IEA/EBRD Steel Experts' Dialogue Activities of Japanese steel industry for a Low Carbon Society

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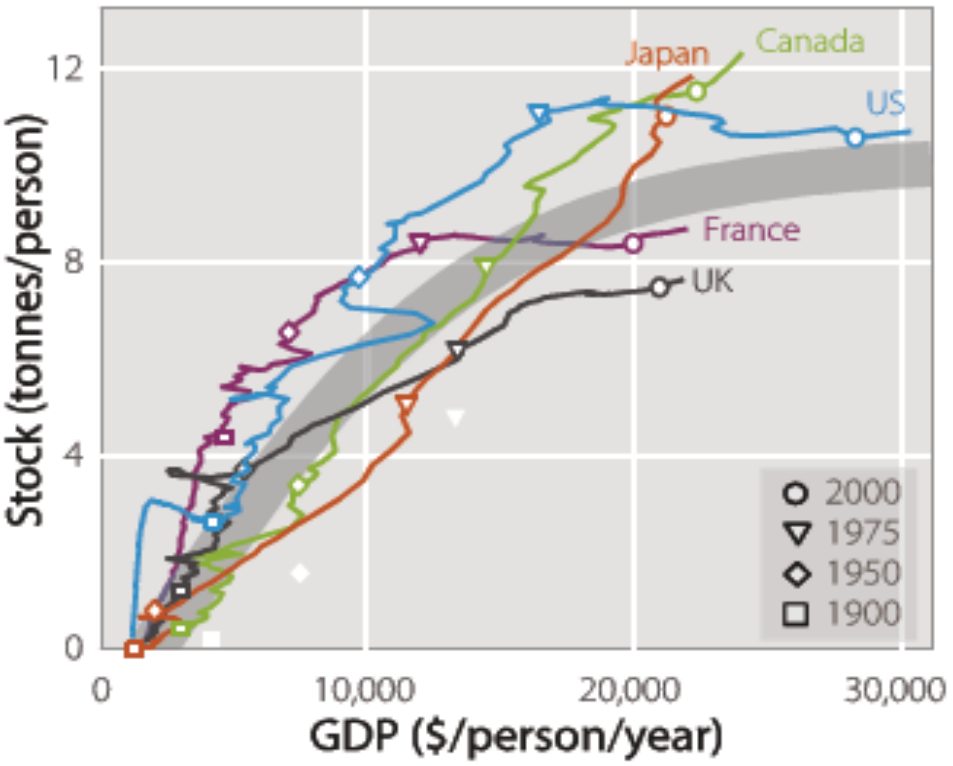
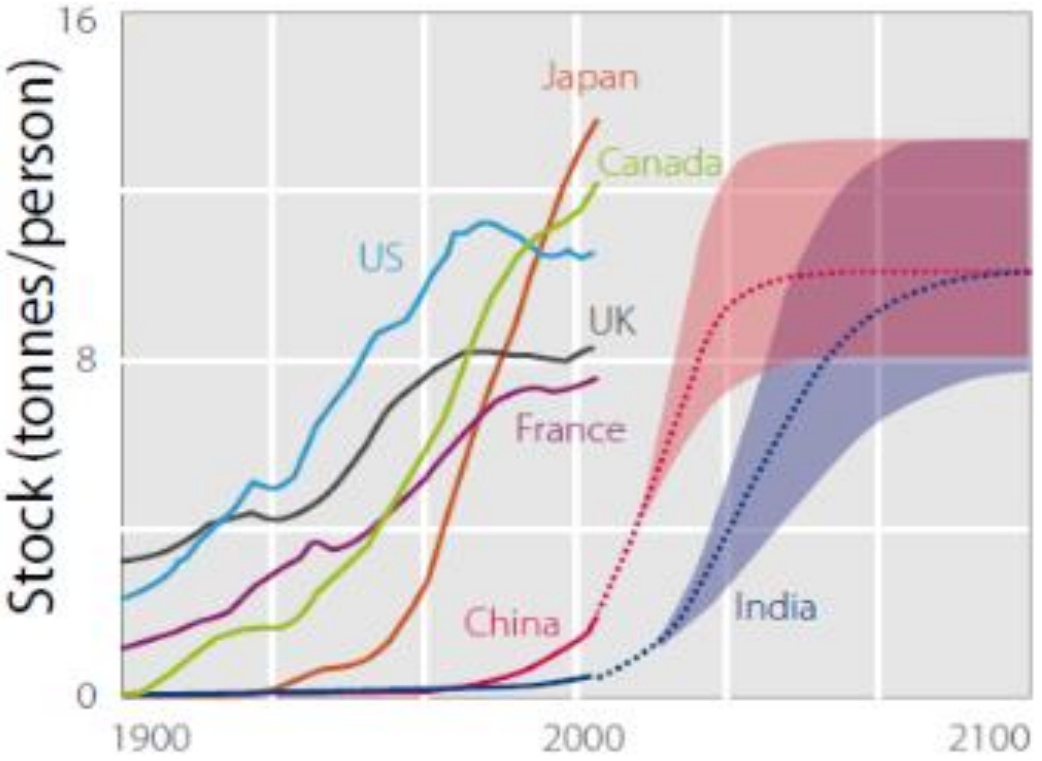
Estimating the future steel demand and supply: performance trend of the world

