

# Cooperative Projects in Australia

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**Melbourne, Australia**

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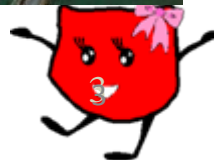
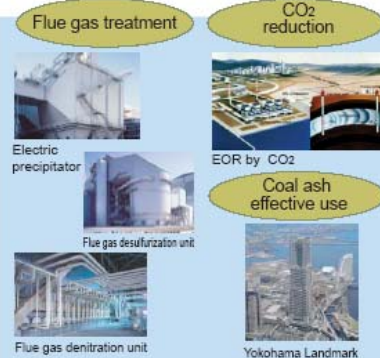
- Established as a foundation in 1990 □ with its origin back to 1948 □
- Covers all coal related issues from upstream to downstream
- Official Members: 99 □ incl. major public-listed companies and main players in energy and relevant sectors □
- **Supervision by METI** (Min. of Economy, Trade and Industry of Japan)
- Personnel: 79 □ as of October 1, 2010 □
- Annual Budget: 3.3 billion yen □ FY2010 □

## Mining & Preparation

## Promotion of environmentally friendly coal utilization



## Exploration



# JCOAL's CCT ROAD MAP (Preliminary)

2010

2020

2030

2040

2050

## HIGH EFFICIENCY DECADE

☐ A-USC(700)

☐ ECOPRO  
☐ DRY OF BROWN COAL  
☐ TIGAR  
☐ HWT

☐ Post Combustion  
☐ Oxyfuel  
☐ Pre-combustion

☐ CBM/ECBM

☐ COURSE50  
(Hydrogen Reduction Steel Manufacturing/ New Cokes Technology)

EDGE OF  SHOWS COMMERCIALIZATION TIMING.

”\*” MEANS GOVERNMENT FUNDED PROJECT.

## LOW CARBON DECADE

☐ UA-USC(760)  
☐ IGCC+IGCC  
☐ Poly-generation

☐ LRC Gasification ☐ CCS

☐ Ad-Post Combustion  
☐ Ad-Pre-Combustion  
☐ Ad-Oxy-fuel  
(Ad: Membrane Technology)  
☐ Chemical Looping

☐ ECBM

☐ COURSE50  
(Hydrogen Reduction Steel Manufacturing/ New Cokes Technology)

## ZERO EMISSION DECADE

☐ IGFC+CCS  
☐ A-IGCC+CCS

## SUSTAINABILITY DECADE

☐ A-IGFC+CCS

COMBUSTION
LOW RANK COAL
CCS
COAL BED METHANE
STEEL MANUFACTURING



# Victoria/Japan Joint Project on Low Rank Coal Utilization

Company/University	Project(FS, R&D, Demonstration)	Partner/Supporter
NSEC/CHIYODA	Highly Efficient Pyrolysis Coal Gasification	Australia Federal Gov./Victoria state Gov./Japanese Gov.(METI)
MHI/JCOAL/Tokyo Uni.	Research on high efficient brown coal Drying system	Monash Uni./HRL/METI
KEPCO/KYUSHU Uni.	International cooperation study on high utilization technology of brown coal based on gasification	Victoria state Gov./ Monash Uni./NEDO
KHI	Realization research on future energy system by the carbon-free fuel of the low rank coal origin	Victoria state Gov./HRL/ CO <sub>2</sub> CRC/NEDO

