



CCS/CCUS PROGRAM AND ACTIVITIES IN INDONESIA

Dr. I Gusti Suarnaya Sidemen,
Directorate General of Oil and Gas Indonesia

Deep Dive Workshop CCS Way Forward in Asia
Manila, 6 Juni 2016





OUTLINE



I. Back Ground

I. INDONESIA CCS/CCUS COE

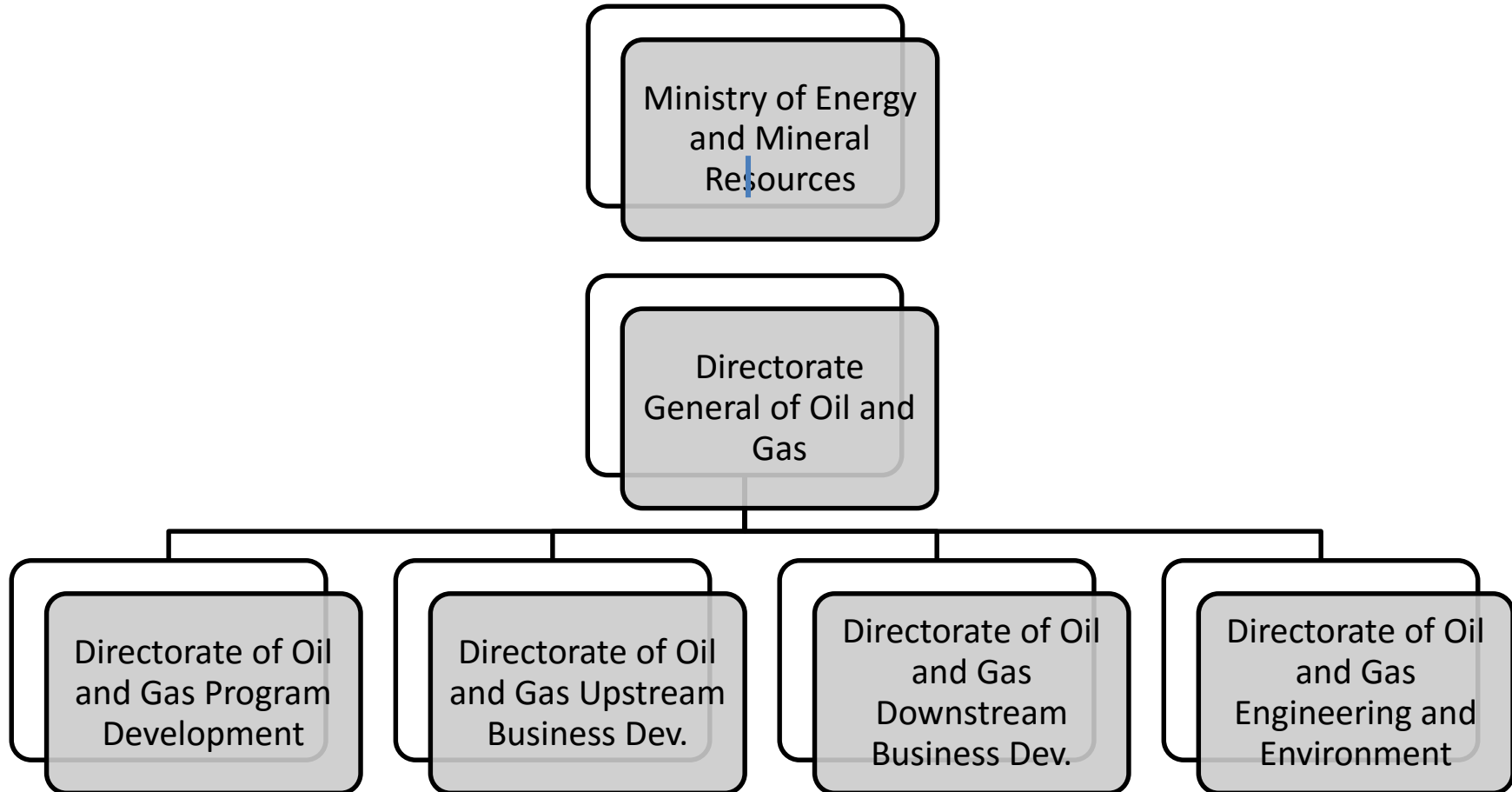
III. CCS/CCUS Program

IV. Challenges/Opportunities





BACKGROUND: MINISTRY OF ENERGY AND MINERAL RESOURCES



- 29% emissions reduction from BAU by 2030 and 41% with international support scenario

Related to Energy:

CCS and CCUS

- Contributions can be given by
Introducing **CCS and CO2-EOR (CCUS)** to the community and implementing those approaches in Indonesian HC fields





ROLE OF CCS IN OIL AND GAS INDUSTRY



GREEN OIL AND GAS INDUSTRY INITIATIVE (GOGII)