There is a certain correlation between economic growth and the amount of steel stock per capita, and as the population increases, the total stock amount expands. The steel stocks in developed countries are estimated to be in the range of 8 to 12 t/person, and it is estimated that the steel stock will reach 10 tons per person in China in the first half of this century and in India during this century.



Relationship between GDP per capita and steel stock

Muller, et.al, “Patterns of Iron Use in Societal Evolution”, Environ. Sci. Technol. 2011, 45



Transition of steel stock per capita

“Sustainable steel: at the core of a green economy”, World Steel Association, 2012

Estimating the future steel demand and supply: calculation results

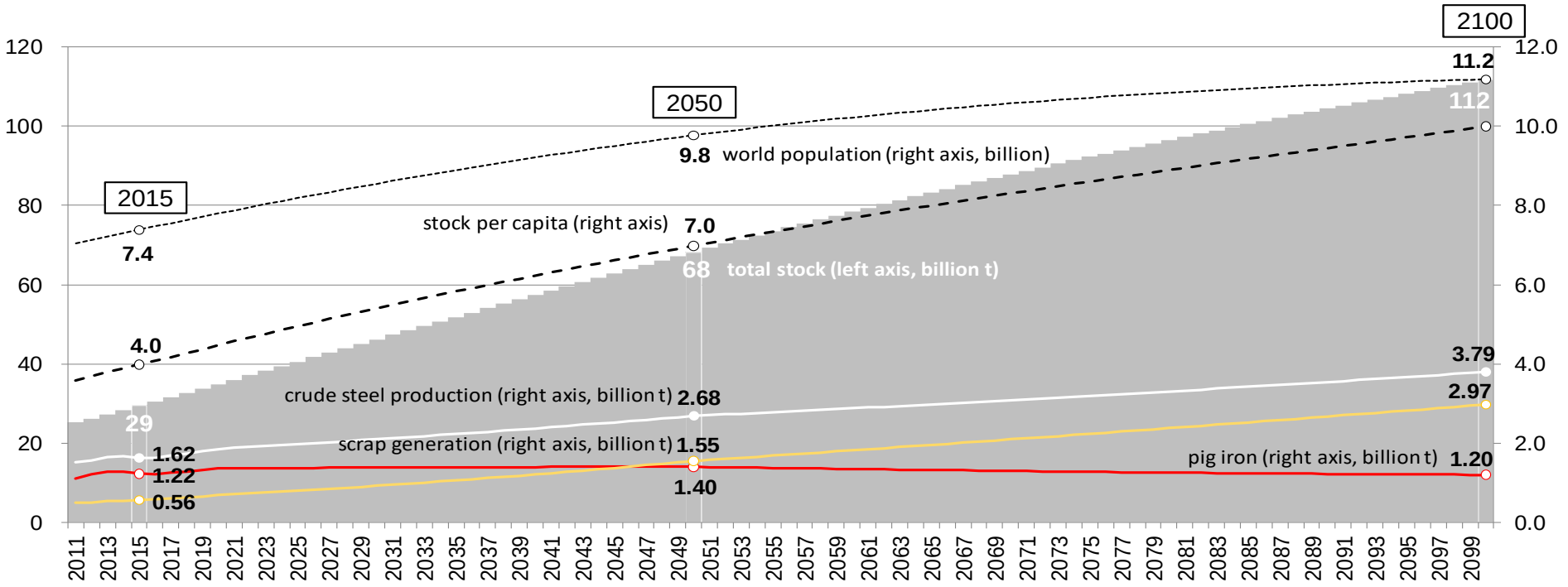
[crude steel production] increase as the steel demand increases

