

Confidential



# Energy Transition toward Carbon Neutral Society by Biomass Use in Coal-fired Boiler

## - "Introduction of Idemitsu Green Energy Pellet" -

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6<sup>th</sup>, September, 2022

Idemitsu Kosan Co.,Ltd.

# Idemitsu by the numbers

- Start of Business : In 1911
- 30% share of domestic fuel supply



**Consolidated  
Net Sales**  
**¥ 6.7 trillion**



**Consolidated number  
of employees**  
**14,000 people**

## Petroleum



Crude oil processing  
capacity  
**945,000 barrels/day**



Fuel oil sales  
volume in Japan  
**34 million kL/year**



Number of service  
stations in Japan  
**6,200 locations**



Crude oil tankers  
**21 ships**



Number of oil depots  
**34 locations**



Overseas petroleum  
trading volume  
**24 million kL/year**

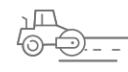
## Functional Materials



Sales volume of  
engineering plastic  
**150,000 tons/year**



Sales volume of  
lubricants  
**1.2 million kL/year**



Sales volume of asphalt  
**410,000 tons/year**



Adhesive material  
production capacity  
**75,000 tons/year**



OLED material  
production capacity  
**26 tons/year**



Sales volume of  
agri-bio products  
**16,000 tons/year**

## Basic Chemicals



Ethylene  
production capacity  
**1 million tons/year**



BTX\*  
production capacity  
**2.5 million tons/year**

## Resources



Crude oil and gas  
Production volume  
**29,000 barrels/day**



Thermal coal  
production volume  
**10 million tons/year**

## Power and Renewable Energy



Electric power  
generation capacity  
**1.8 GW**

Of which, renewable energy is 0.7GW  
(Renewable energy ratio: 39%)



Electricity sales  
volume  
**5,200 million kWh**

## Overseas



Overseas  
bases  
**66 bases**



Overseas  
employees  
**3,200 people**

# Corporate Vision for 2030

## Your Reliable Partner for a Brighter Future

We believe it is our responsibility to contribute to social challenges in addition to providing stable energy supply, and will fulfill three responsibilities through our business activities:

Responsibility to protect the environment and lifestyles:

**Energy/material transition to a carbon neutral/circulatory society**

Responsibility to support regional communities:

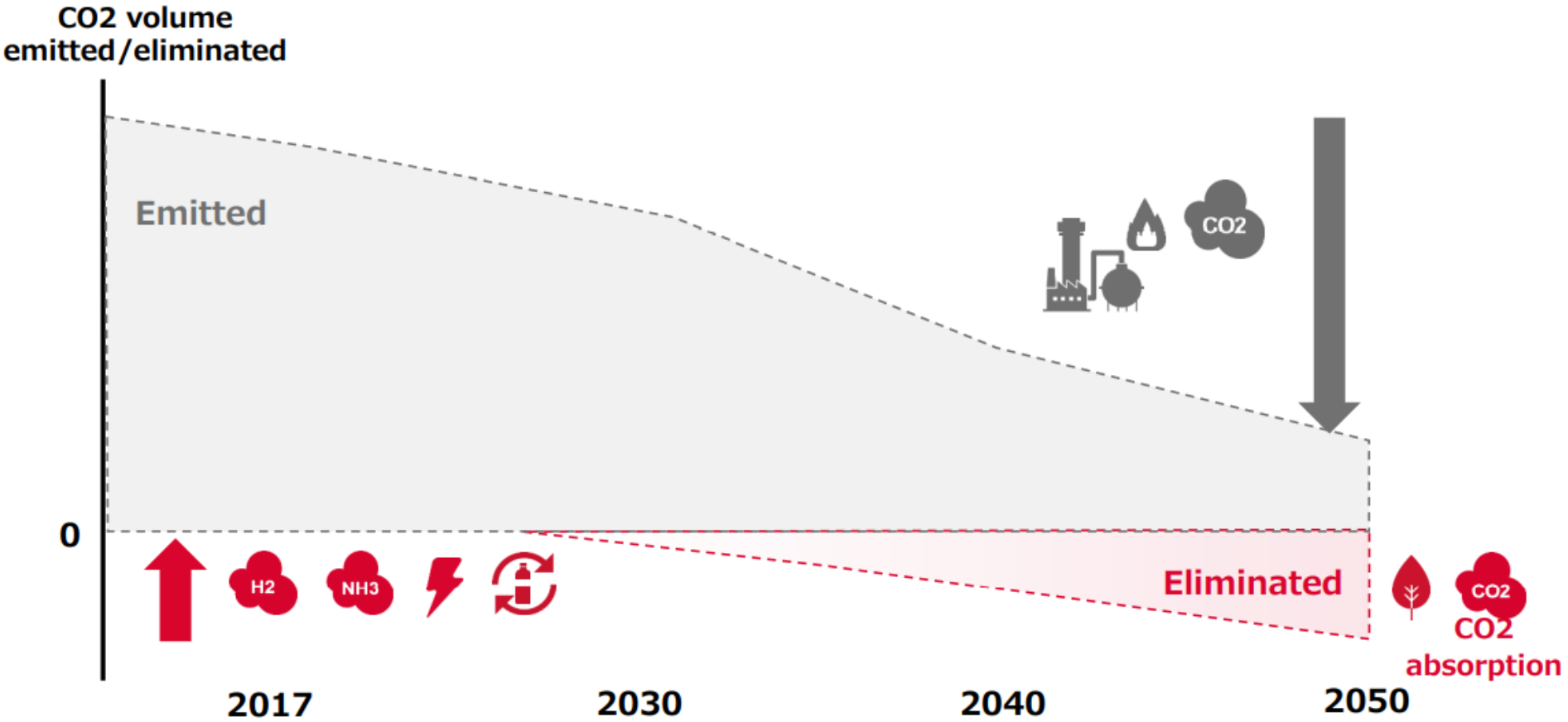
**Next generation mobility & community for an aging society**