## Unique Features of ECOPRO\* Technology

< \*Efficient Co-Production with Coal Flash Partial Hydro-pyrolysis Technology >

### Gasification Process with Partial Oxidization and Pyrolysis zones.

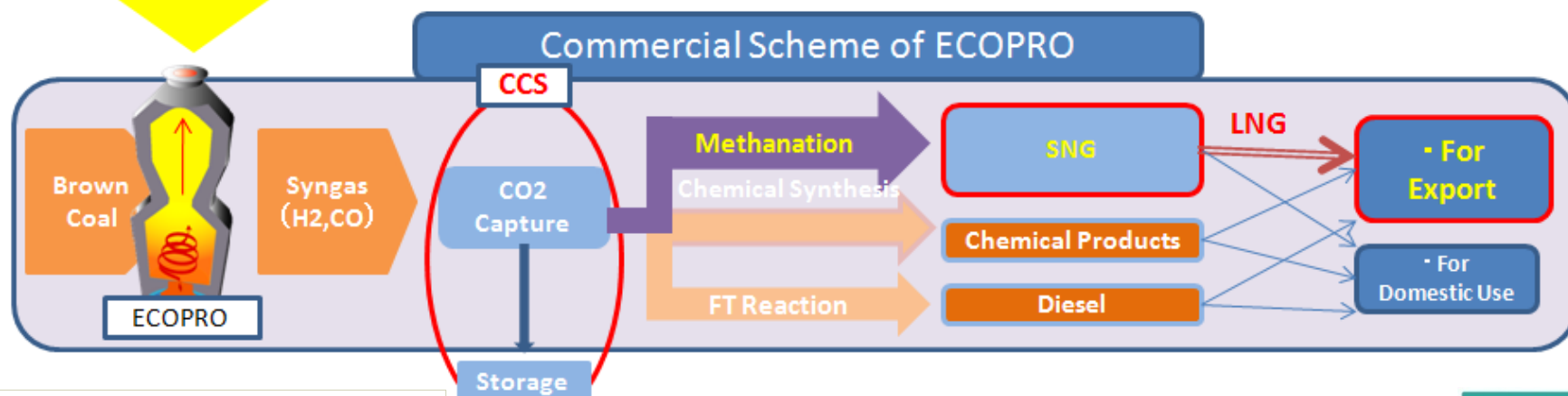
- ① Re-utilizes the Partial Oxidization heat for Pyrolysis and achieves **high energy efficiency** (= Low CO2 Generation)  
**The world's best efficiency at 85%**
- ② Process suitable for gasifying low rank coal with higher volatile components, such as **Brown Coal**.
- ③ CH4 contained in the gas product enables **higher production efficiency of SNG**.



Pilot Plant (20ton/day)

Lower CO2 Emission  
by approx. **10%**

Higher SNG Production  
Efficiency by approx. **10%**





# The Pre-feasibility Study for ECOPRO Demonstration Project

## Objective

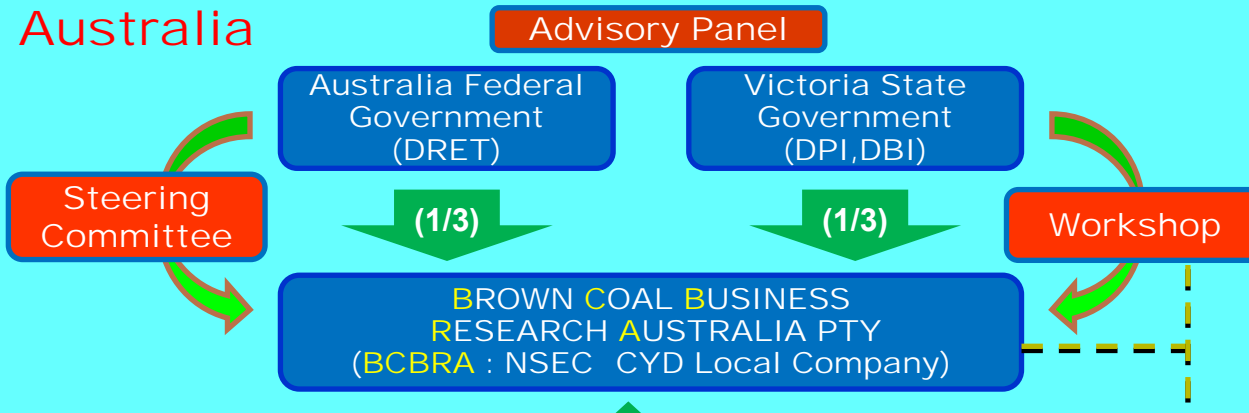
### ■ Commercialization Study

To assess the viability of commercialization option with respect to each of the ECOPRO products for the utilization of Victorian Brown Coal, considering the commercial scale plant capacity with the future integration to CCS network and both domestic and export markets.

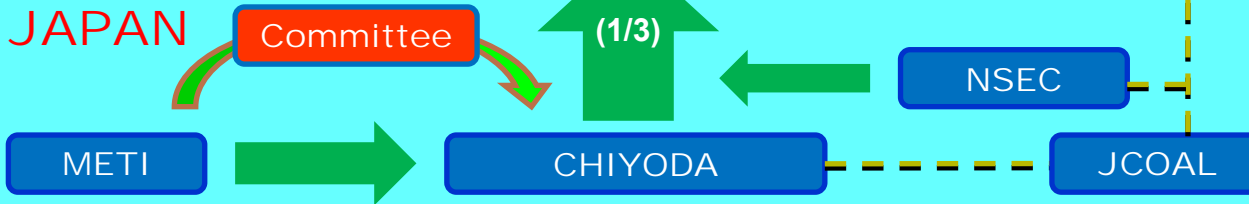
### ■ Utilization of Demonstration Plant

- 1) To study possible utilization of the Demonstration Plant after its demonstration operation.
- 2) To study marketability of the products expected from the Demonstration Plant to the prospective local market.

