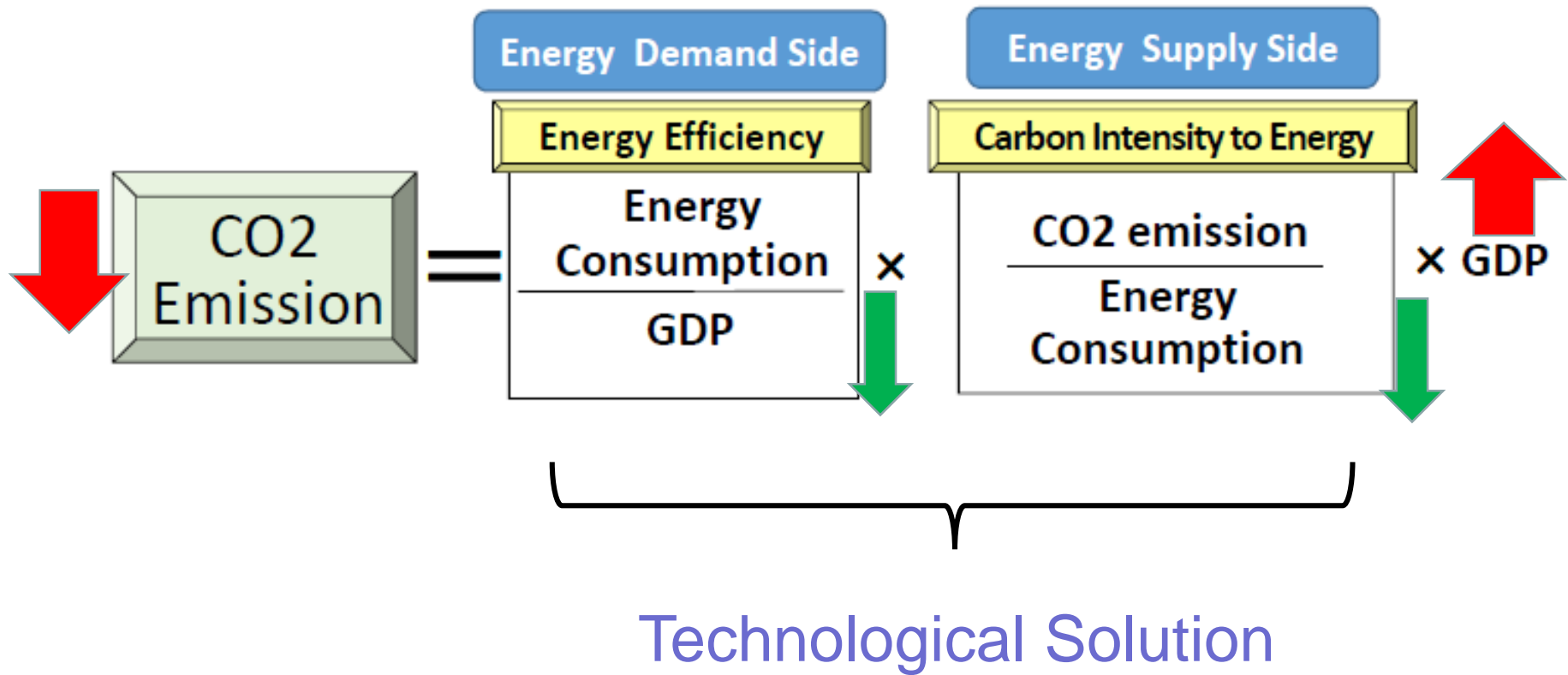
With Japanese energy saving technologies,  
Indian steel industry will be able to reduce CO<sub>2</sub> emission  
by **13 Mt per year.**