[scrap] its use increases mainly as a result of increased generation of end-of-life scrap due to expansion of the amount of total steel stock.

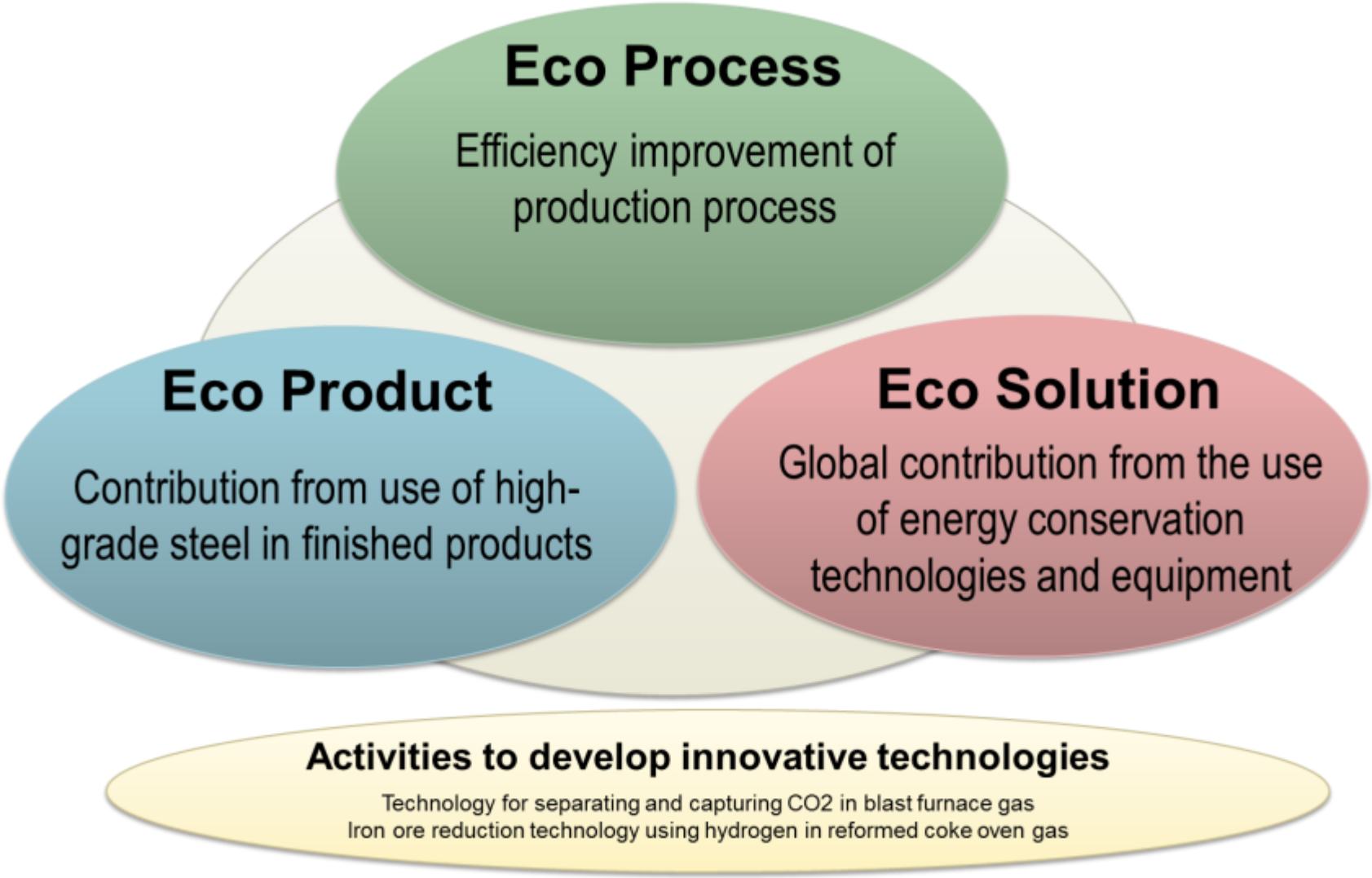
[pig iron production] As scrap alone can not meet steel demand and production from the natural resource route is essential for the expansion of ste
pro
at t