Responsibility to provide for society with technological capabilities:

**New materials to make it possible to overcome such challenges**

# Pursuing Carbon Neutrality by 2050

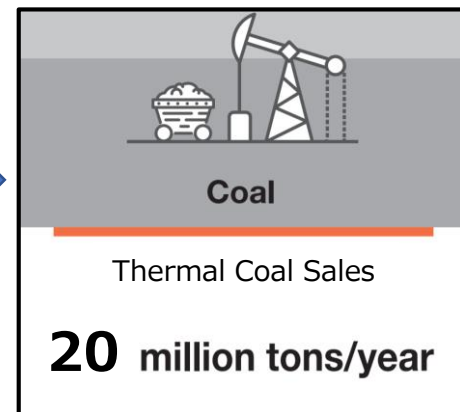
We aim to achieve carbon neutrality (net zero CO2 emission) from in-house operations (scope 1+2) by 2050



# Idemitsu Business Segments



<Coal and Energy Solution Department>



# Coal Business Supply Chain



**Idemitsu's involvement is from coal production until technical support to end users since 1980s**

# Idemitsu Coal Business harmonized with environment

## Supply High grade coal



## ULTY-V plus

(Around 1% Reduction of fuel consumption by combustion control)



## Biomass Co-firing (Black pellet Supply)







## Technical Consulting for Combustion



In addition to stable energy supply to Asian countries including Japan, we provide various business menu harmonized with environment.

# Biomass Fuel Comparison

Type of Fuel	Picture	Calorific Value (kcal/kg)	Character	Suitability for Co-firing
Wood Chip		1600- 2800	<ul style="list-style-type: none"> <li>• Cheap</li> <li>• High moisture</li> <li>• Outdoor storage</li> <li>• Low logistics efficiency</li> </ul>	△
White Pellet		3600- 4000	<ul style="list-style-type: none"> <li>• Indoor storage</li> <li>• Middle logistics efficiency</li> </ul>	△
Black Pellet “Idemitsu Green Energy Pellet”		4300- 5500	<ul style="list-style-type: none"> <li>• Outdoor storage</li> <li>• High logistics efficiency</li> <li>• Good grindability</li> </ul>	◎
PKS (Palm Kernel Shell)		- 4500	<ul style="list-style-type: none"> <li>• Bad grindability</li> <li>• Outdoor storage</li> <li>• High logistics efficiency</li> <li>• Quality fluctuation</li> </ul>	×

**Black Pellet is more suitable fuel for co-firing in coal-fired power plants without additional investment for equipments.**



# Good Characteristics of Black Pellet against white pellet

✓ Higher energy density



Efficient for logistics  
Smaller space for stock

✓ Good grindability



Higher co-firing ratio at pulverized coal boiler  
(White:1~3% ⇒ BP 30~50%)