# Thank you

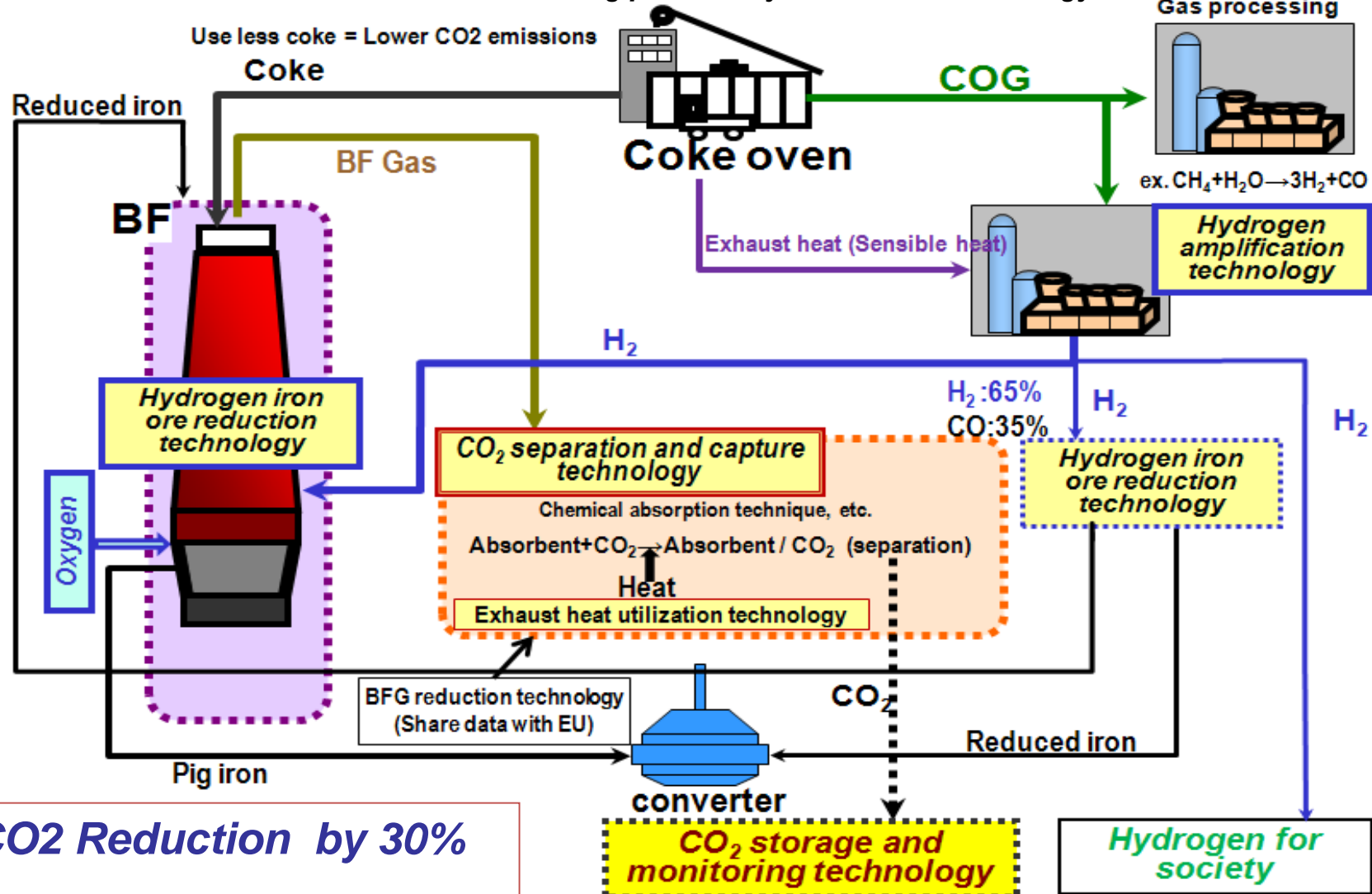


# Kaya Identity



# COURSE50 ~ Breakthrough Technology

(COURSE50: **CO<sub>2</sub> Ultimate Reduction in Steelmaking process by Innovative technology for cool Earth 50**)



- CO<sub>2</sub> Reduction by 30%
- Develop by 2030



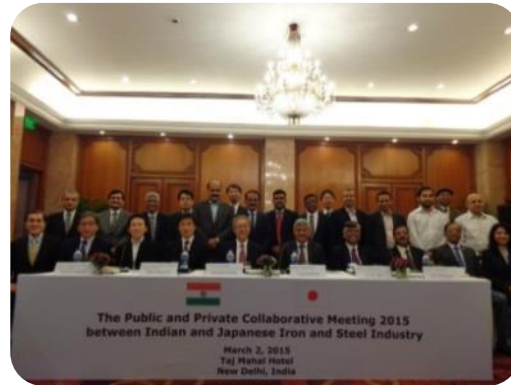
# JISF's global Energy Saving activities

Japanese steel industry promotes global cooperation in energy saving area



**China** since 2005

Japan-China Steel Industry  
Environmental Protection and  
Energy Conservation  
Technology Conference



**India** since 2011

The Public and Private  
Collaborative Meeting  
between Indian and Japanese  
steel industry



**ASEAN** since 2014

ASEAN: ASEAN-Japan Steel  
Initiative