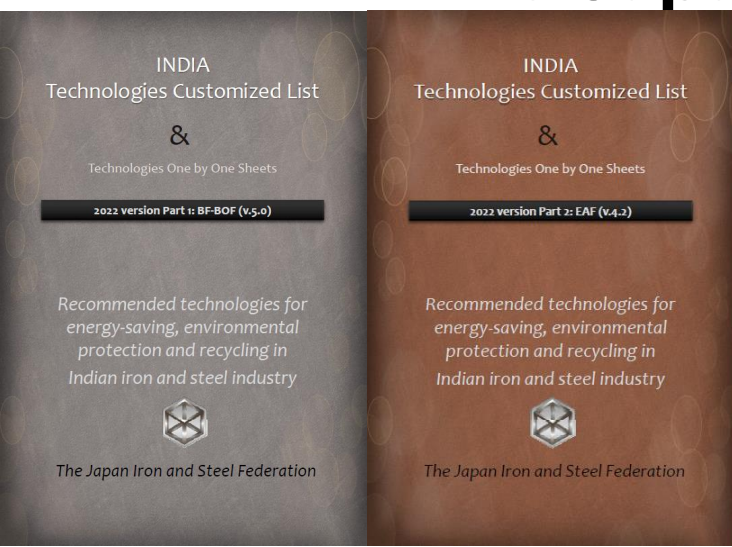


# Overview of Technologies Customized List

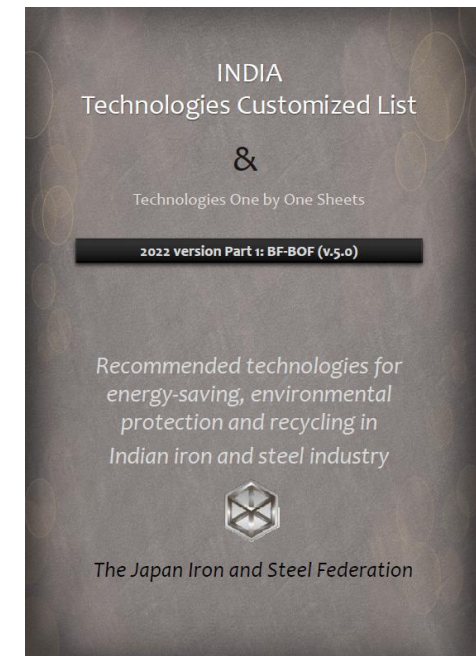
January 2022

The Japan Iron and Steel Federation



# What is Technologies Customized List (TCL)?

- ◆ TCL is developed as one of **Eco-solution** activities
- ◆ There are TCL for India and ASEAN
- ◆ TCL contains technologies for
  1. Energy saving
  2. Environmental protection
  3. Recycling**suitable** to steel mills of the target country or region with the **BF-BOF and Electric Arc Furnace**
- ◆ Offer information on CO<sub>2</sub> reduction effect and payback time for the target country and region



**Version 5.0 for India (Jan 2022)**

## Purpose of the Technologies Customized List

- The method to embody warming measures on a global scale
- The partner countries' governments can use the positive list (Build up the framework to support technology implementation)
- The partner countries' steelmaker can examine suitable own company's technologies for energy saving, environmental protection or recycling and contact supplier companies directly

# Development of Technologies Customized List

## Reference

- APP-STF SOACT Handbook (Dec. 2010)
- NEDO Handbook (2008)
- EU-IPPC BAT Reference Document Jun. 2011, Draft)
- USA-EPA BACT (Oct. 2010)
- Other valuable technologies unlisted above references

a

## Preparation

- Japanese steel experts listed up appropriate technologies



c

## Steel Plant Diagnosis

- Conduct steel plant diagnosis



b

## Questionnaire

- Investigate technology of the target country or region's steel companies via questionnaire

d

## Discussion between of the target country or region's and Japanese experts



**Customized for the target country and region**

## Finalizing TCL

ASEAN  
Technologies  
Customized List  
2022 version  
Part-2 : BF-BOF (v.4.0)

ASEAN  
Technologies  
Customized List  
2022 version  
Part-1 : EAF (v.3.2)

Recommended technologies for energy saving, environmental protection and recycling in ASEAN iron and steel industry

The Japan Iron and Steel Federation

Technologies for energy saving, environmental protection and recycling in ASEAN iron and steel industry