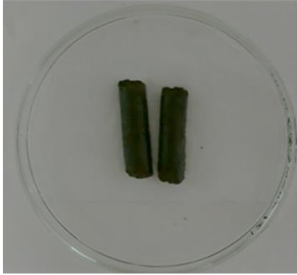



✓ Waterproof /  
No self-degrade



No investment for storage  
by outdoor storage

**Handling in the same way as coal**

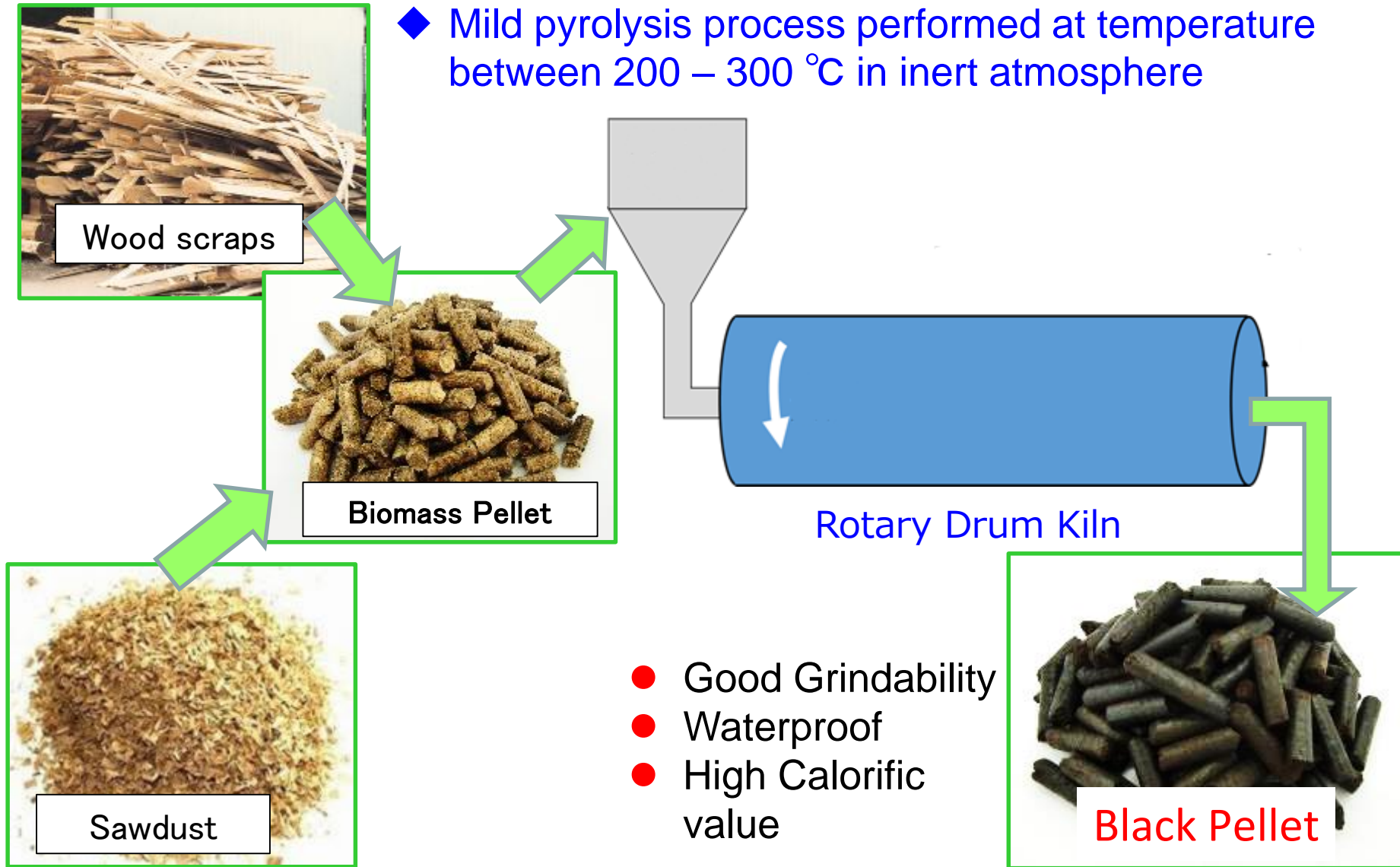
# Waterproof of Black Pellet

	Torrefied Pellet	Wood Pellet
0min		
5min		
1day		

**Black Pellet is hardly disintegrated  
and does not collapse**

# How to produce Black Pellet?

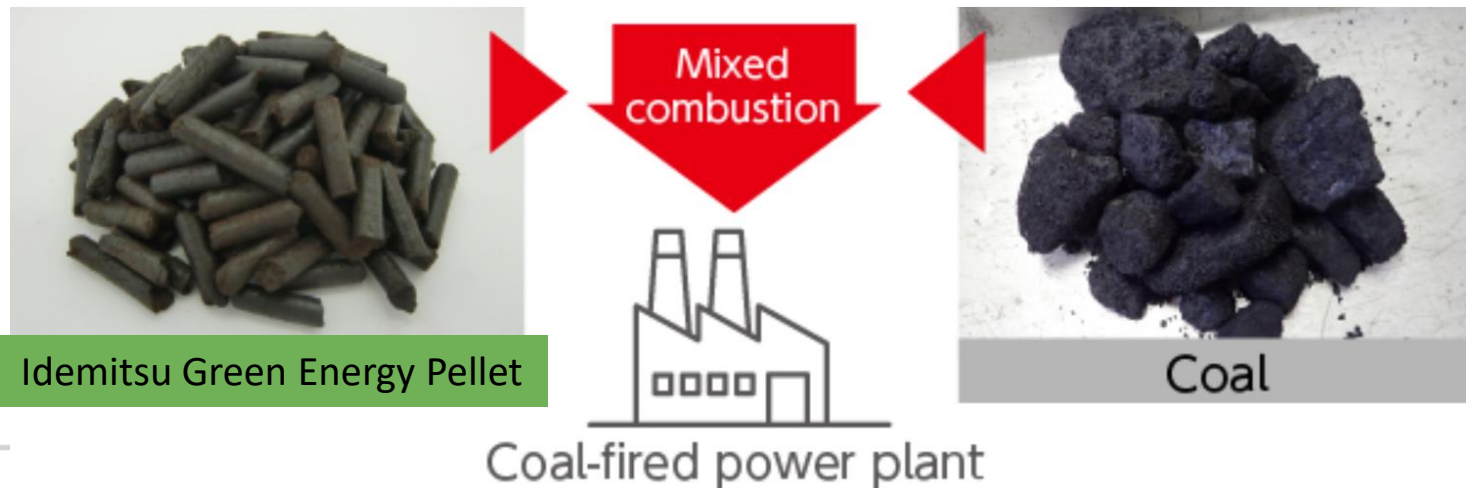
- ◆ Mild pyrolysis process performed at temperature between 200 – 300 °C in inert atmosphere