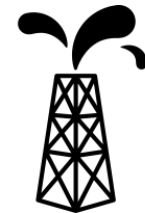


ENERGY
UTILIZATION
OIL & GAS FUELS



EFFICIENT

OIL & GAS
UPSTREAM &
DOWNSTREAM
ACTIVITIES



EOR



INDUSTRY

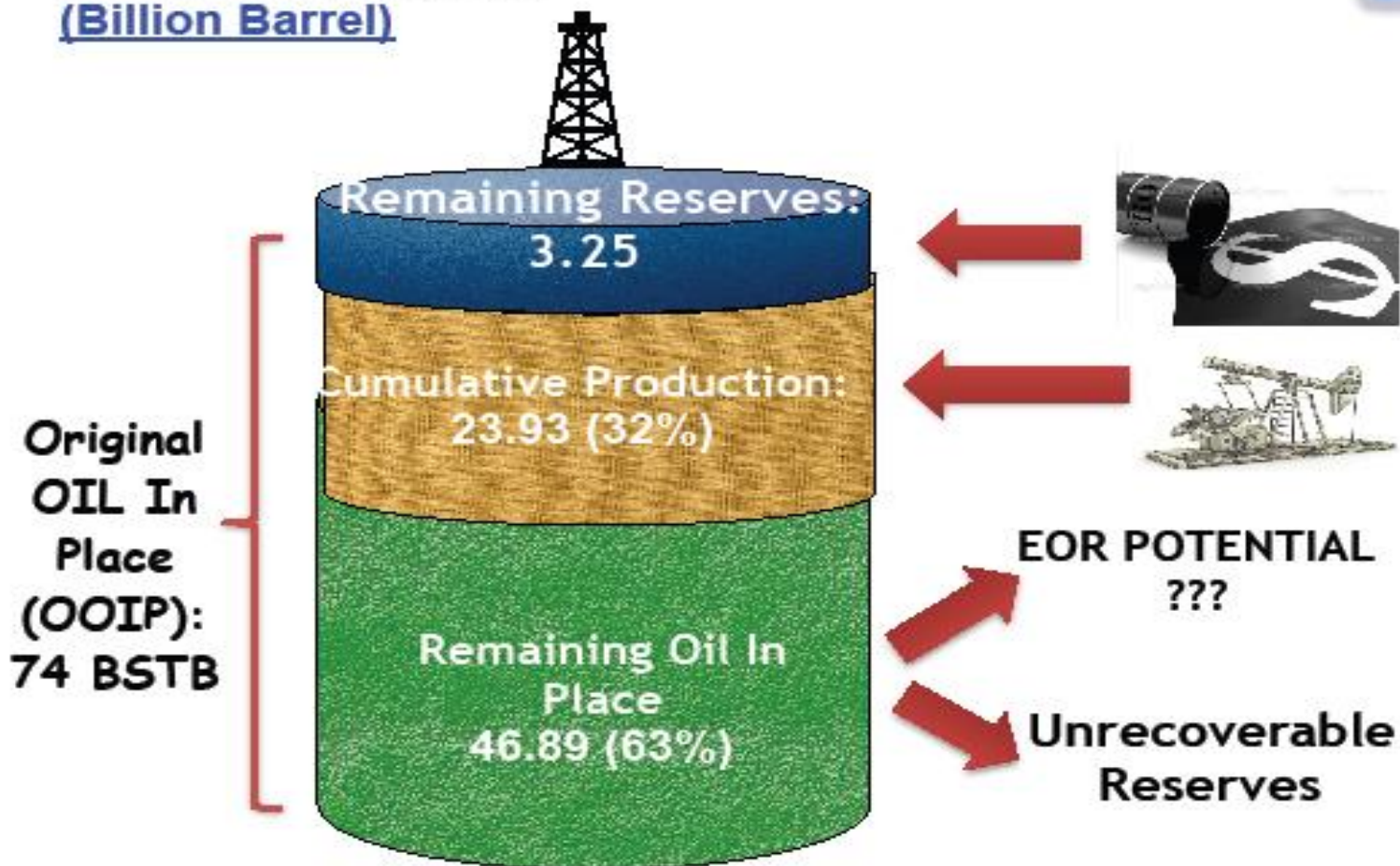


CCS

EOR Potential



Reserves Distribution:
(Billion Barrel)



Source: SKK Migas Indonesia Oil Reserves Data (1/1/2014)