## Australia



## JAPAN



## A Role of JCOAL

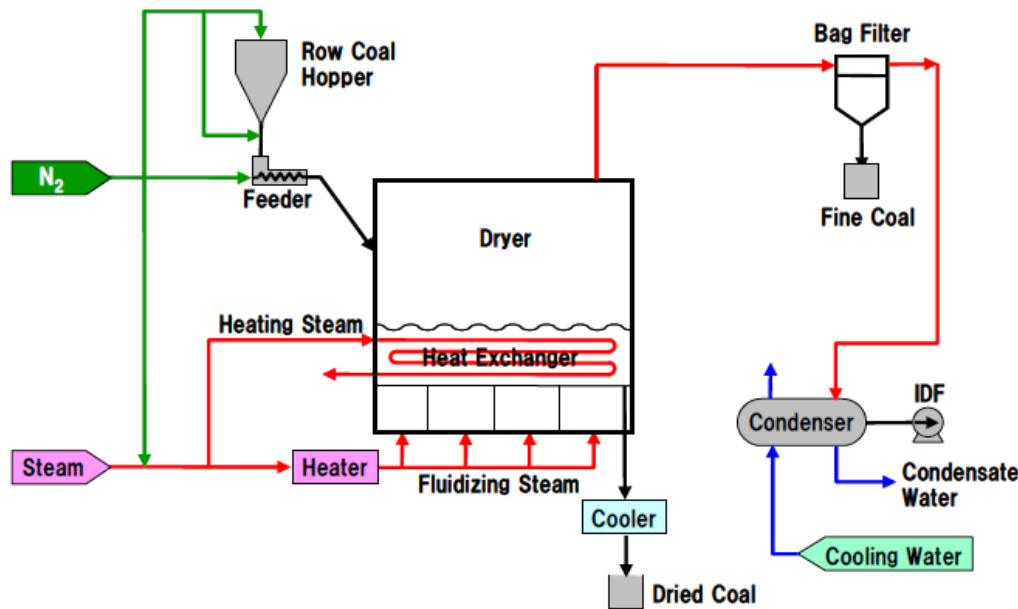
- (1) Coal Gasification Technology Assessment & Market Study
- (2) Investigation for Trend of Low Rank Coal Gasification Technology
- (3) Investigation for Drying Technology of Brown Coal
- (4) Coordination of the Working Group Activities



ECOPRO WORK SHOP  
Melbourne  
Latrobe valley  
(9,10 Feb.,2011)

## PDU (Process Development Unit) System Diagram

Type	Steam fluidized bed dryer (indirect heating)
Capacity	6 - 10 t/d
Moisture (inlet/outlet)	62.5% / 10%
Heating Steam	120~170°C



Latent heat recovery system  
Is not shown here

Note: PDU test plant is installed at Nagasaki R&D Center, MHI.