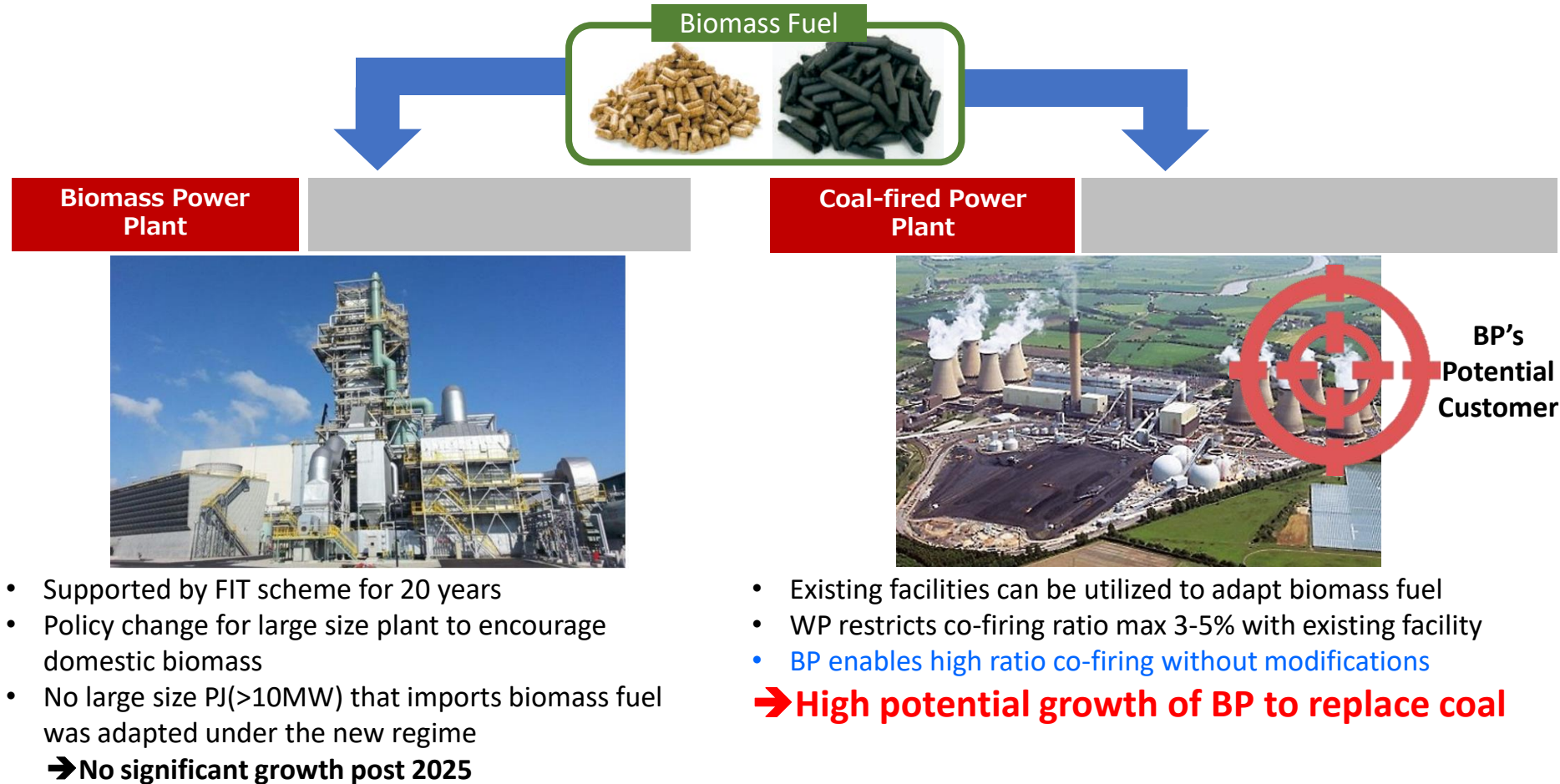
- Good Grindability
- Waterproof
- High Calorific value

# Black Pellets by Idemitsu

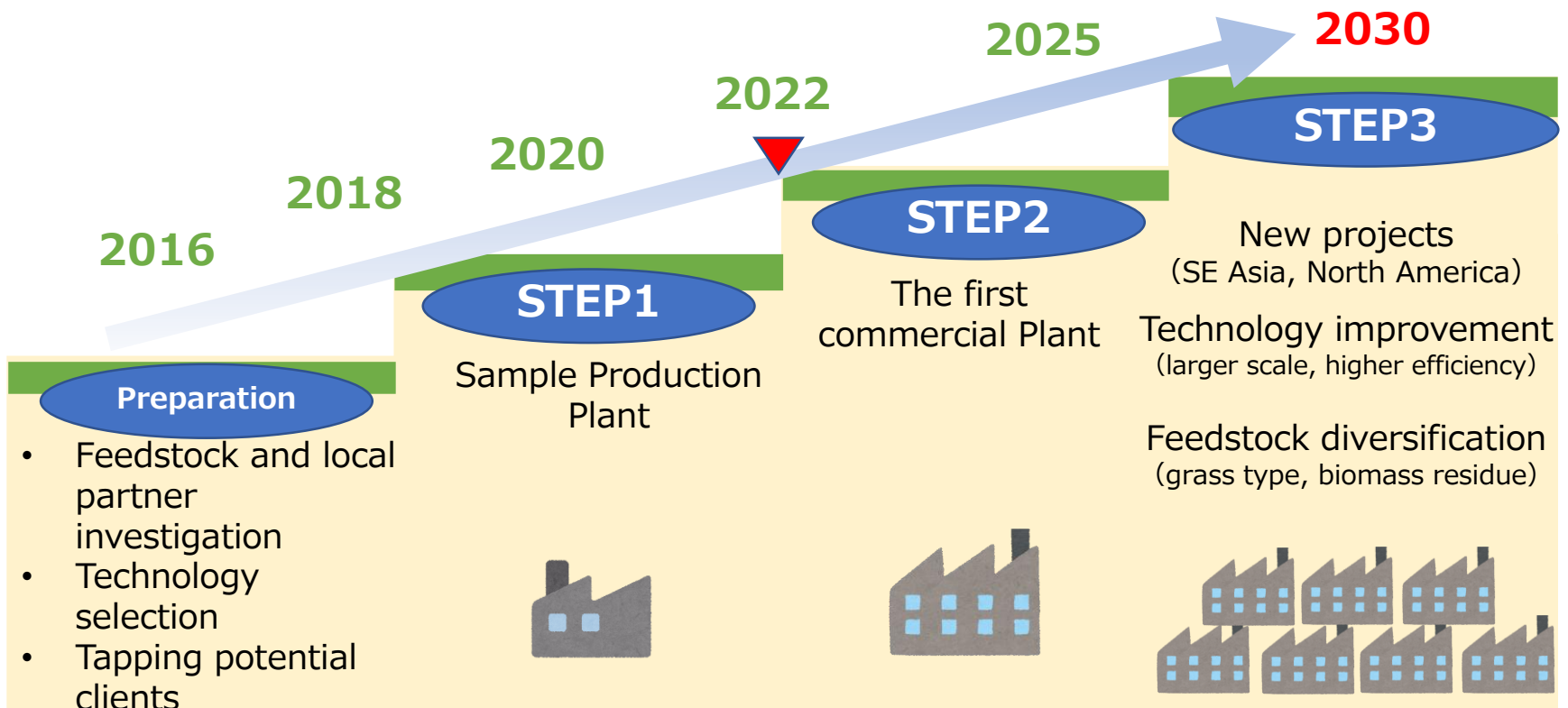
- Idemitsu started investigation on manufacturing and marketing Black Pellet for co-combustion use in Japan.
- Construction of the first commercial plant have just started in Vietnam and Black Pellet supply will commence in 2023.
- Japanese coal users show big interest in “**Idemitsu Green Energy Pellet**” for their co-combustion and reduction of coal use.