The Japan Iron and Steel Federation

**Points of making TCL**

**Point 1**  
*Technological knowledge of steel experts*

**Point 2**  
*Experience of Japanese steel industry*

**Point 3** *Considering the circumstances of the target country or region*



# Contents of Technologies Customized List

E.g.) ASEAN Technologies Customized List version 4.0 for BF-BOF

## 1. Energy-Saving Technologies

1-1. Technologies Customized List.....4

1-2. Technologies One by One Sheet...8

## 2. Environmental Protection Technologies

2-1. Technologies Customized List...35

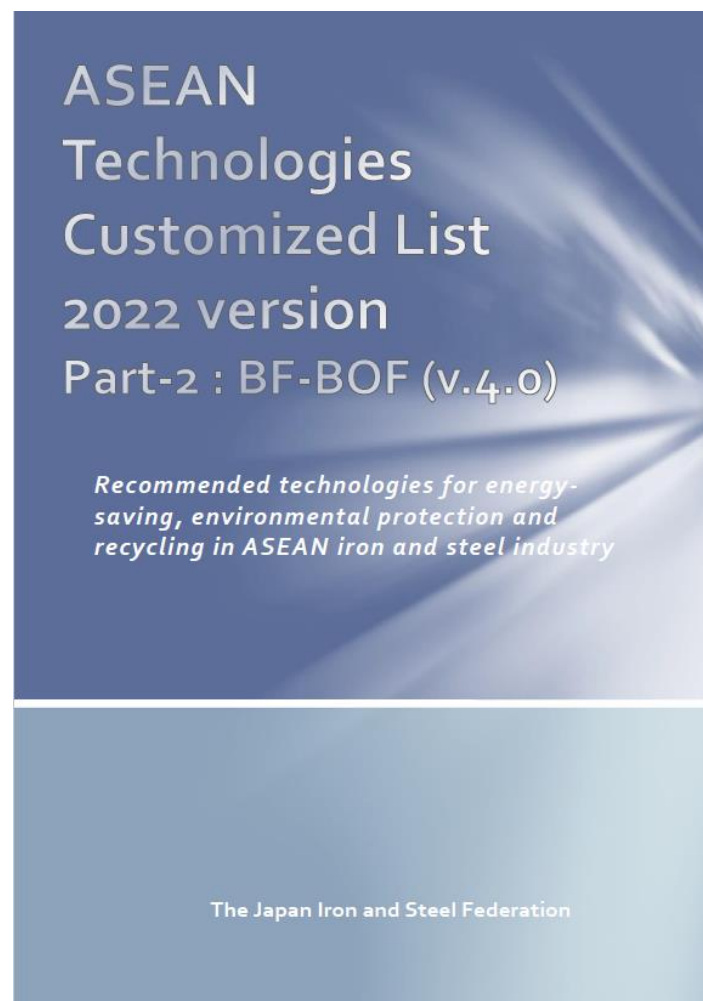
2-2. Technologies One by One Sheet...37

Contact Points of Suppliers.....56

ANNEX1.

Guidance for calculating the profit, assumed

investment cost and payback time for your country



# Technologies Customized List

## Technologies Customized List of Energy Saving Technologies for ASEAN Steel Industry 2022 version part-2: BF-BOF (v.4.0)

No.	Type of Technology	Technical Description	Expected Effects of Introduction									
			Electricity Savings kWh/t of product	Fuel Savings GJ/t of product	CO2 Reduction						Estimation Details	Co-benefits
					kg- CO2/t of product							
					Thailand	Indonesia	Vietnam	Philippines	Malaysia	Singapore		
Sintering (product: sinter)												
A-1	Sinter Plant Heat Recovery (Steam Recovery from Sinter Cooler Waste Heat)	The device recovers the sensible heat in the hot air with temperature of 250C to 300C from a sinter cooler.	-	0.25	23.85 (emission factor: steam coal)						-	SOx, NOx, Dust
A-2	Sinter Plant Heat Recovery (Power Generation from Sinter Cooler Waste Heat)	This is a waste gas sensible heat recovery system from sinter cooler to generate electric energy.	22.10	-	12.11	17.04	13.24	11.32	14.81	10.74	-	-