(billion ton)

	2015	2050	2100
Amount of steel in final products	1.29	2.13	3.01
Crude steel production	1.62	2.68	3.79
Pig iron production	1.22	1.4	1.2
Scrap consumption	0.56	1.55	2.97



Japanese steel industry's activities to address climate change – 3 Ecos



JISF's commitment to a low carbon society – Phase II (2030)

JISF will also contribute to global GHG reduction by enhancing domestic and global energy saving under *JISF's commitment to a low carbon so*ciety.

(1) Towards 2030

Eco process⇒ 9 million-tons CO2 reduction vs. BAU emission

- Aiming for further improvement in energy efficiency of steel production processes, which are already the highest in the world.

Eco solution⇒ Estimated contribution of 80 million-tons CO2

- Contribute worldwide by transferring the world's most advanced energy-saving technologies to other countries and increasing the use of these technologies.

Eco product⇒ Estimated contribution of 42 million-tons CO2

- By supplying high-performance steel, which is vital to creating a low-carbon society, Japanese steelmakers contribute to cutting CO2 emissions when finished products made of this steel are used.

(2) Long term

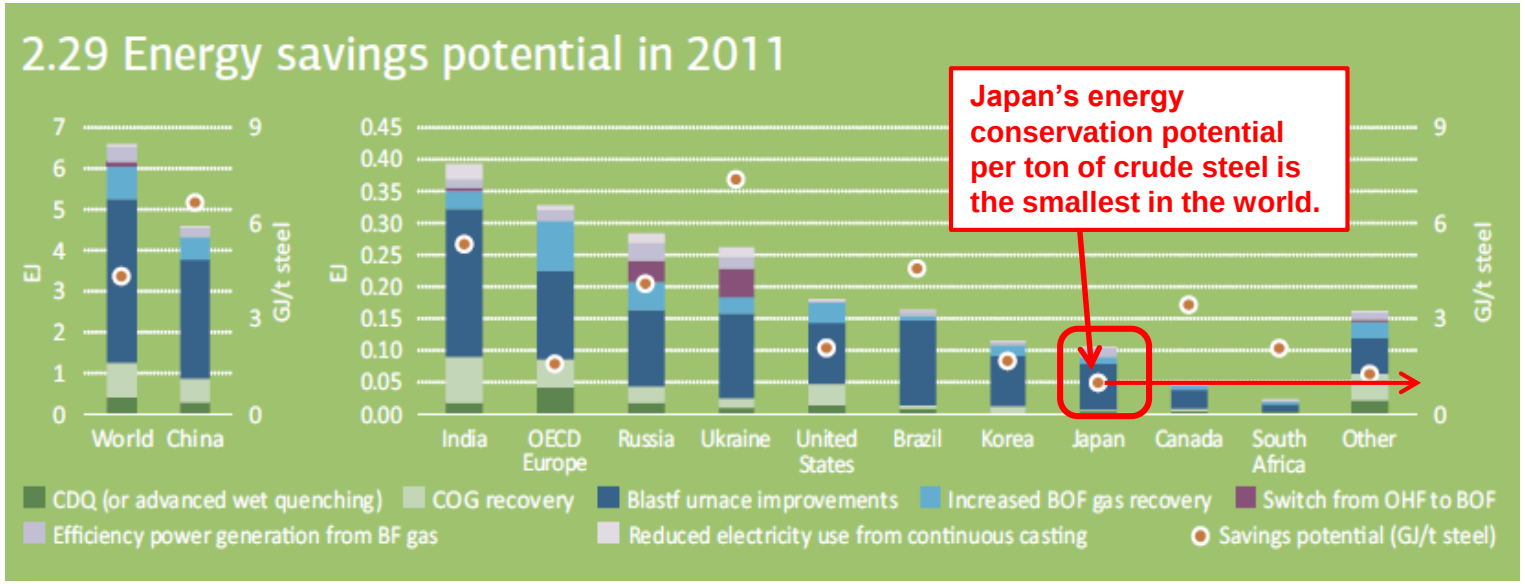
Environmentally Harmonized Steelmaking Process Technology Development (COURSE50)