# Biomass Power Plant or Coal-fired Power Plant



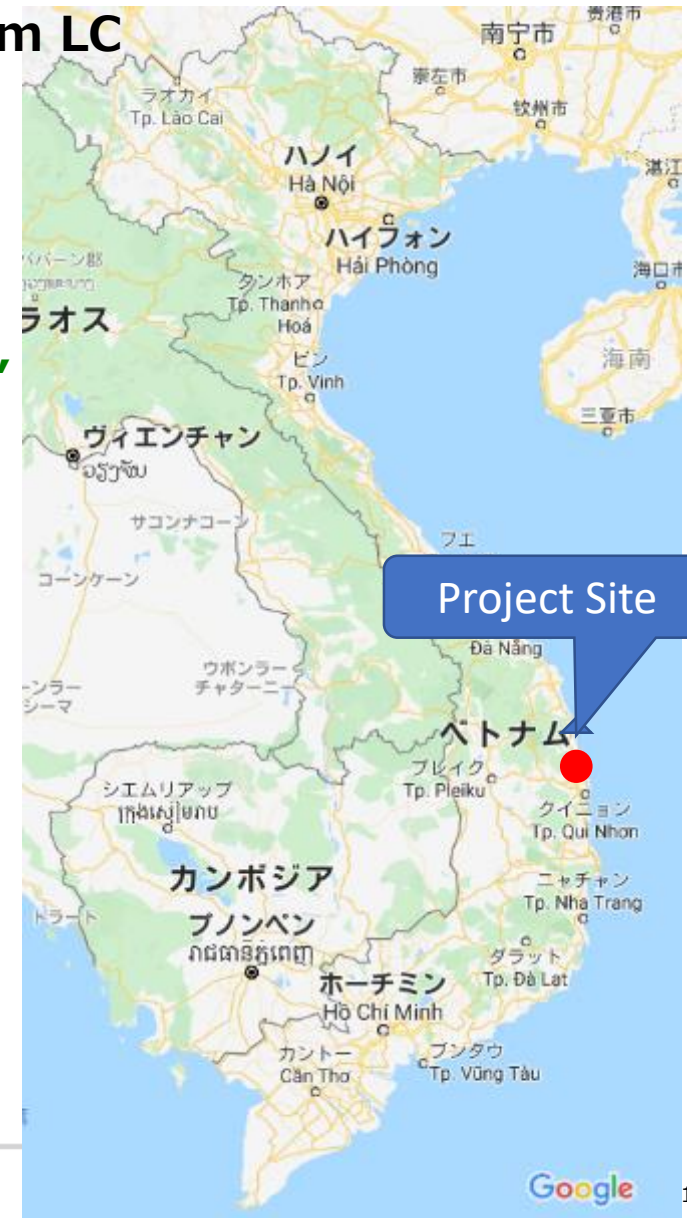
# Black Pellet Business Development



**Targeting to supply 3 million tons of BP as the replacement of coal.**

# 1st Commercial Plant

- **Producer** : Idemitsu Green Energy Vietnam LC
  - **Location** : Binh Dinh
  - **Feedstock** : Acacia
  - **Capacity** : 120,000t/year
  - **Technology** : Rotary kiln
  - **Product** : "Idemitsu Green Energy Pellet"
- Commercial operation to be started in 2023**



# “Idemitsu Green Energy Pellet”

- Idemitsu has given the name “Idemitsu Green Energy Pellet” for our black pellet.
- “Idemitsu Green Energy Pellet” is realistic green solution toward carbon neutral.
- We believe this activity will also meet some purposes of SDGs.