1

Title of technology

3

Expected Effects of Introduction

2

Technical Description



# Contents of Technologies One-by-One sheet for ASEAN

List  
Number

A-1

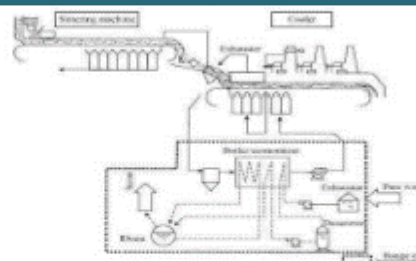
Names of technology

Sintering

Sinter Plant Heat Recovery  
(Steam Recovery from Sinter Cooler Waste Heat)

Process Flow or Diagram

Process Flow

Technology  
Definition/SpecificationTechnology Definition/  
Specificationthe  
order of 60,000Effect of  
Technology  
IntroductionInvestment cost &  
Operating life

1. Investment Cost &amp; Operating Life

Investment cost : approx. 2,500 million

Construction cost : approx. ¥500 million

2. Effect of  
technology  
introduction•Reduction of CO2  
Emission  
•Fuel Savings23.86kg-CO2/t-sinter :  $0.251 \times 1,000 \times 0.095$  (CO2 emission factor of coal)

0.251GJ/t-sinter [NEDO] : 60,000 kcal/t-sinter / 1,000,000 \* 4.186

Direct Effect  
Annual  
operating Cost•Economic Effect  
(payback time)  
•Productivity  
Improvement  
•Maintenance Cost  
Reduction

Equipment only : approx. 22.1 years  
Including construction cost : approx. 25.8 years  
Annual steam recovery :  $60,000 \times 10^6$  kcal/y  
Reduction in crude oil equivalent : 7,500 t-crude oil/y  
Economic effect : ¥135.8 mil/y ( $= 60,000 \times (1.81/0.8) / 1,000$ )

Indirect Effect  
(Co-benefits)•Product Quality  
Improvement  
•SOx, Dust DecreaseNot announced  
Not announcedDiffusion Rate of Technology in  
Japan

widely spread and

Japanese Main Supplier

JIP

Technologies Reference:

NEDO

3. Preconditions

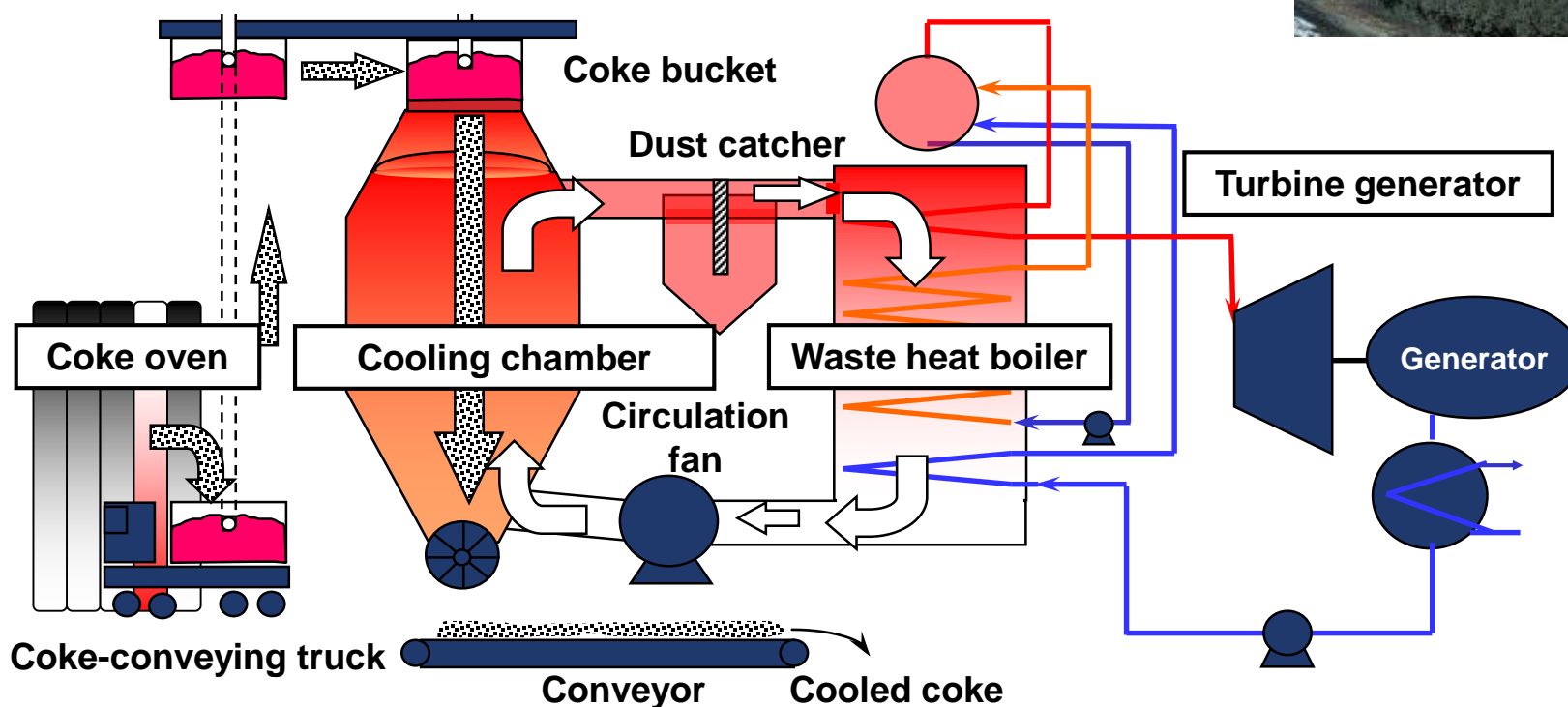
\* Payback time was defined as (Investment cost / Economical merit) in this project.  
\* annual sinter production : 1 mil. ton/y  
\* CO2 emission factor of coal : 0.095  
\* unit cost of C heavy oil : ¥1.81/ 1,000 kcal [NEDO]  
overall boiler efficiency : 0.8  
Economic effect :  $60,000 \times 1.81 / 0.80 = ¥136$  mil/y  
\* Refer to <http://asiapacificpartnership.jp/japanese/soect2nd.aspx> and <http://www.nedo.go.jp/content/100107259.pdf>