Innovative ironmaking process (Ferro Coke)

International Comparison of Energy Efficiency in the Steel Industry

- The International Energy Agency (IEA) estimates that if most of energy saving technologies available as of 2011 are applied world widely, the total energy saving potential would reach 6.6 EJ
- Virtually all steel mills in Japan use existing technologies and that there is very little potential for further energy-conservation measures
- Therefore, it is crucially important to disseminate these technologies to achieve further CO2 reduction and energy saving

Energy Saving Potential from Transferring and Promoting Energy Conservation Technologies (2011)



Source: IEA "Energy Technology Perspective 2014"

JISF's global energy saving activities

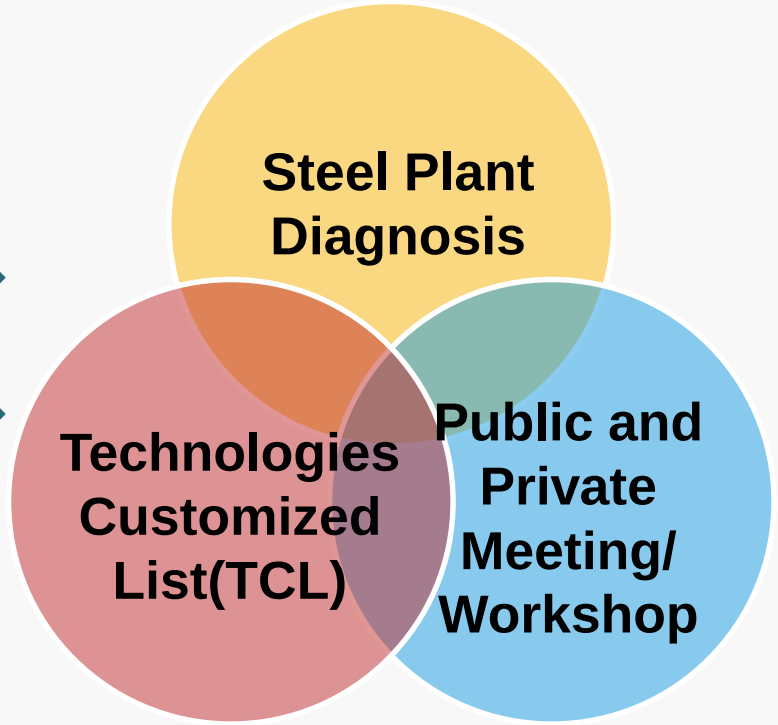
Collaborative
Country & Region

China (2005～)

India (2011～)

ASEAN (2014～)

3 main activities



India-Japan Public and Private Collaborative Meeting on iron and steel industry (1/2)

Purpose

To encourage technology transfer from Japanese to Indian steel industry and thereby contribute to the energy saving in India and in the world.

Members – Public and Private sectors of India and Japan

Public and Private Partnership

India

Public members and observers

Ministry of Steel
Bureau of Energy Efficiency etc.

Private members and observers

Indian steel companies
(SAIL, RINL, TSL, JSW, JSPL, BSPL, BSL, Essar, MECON etc.)

Japan

Public members and observers

Ministry of Economy, Trade and Industry/ NEDO / JBIC / JETRO

Private members and observers

The Japan Iron and Steel Federation
(Nippon Steel & Sumitomo Metal, JFE steel, Kobe steel, Nisshin Steel etc.)