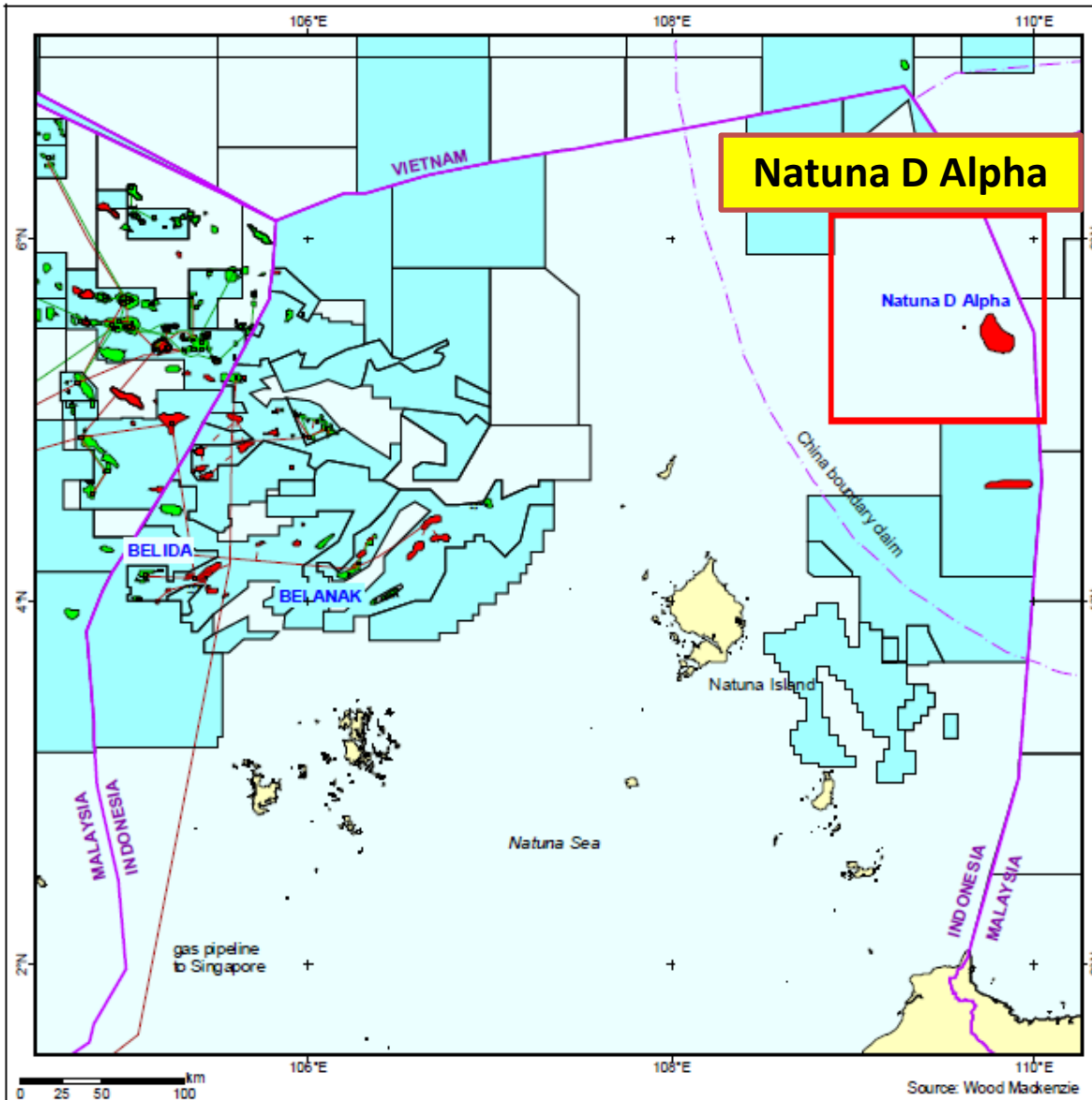


CO₂ Contents of Some Gas Fields in Indonesia

No	Field	Contractor	Gas Reserves (TSCF)	CO ₂ Content
1	Subang	PT Pertamina EP	0.76	± 20%
2	Cilamaya	PT Pertamina EP	0.14	± 30%
3	Jatibarang	PT Pertamina EP	0.09	± 23% (<i>for EOR</i>)
4	Merbau	PT Pertamina EP	0.18	± 7%
5	Gundih	PT Pertamina EP	0.32	± 21%
6	Jambaran Tiung Biru	Mobil Cepu Ltd	0.03	± 35%
7	East Natuna	PT Pertamina EP	46	± 72%
8	Tangguh	BP (Berau) Ltd.	6.93	± 12%



Natuna D Alpha Field



Natuna D Alpha

Gas Reserves	: 46 TSCF
CO₂ Content	: 72%
Discovery Year	: 1973
Water Depth	: 143 m



Simulation of Monetization of Natuna D Alpha Field

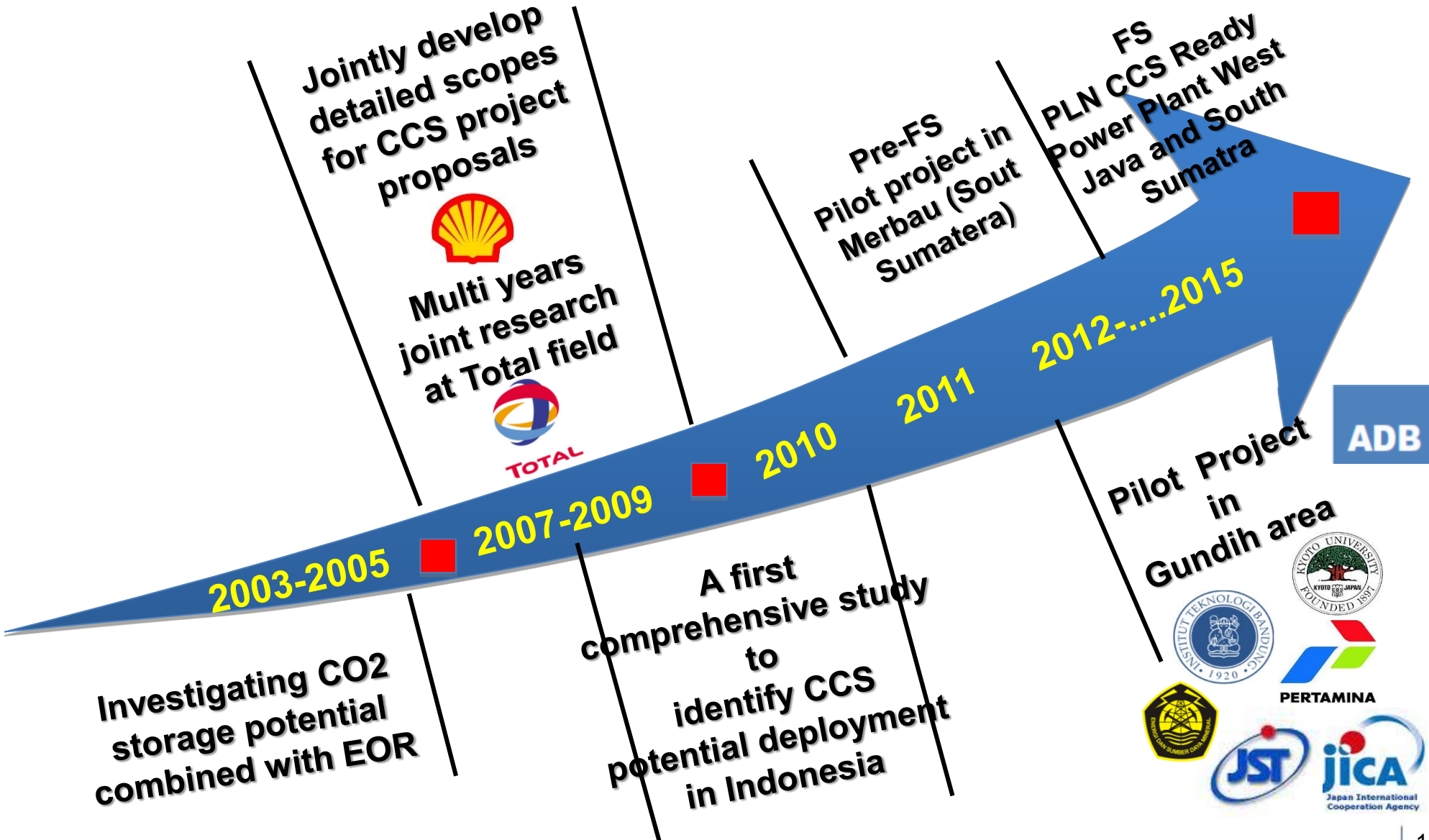
Assumed conditions with CCUS :

1. Calorie Heating Value : 1100 BTU/CF (based on data for a nearby field)
2. Gas Price : 7 – 13 USD/MMBTU

Case	Gas in Place (TSCF)	Recov Reserve (TSCF)	Monetization (billion USD)	
			Gas Price: 7 USD/MMBTU	Gas Price: 13 USD/MMBTU
Low Case	138	29	233.3	414.7
Medium Case	222	46	354.2	657.8
High Case	272	57	438.9	815.1