7. Affordable and clean energy

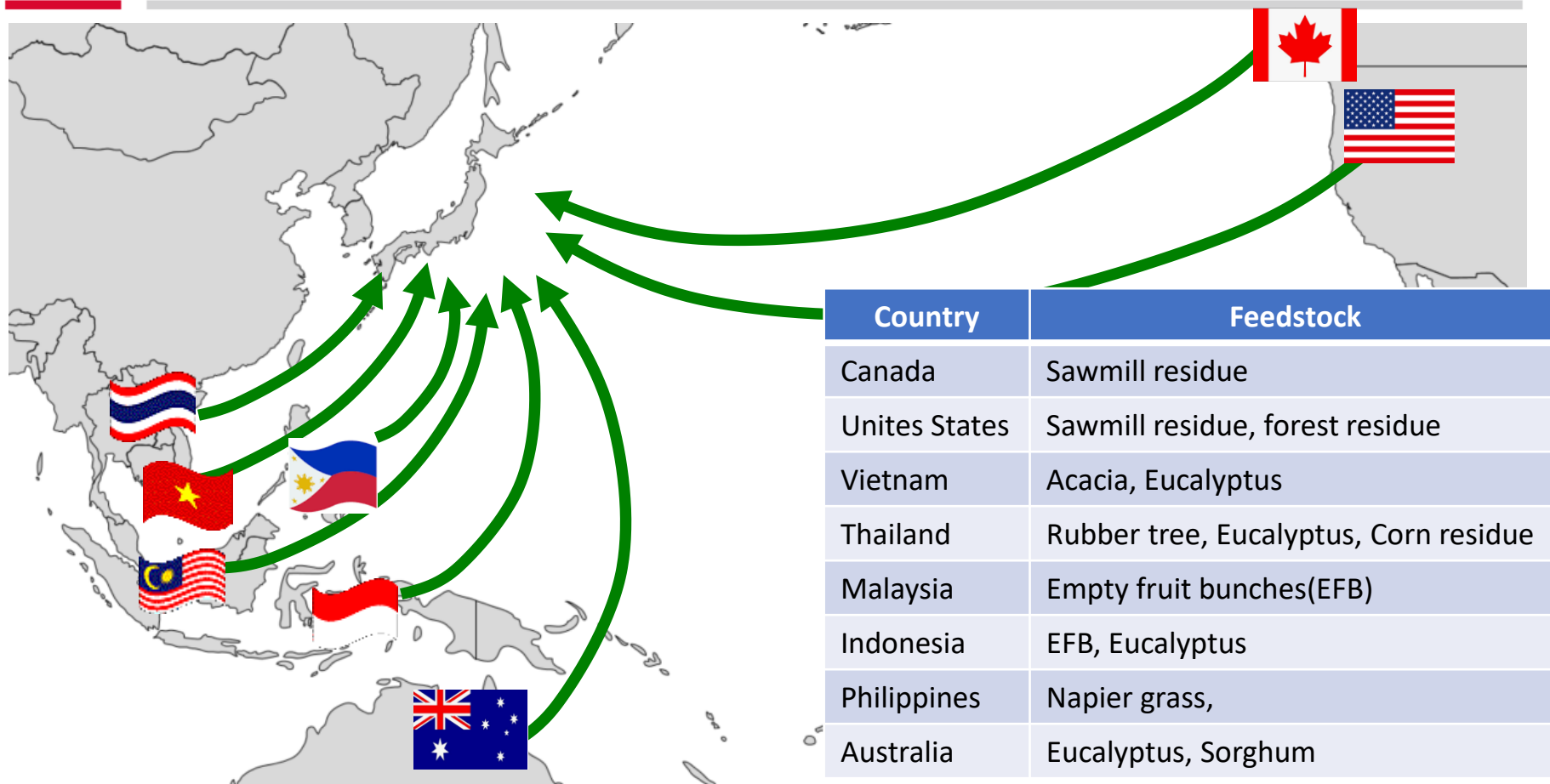
12. Responsible consumption and production

13. Climate Action





# Business Expansion Plan



- Targeting to supply 3 million tons of BP by 2030 by mixture of various types of business involvements, such as a minor shareholder and just a product offtaker.
- Investigating potential feedstock supply around the Pacific Ocean including agricultural waste and our own plantation.

# Steam Explosion Process Development with EFB

- Collaboration with TG2/Wilhelmina for BP production project from Empty Fruit Bunches (EFB)
- The unique steam explosion process produces black pellets with low alkali contents