Other Information  
(Supplier Name,  
Technical Reference, etc)

## Technologies Customized List #A4 (cokemaking)

### (Reference) **Coke Dry Quenching (CDQ)**

- Instead of water used conventionally, this equipment uses inert gas to quench the hot coke and, at the same time, recovers the sensible heat in the shape of steam which is utilized for generating power. In addition to the waste heat recovery, the equipment contributes to the improvement of coke quality, the reduction of environmental pollution and the improvement of energy efficiency.
- This equipment has been installed at all the working coke ovens of steel manufacturers in Japan and also expanded all over the world.

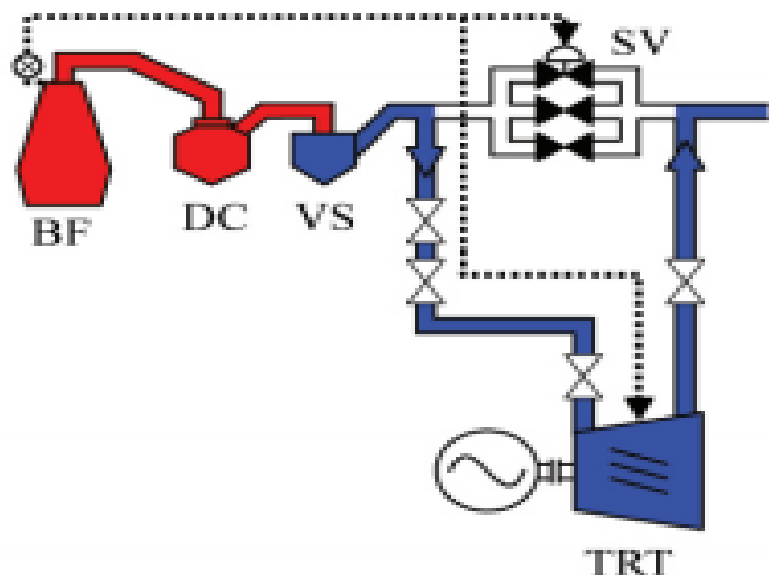
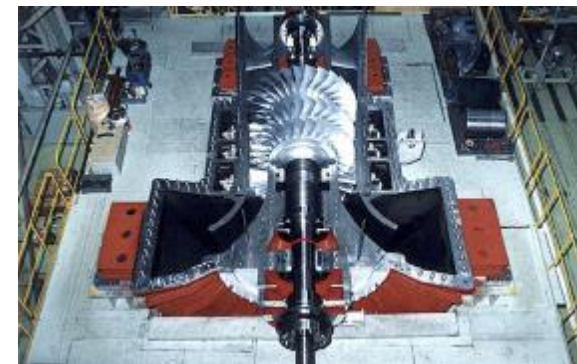