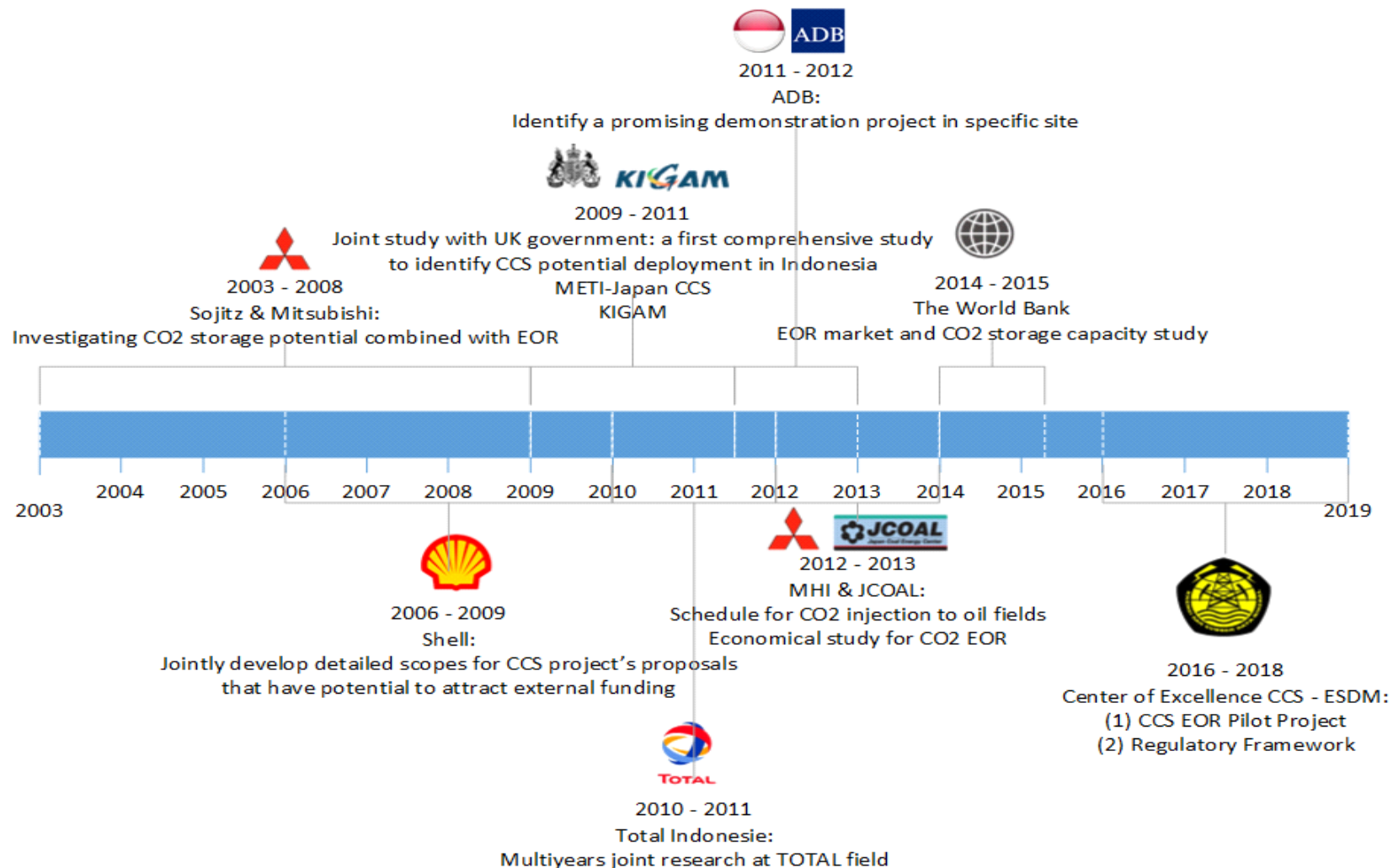
CURRENT STATUS

(After Nagaoka, Haokaido (2004) in Asia-pacific)





Chronology of LEMIGAS's CCS/CCUS activity since 2003





Status of CCS & CCUS in Indonesia

Field	Stakeholders	Results
Tiung Biru Field, Mid Java	ASCOPE, Petrad, CCOP, DNV-Statoil	The field was not applicable
Jatibarang Field, West Jawa (2011 – 2013)	Pertamina, Marubeni/AOC, UPN	CO ₂ EOR Feasibility Study
Merbau Field, South Sumatera (2011 – 2012)	Pertamina EP, ADB, MIGAS LEMIGAS	CCS/CO ₂ EOR Joint Feasibility Study
Gundih Field, Jawa Tengah (2012 – 2015)	Pertamina, Bandung Institute of Technology, Kyoto University, ADB, MIGAS	<ul style="list-style-type: none">• Joint FS for Carbon Sequestration & Monitoring• Current Status: Preparation for pilot project