India-Japan Public and Private Collaborative Meeting on iron and steel industry (2/2)

Meetings – since 2011

Cooperative Approach

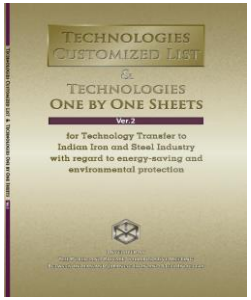
2011	2012	2013	2014	2015	2016	2017	2017	2019
1st meeting (New Delhi)	2nd meeting (New Delhi)	3rd meeting (Tokyo)	4th meeting (Tokyo)	5th meeting (New Delhi)	6th meeting (Tokyo)	7th meeting (Jaipur)	8th meeting (Kitakyushu)	9th meeting (Mumbai)

Three pillars of the energy management in the steel plant

ISO14404

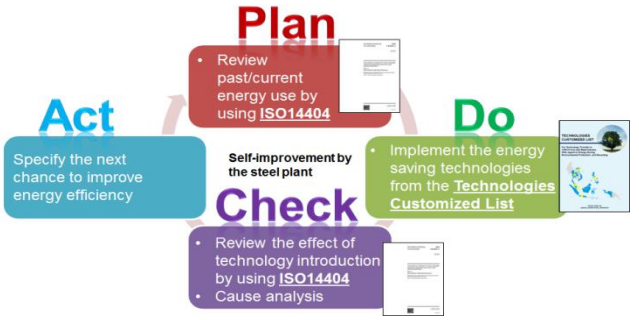
Steel Plant Diagnosis using ISO14404 (2013-2018)