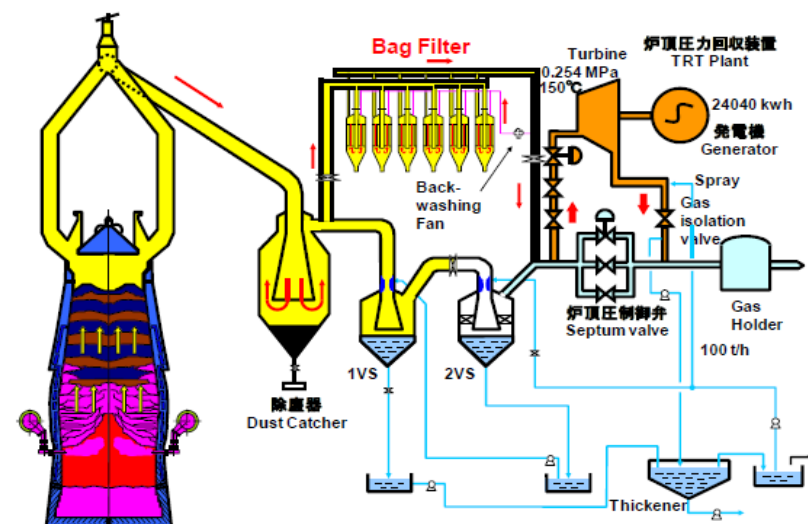
## Technologies Customized List #A6 (Ironmaking)

(Reference) **Top Pressure Recovery Turbine (TRT)**

- This technology is a method of generating power by employing this heat and pressure to drive a turbinegenerator. In addition, TRT has the function to control the top pressure.
- This equipment has been installed at all the working blast furnace of steel manufacturers in Japan and also expanded all over the world.