## <Details of TG2/Wilhelmina's first plant>

Project Owner : Wilhelmina Energy Malaysia Sdn Bhd

Capacity : 120,000 t/year

Project Site : Kuantan, Malaysia

Feedstock : EFB

COD : 2023 4Q

Oil Palm Tree



EFB



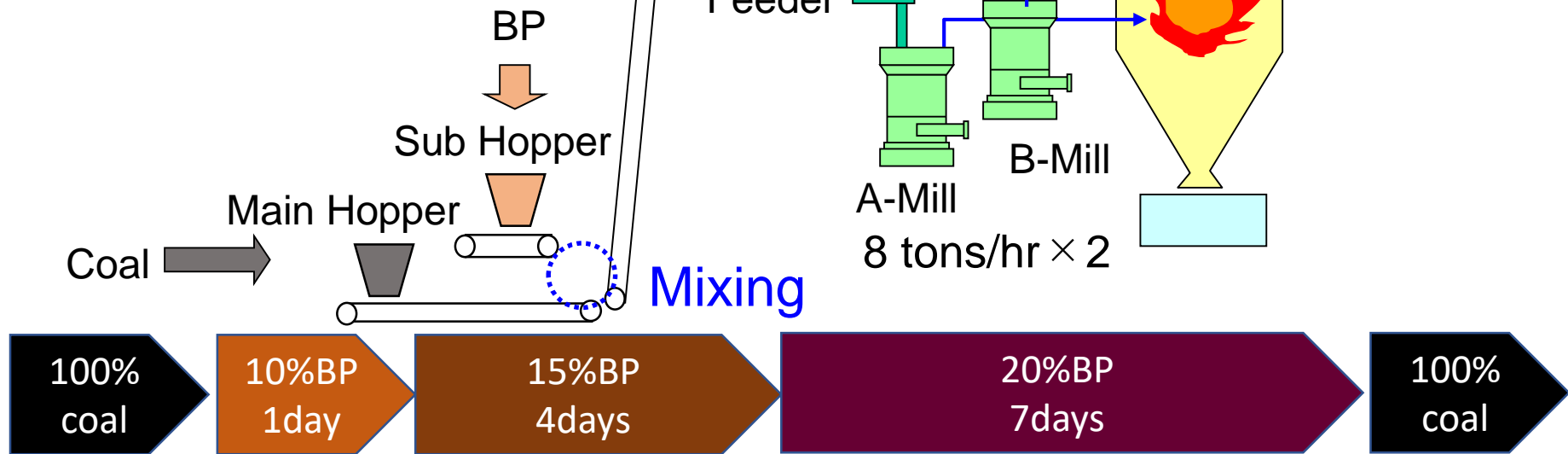
TG2 Pellets™



# Co-firing Test at Idemitsu Factory

## Boiler specification

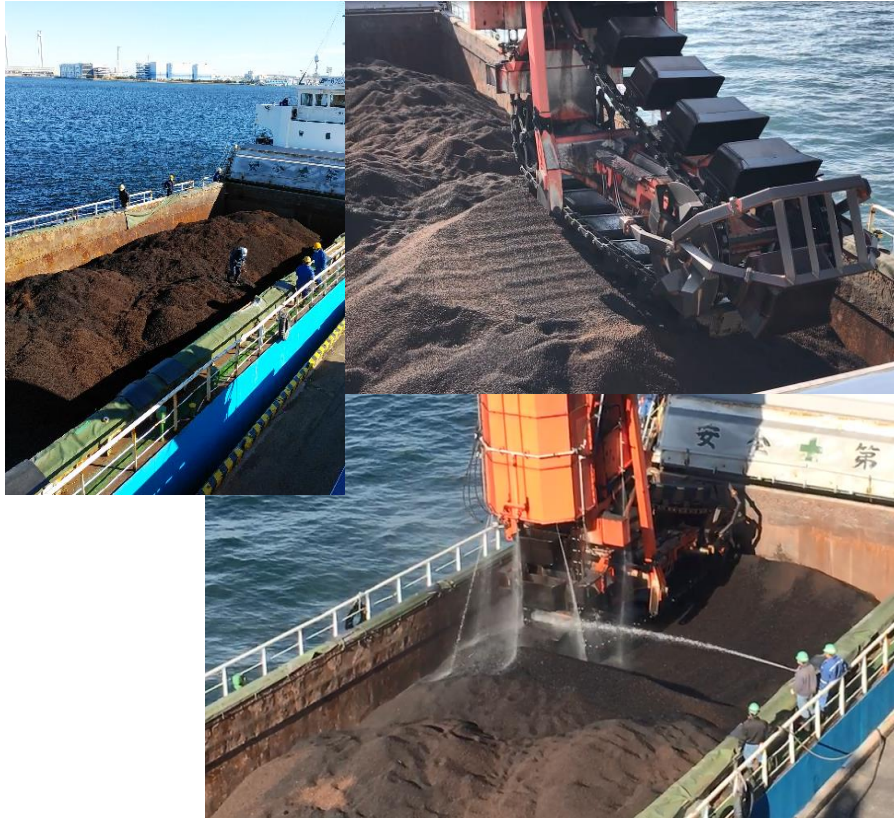
Maker	Mitsubishi
Coal	BB8+Indonesian Coal
Feed rate	11.2 t/h
Steam Pressure	12 Mpa
Steam Temp	530 °C
Steam Volume	Normal: 120 t/h Test: 105 t/h



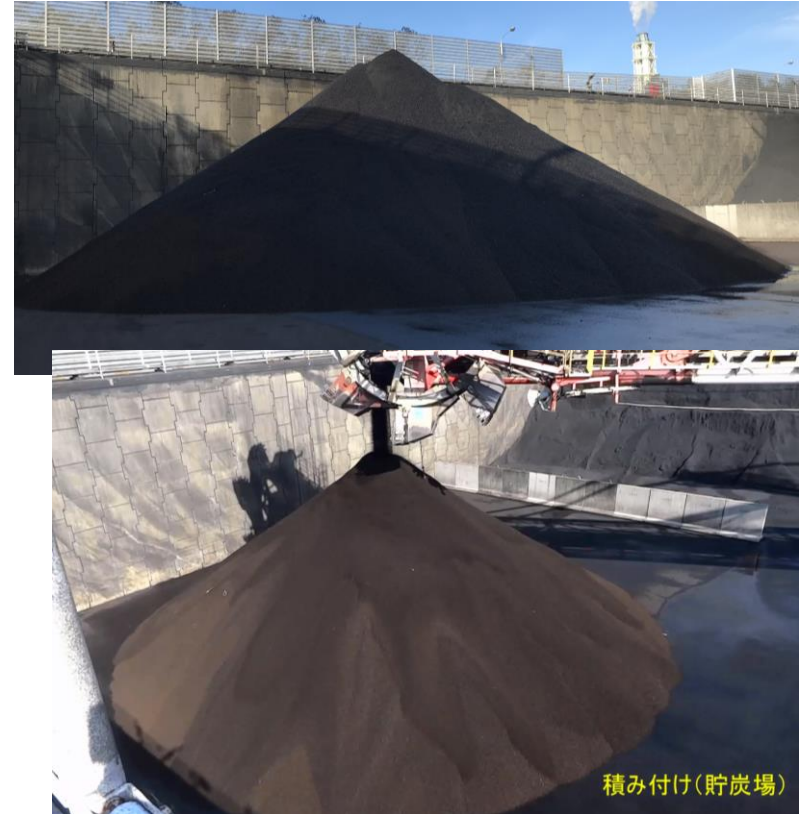
➤ Already, similar co-firing tests have been made at more than 10 power plants and factories and we have got the positive feedback from our customers.