Technologies Customized List



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

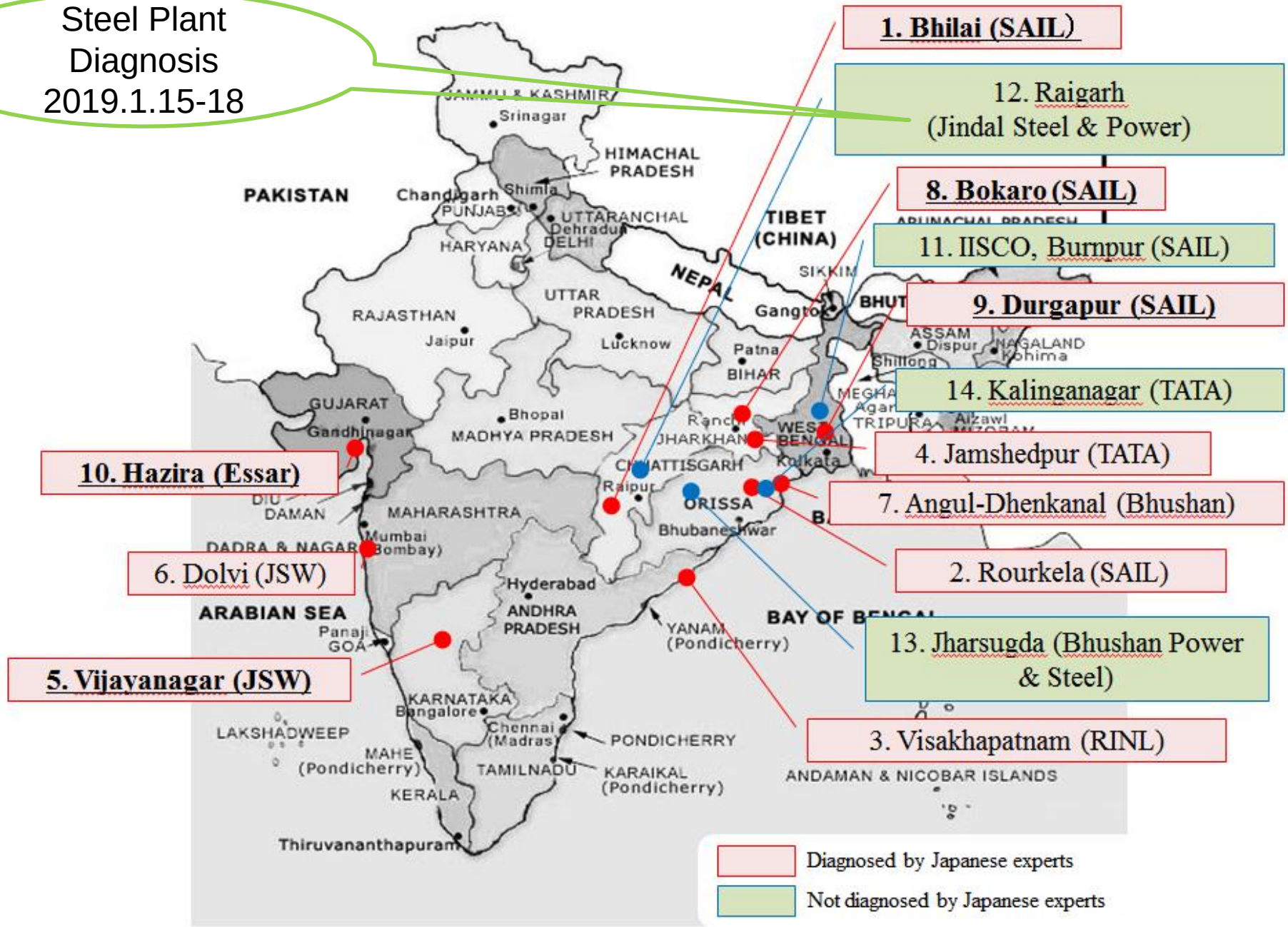
Energy Management System



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

Steel Plant Diagnosis (Location of integrated steel)

Steel Plant Diagnosis 2019.1.15-18



Technologies Customized List (TCL)

TCL is a technology reference covering recommended technology for individual countries and regions. India version and ASEAN version are available now.

ASEAN

Version 1
(Nov 2014)

Included tech items
30→33

Version 2
(Sep 2016)

Adding 32 BF-BOF techs

Version 3
(Feb 2019)

India

TCL version I (2013)
- 17 energy saving techs

Energy Saving tech items
17→19

TCL version II (2014)
- 19 energy saving techs

Adding 16 items of environmental protection tech

TCL version III (2017)
- 19 energy saving techs
- 16 environmental protection techs

Adding 34 EAF techs

Version 4
(Feb 2019)

Please find latest TCL from bellow link
http://www.jisf.or.jp/en/activity/climate/Technologies/index.html

What are the advantages of Technologies Customized List?

1. The benefit of technology implementation is clearly demonstrated
   - Indicate CO_2 reduction effect and payback time for the collaborative country or region, based on country-based energy prices, plant installation cost and CO_2 emission factor

2. Technologies listed on TCL are reliable
   - Effects of the technologies are proven through Japanese steelmakers' operating experiences

3. Easy to reach out to further information when necessary
   - Include in contact detail of supplier companies which have the best available technologies

The 9th India-Japan Public and Private Collaborative Meeting on Iron and Steel Industry Mumbai, India 23 January, 2019.

India side's thanked the updating of TCL and they mentioned that they would like to diffuse it to stakeholders in India and also expect to continually have a Public and Private Collaborative Meeting.

Technology Transfer of Energy Saving Technologies

CDQ, TRT and other major types of equipment alone are already lowering annual aggregate CO_2 emissions in China, Korea, India, Russia, Ukraine, Brazil and other countries by approximately 60 million tons in 2017.

(Mt/year)