Wet Type Dust Cleaner



Dry Type Dust Cleaner

# Supplier information

Company	Energy-Saving Technologies	Environmental Protection Technologies	Contact Points
Chugai Ro Co., Ltd.	A-12: Low NOx regenerative burner system for ladle preheating A-15: Process control for reheating furnace A-16: Regenerative Burner Total system for reheating furnace A-17: High temperature recuperator for reheating furnace A-18: Fiber block for insulation of reheating furnace A-20: Oxygen enrichment for combustion air		3-6-1 Hiranomachi, Chuo-ku, Osaka 541-0045, Japan TEL: +81-6-6221-1251 FAX: +81-6-6221-1411 <a href="https://chugai.co.jp/en/">https://chugai.co.jp/en/</a>
Daido Steel Co., Ltd.	A-21: Highly efficient combustion system for radiant tube burner		1-10, Higashi Sekure 1-chome, Higashi-ku, Nagoya, Aichi, 461-8561, Japan TEL: +81-52-963-7501 FAX: +81-52-963-4386 <a href="https://www.daido.co.jp/en/index.html">https://www.daido.co.jp/en/index.html</a>
Fuji Electric CO., LTD.	A-23: Energy Monitoring and Management Systems	B-18: Gas Analyzer	Gata City Ohsaki, East Tower, 11-2, Ohsaki 1-chome, Shinagawa-ku, Tokyo 141-0032, Japan <a href="https://www.fuji-electric.com/contact/?u_medium=gl_gnavi">https://www.fuji-electric.com/contact/?u_medium=gl_gnavi</a>
JP Steel Plantech Co.	A-1: Sinter Plant Heat Recovery (Steam Recovery from Sinter Cooler Waste Heat) A-2: Sinter Plant Heat Recovery (Power Generation from Sinter Cooler Waste Heat) A-3: High Efficient (COG) Burner in Ignition Furnace for Sinter Plant A-4: Coke Dry Quenching (CDQ) A-8: Pulverized Coal Injection (PCI) System A-11: Converter Gas Recovery Device A-13: Converter Gas Sensible Heat Recovery Device A-25: Management of Compressed Air Delivery Pressure Optimization	B-15: Ring Silt Washer (RSW) Wet Gas Scrubber	Kaneko 2nd Building 4-9F 2-6-23 Shin-yokohama, Kohoku-ku, Yokohama 222-0033 JAPAN TEL: +81-45-471-3911 Fax: +81-45-471-4002 <a href="https://steelplantech.com/en/">https://steelplantech.com/en/</a>
J-POWER EnTech, Inc.		B-13: Dry Activated Coke Exhaust Gas Treatment Facilities	Delwe NishiShinbeshi Building (4F), 3-2-1, Nishi-shinbeshi, Minato-ku, Tokyo, 105-0003 Japan TEL: +81-3-3434-7081 FAX: +81-3-3434-7086 Email: mail-box@jp-entech.co.jp <a href="https://www.jp-entech.co.jp/en/">https://www.jp-entech.co.jp/en/</a>
Kobe Steel, Ltd.	A-26: Power Recovery by Installation of Steam Turbine in Steam Pressure Reducing Line		ON Building, 9-12, Kita-Shinagawa 5-chome, Shinagawa-ku, Tokyo, 141-8688, Japan TEL: +81-3-5739-6000 FAX: +81-3-5739-6903 <a href="http://www.kobelco.co.jp/english/machinery/inquiry/">http://www.kobelco.co.jp/english/machinery/inquiry/</a>
Kobelco Eco-Solutions Co., Ltd.		B-2: High-speed Filtration Equipment B-3: Multi-Stage Fluidized-Bed Activated Carbon Absorption Equipment B-5: Cooling Tower	4-7B, 1-chome, Wakuihama-cho, Chuo-ku, Kobe, 651-0072, Japan TEL: +81-78-232-8018 FAX: +81-78-232-8051 <a href="https://www.kobelco-eco.co.jp/english/">https://www.kobelco-eco.co.jp/english/</a>
Mitsubishi Heavy Industries Environmental & Chemical Engineering Co., Ltd.		B-6: Electro Chlorination System(MGPS)	(Mitsubishi Group) MITSUBISHI HEAVY INDUSTRIES, LTD. 2-3, Marunouchi 3 Chome, Chiyoda-ku, TOKYO 100-8332 JAPAN TEL: +81-3-6275-6199 FAX: +81-3-6275-6474 <a href="https://www.mhl.com/">https://www.mhl.com/</a>
Mitsubishi Heavy Industries Power Environmental Solutions, Ltd.		B-1: High-Speed Coagulating Sedimentation Equipment B-4: High-Speed Air Flotation System B-8: Wet type Electrostatic Precipitator B-9: Dry type Electrostatic Precipitator B-10: Moving Electrode Electrostatic Precipitator(MEEP) B-11: Wet type Electrostatic precipitator for Scarfing Machine and Gas Cutting Machine B-12: Wet type Electrostatic Precipitator for By-Product Gas Turbine	NISSEKI YOKOHAMA Bldg. 1-6, Sakuragicho 1-Chome Naka-Ku, Yokohama 231-0062, Japan TEL: +81-(0)45-232-4948 FAX: +81-(0)45-307-3400 URL: <a href="https://power.mhl.com/jp/group/es/">https://power.mhl.com/jp/group/es/</a>
Mitsui E&S Machinery Co., Ltd.	A-6: Top Pressure Recovery Turbine (TRT)		1-1 Tama 3-chome, Tamano, Okayama, JAPAN Sales Gr. Plant Machinery Service Dept. Technoservice Div. TEL: +81-863-23-2586 <a href="https://www.mes.co.jp/machinery/english/">https://www.mes.co.jp/machinery/english/</a>
Mitsui E&S Power Systems Inc.	A-19: Induction type billet heater for direct rolling		MESPS Tokyo Office: TEL: +81-3-6806-1075 FAX: +81-3-5294-1121 <a href="https://www.mesps.co.jp/contact/index.html">https://www.mesps.co.jp/contact/index.html</a>

# What are the advantages of Technologies Customized List?

1. The benefit of technology implementation is clearly demonstrated
  - Indicate CO<sub>2</sub> reduction effect and payback time for the target country or region, based on country-based energy prices, plant installation cost and CO<sub>2</sub> 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