CCS/CCUS COE

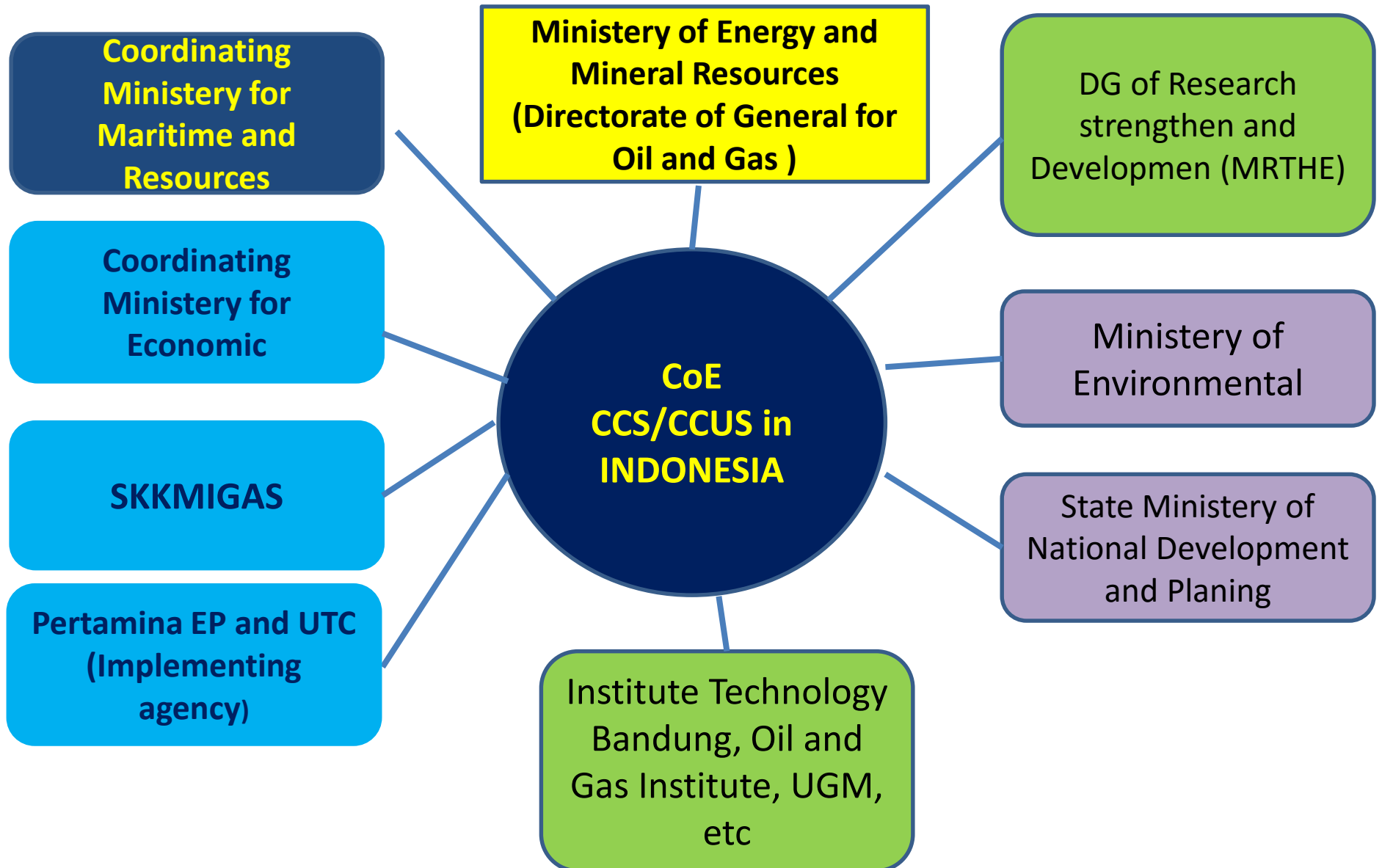


Centre of Excellence

- ✓ Institutional Set Up
- ✓ Cross Cutting Research
- ✓ Institutional & Regional Collaboration