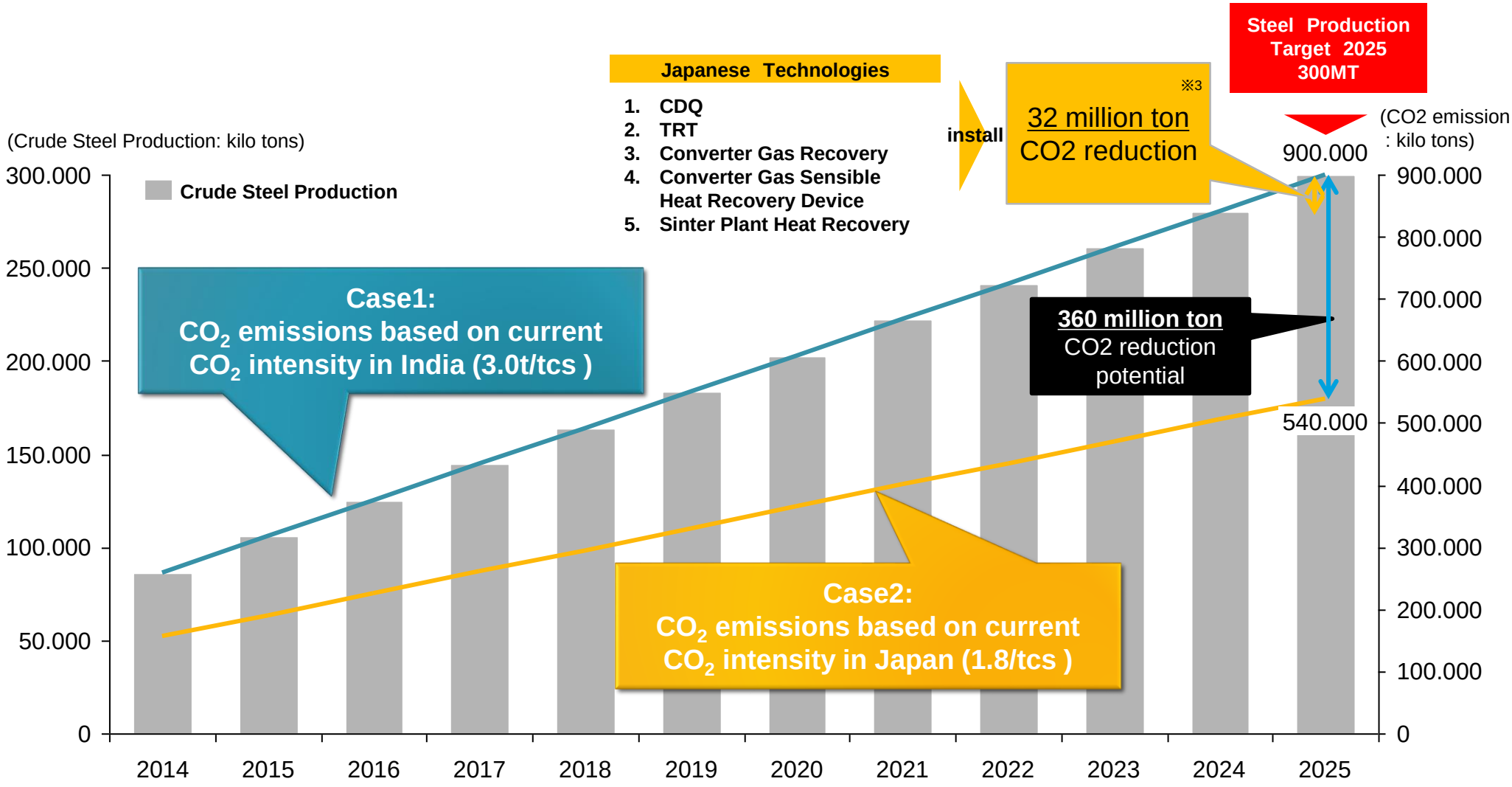
Energy Saving Rechnology	No. of units	CO2 Reduction
Coke dry quenching (CDQ)	96	19.69
Top-pressure recovery turbines (TRT)	62	11.02
Byproduct gas combustion (GTCC)	52	21.90
Basic oxygen furnace OG gas recovery	21	8.21
Basic oxygen furnace sensible heat recovery	7	0.90
Sintering exhaust heat recovery	6	0.88
Total emission reduction		**62.59Mt**

GTCC：Gas Turbine Combined Cycle system

5 major energy saving equippments, commercialized and sold by Japanese companies by 2017

CO_2 reduction potential in Indian steel industry: 360Mt-CO_2 in 2025

➔ 5 most recommended technology will reduce **32 Mt-CO_2**



Thank you