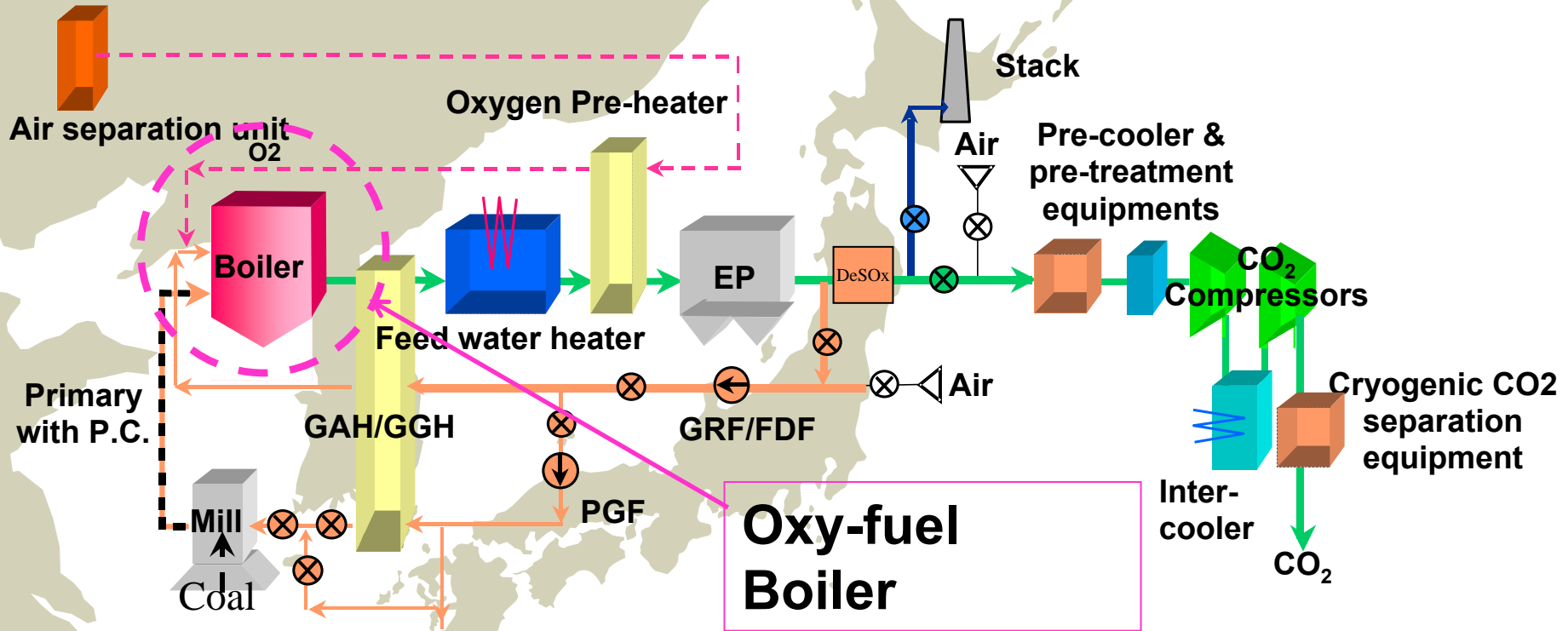
## PDU Test Schedule

Item		2010		2011				2012
		3Q	4Q	1Q	2Q	3Q	4Q	1Q
Fluidized Bed Dryer	Design	←						
	Construction		←					
	Trial Run				←			
	Test				←			
Latent Heat Recovery System	Design		←					
	Construction				←			
	Trial Run						←	
	Test							←



(Under construction)