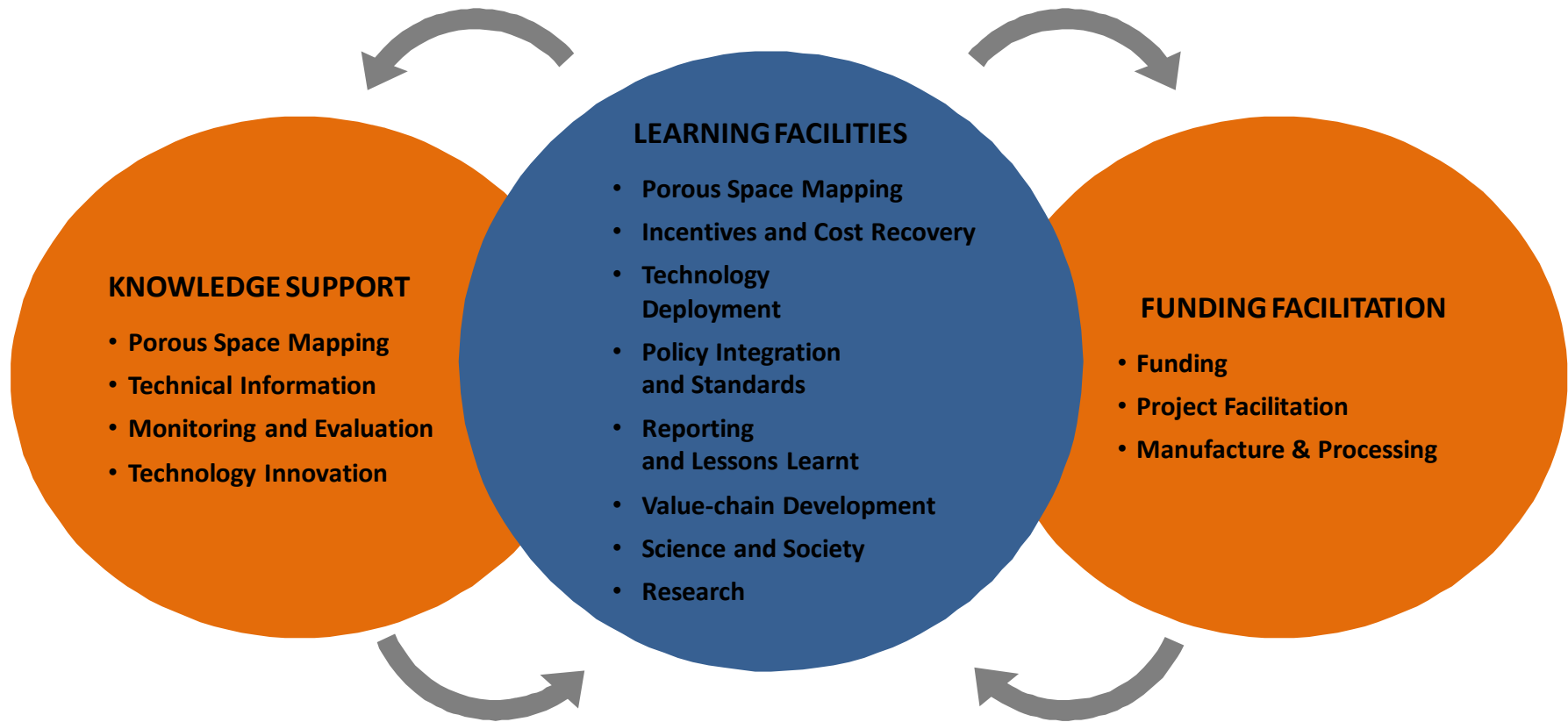


CENTRE OF EXCELENCE FOR CCS/CCUS, INDONESIA

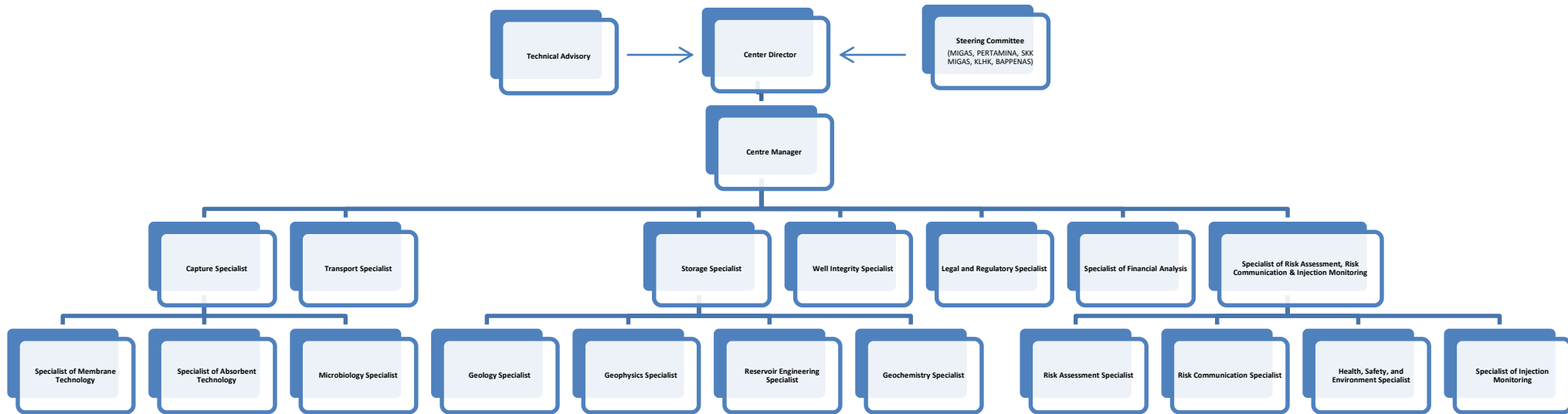




ROLE OF INDONESIA CCS/CCUS CoE



Organization Structure





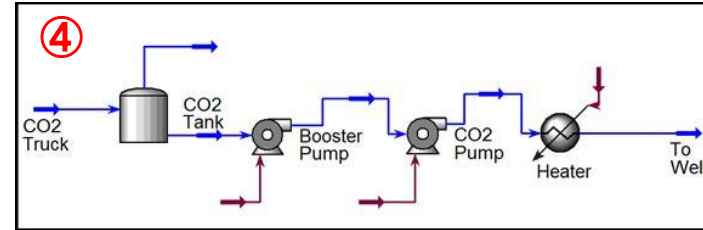
CCS/CCUS COE PROGRAM

1. Pilot Plant CCS Gundih (ADB, JICA SATREP)

300,000 t-CO₂/year



① → ②



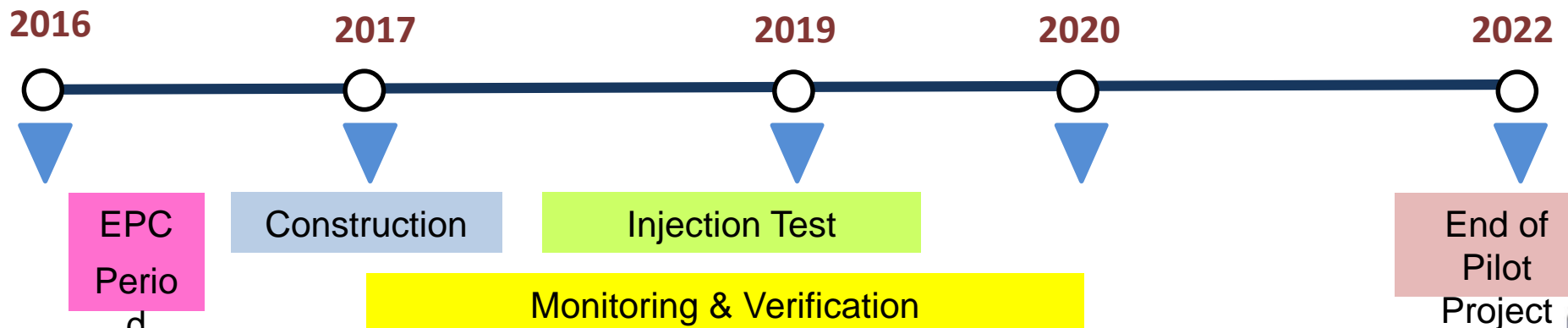
CO₂

Project activity

- ① Purification
- ② Liquefaction
- ③ Transportation
- ④ Injection
- ⑤ Storage



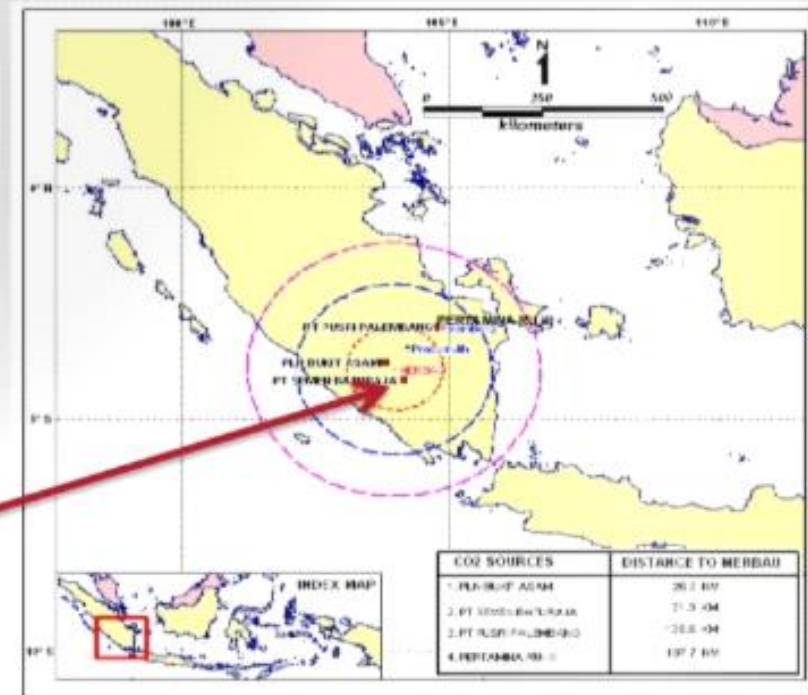
Schedule





CCS/CCUS COE PROGRAM

2. Planned CCUS pilot project in Merbau Field, South Sumatra



Extra facilities need to be built for:

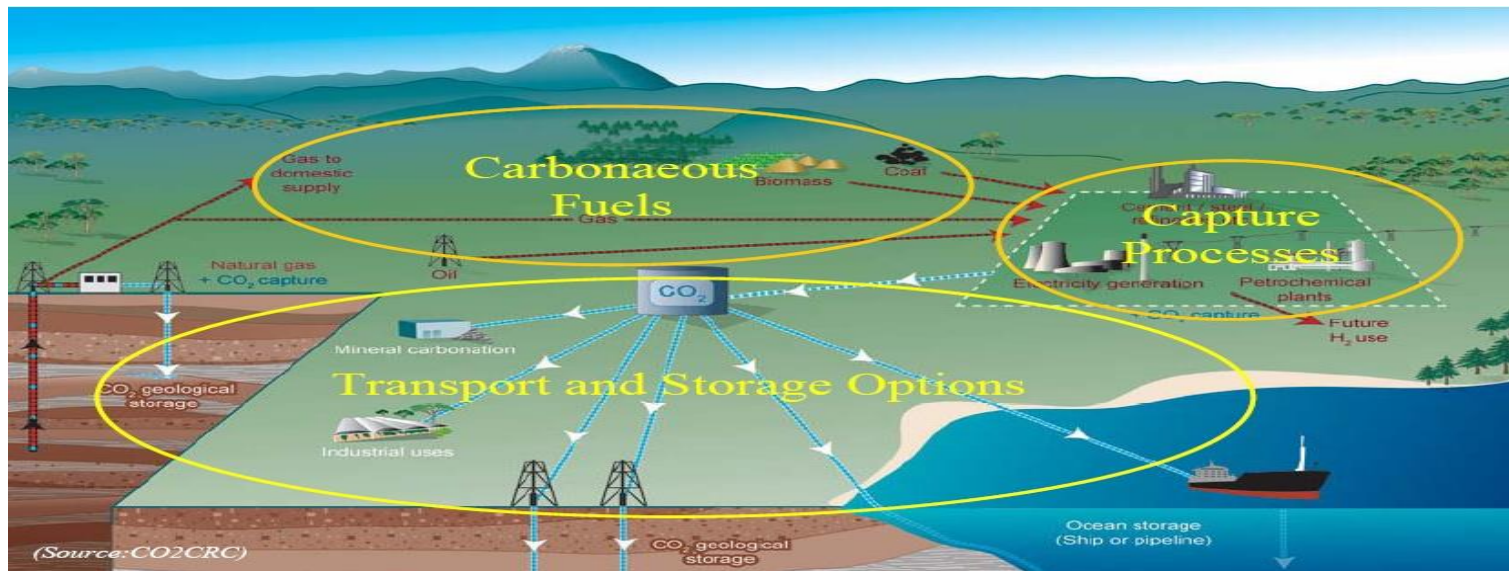
- drying: glycol contactor
- compressing: compressor
- power generation: gas turbines
- transport: pipeline or truck



CCS/CCUS COE PROGRAM

3. SUPPORTING GOI TO DEVELOP CCS/CCUS Regulation

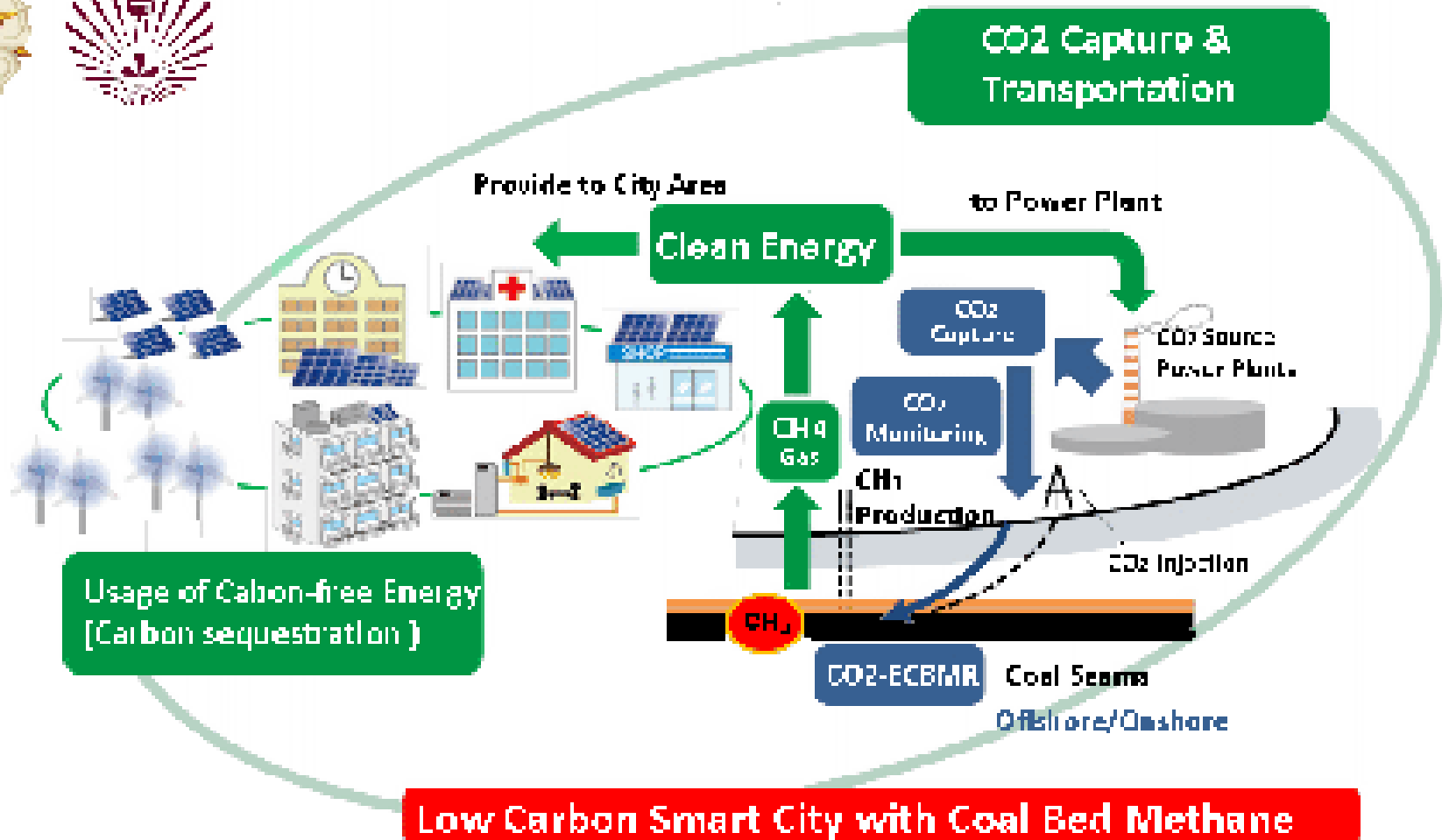
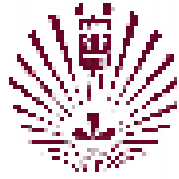
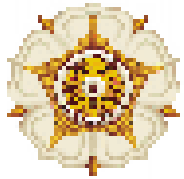
Each activity should be covered by law to enable sustainable CCS & CCUS.