# Black Pellet Handling

## Bulkship

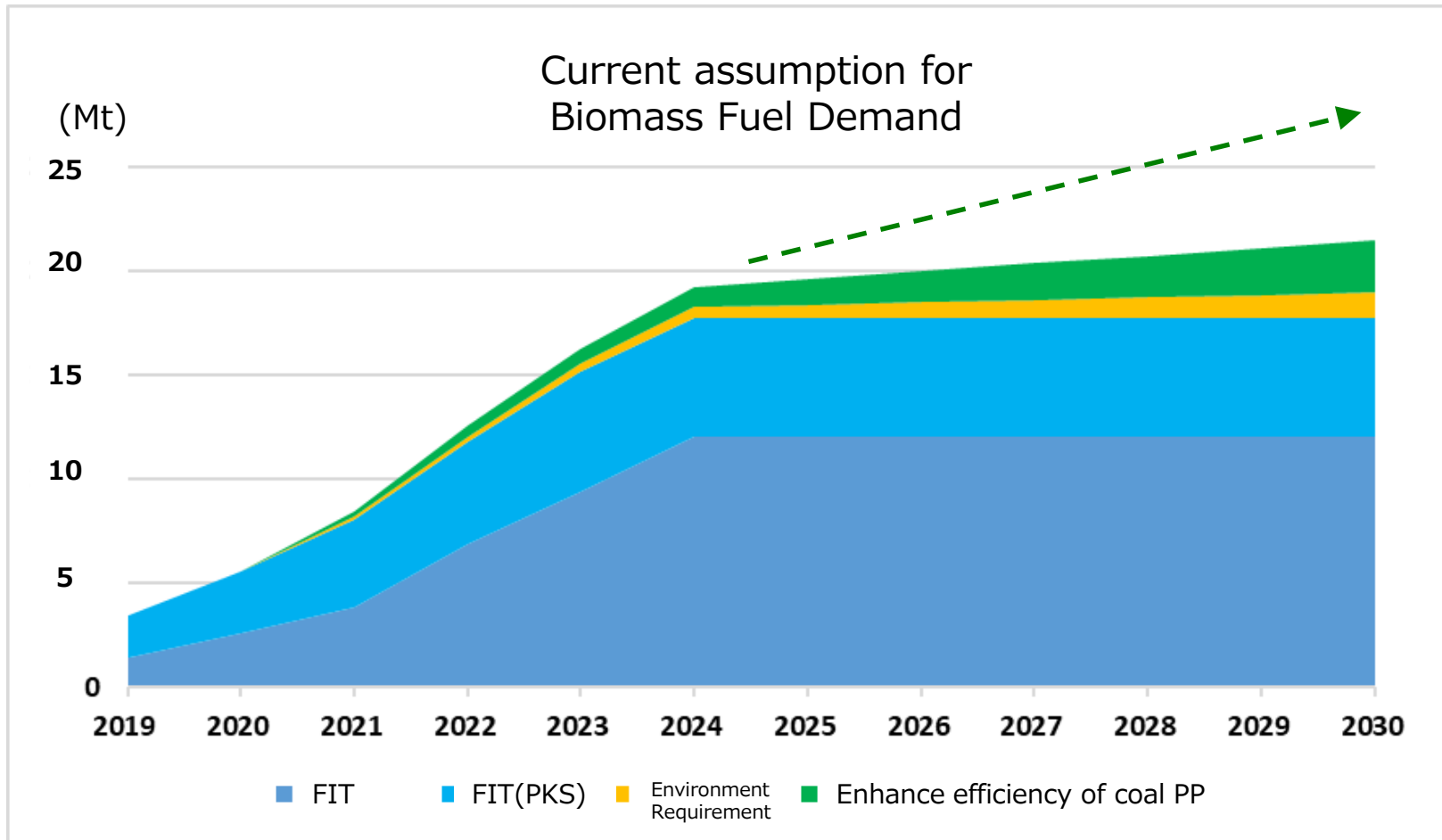


## Coal Yard



**Existing logistics can be utilized for black pellet.**

# Demand Assumption of biomass fuel in Japan



Biomass Fuel Demand will increase in the future and, with further progress of RE, the demand will increase more and more

## Summary

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- Idemitsu is preparing the black pellet (**Idemitsu Green Energy Pellet**) business for coal users.
- We believe that Idemitsu Green Energy Pellet is realistic and efficient solution to reduce CO2 emission for coal users .
- 1st commercial plant is under construction in Vietnam and start operation in 2023.
- We would expand the production volume to 3 million tons by constructing the plant for Idemitsu Green Energy Pellet around the Pacific Ocean.

*Thank you*

# ULTY - Boiler control optimization system -

**“ULTY-V plus” is the boiler control optimization system with AI which can reduce coal consumption and CO2 emission by connecting with existing boiler control system.**



**Reduction of coal consumption:  
Approx. 1%**

**Already, Total 106 ULTY system installed :**

- **Japan 99**
- **Chinese Taipei 6**
- **Indonesia 1**

**Awarded as energy-saving product by  
Commissioner, Agency for Natural  
Resources and Energy in 2021**