# Oxy-fuel Process for CCS

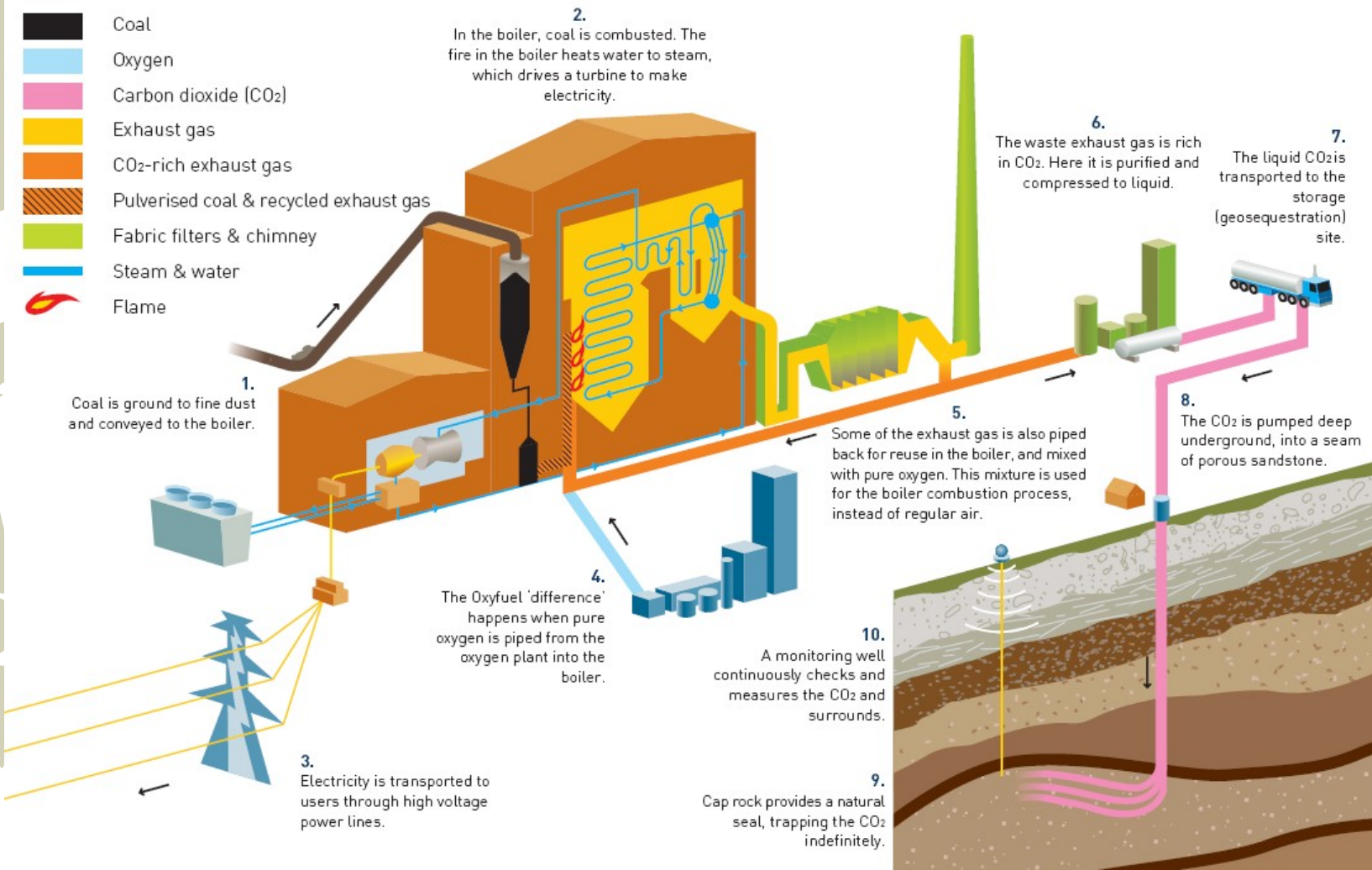


## □ Features

- /Basically consist of mature technologies
- /Without steam cycle modification for existing plant
- /Higher CO<sub>2</sub> capture efficiency
- /Compact Boiler and related backend facilities



# Oxy-fuel Process



# Location of Callide Oxy-fuel Project

**Demonstration of 30MWe sized power plant with CCS by Oxy-fuel technology**

**Callide-A: 4 x 30 MWe (Use one unit)**

**Evaporation: 123 t/h steam**

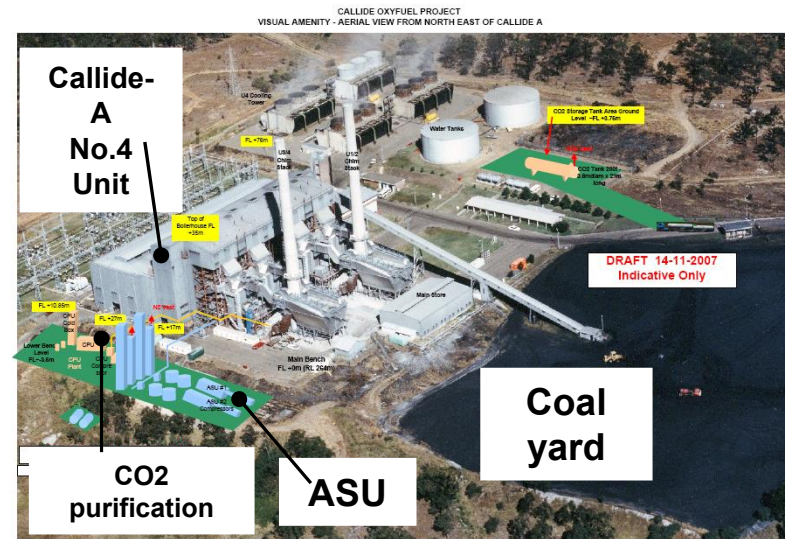
**4.1 MPa/460°C**

**Operation terminated 2002**

**Flue gas treatment / Fabric filter (without DeNO<sub>x</sub> / DeSO<sub>x</sub>)**



**CO2 storage site area**  
**(app.300km far east**  
**from Callide-A)**





# Callide Oxy-fuel Project - Participants

## Oxyfuel Project Partners

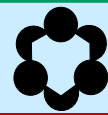


## Supporting Collaborators



## OVERVIEW





*Thank you for your attention!*