1. Environmental Impact Assessment: risk identification, mitigation, emergency response
2. CO₂ Transportation and storage requirement
3. CO₂ Monitoring
4. Liability
5. CO₂ EOR Implementation



4. Low Carbon Smart City With Coal Bed Methane





UGM Project Location

FA2016

UNIVERSITAS GADJAH MADA

PT. Bukit Asam

Palembang

PTBA

90 minutes by flight

Jogja

Locally Rooted, Globally Respected

Palembang

140 km

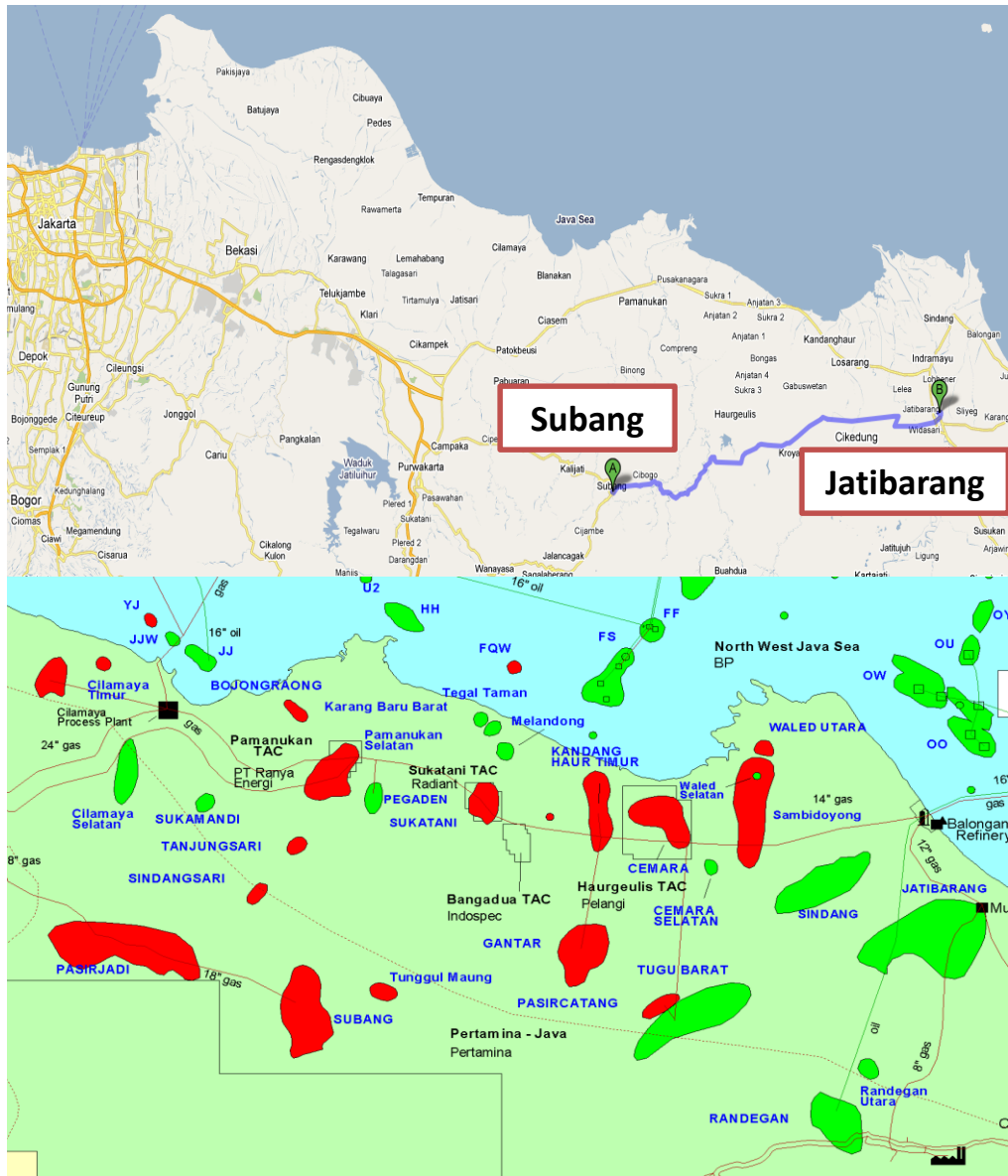
Tanjung Enim (PTBA)

5-6 hours driving

www.ugm.ac.id



5. CO₂ SEPARATION TECHNOLOGY and EOR Pilot Project



- **Jatibarang Field, West Java**
- CO₂ sources:
 - ✓ Subang & Cilamaya CO₂ Removal Plant, and
 - ✓ Balongan Refinery Unit

JATIBARANG FIELD

- Located in NW Java basin
- Approx. 170 km East of Jakarta
- Discovered in 1970
- Commenced production 1975
- Average reservoir depth 1140 m SS
- Volcanic, naturally fractured reservoir
- 17 reservoirs / layers defined
- Approx. 207 wells (27 active)
- Oil Remaining Reserve 49.3 MMSTB (from 58.7 MMSTB OOIP)



CHALLENGES/OPPORTUNITY

1. Limited funding, need project sponsors
2. Access to cross cutting technology related to CCS/CCUS
3. Qualified researchers need exposure to International forum
4. Regional and International Collaboration



Thank You

www.migas.esdm.go.id