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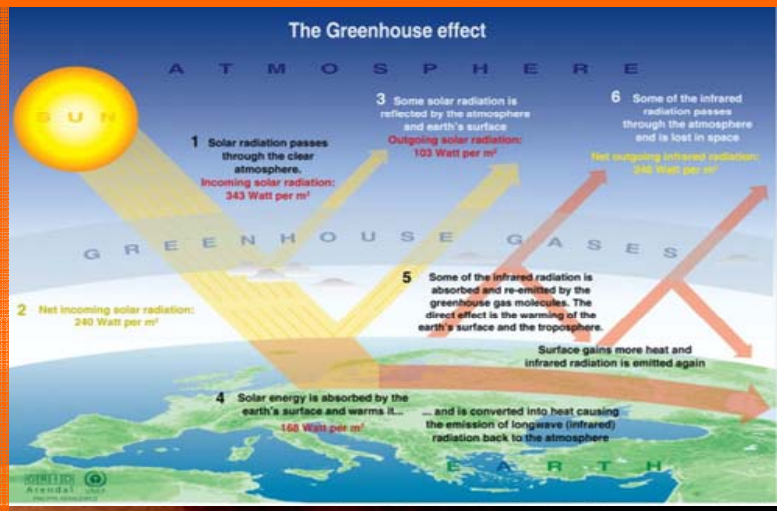
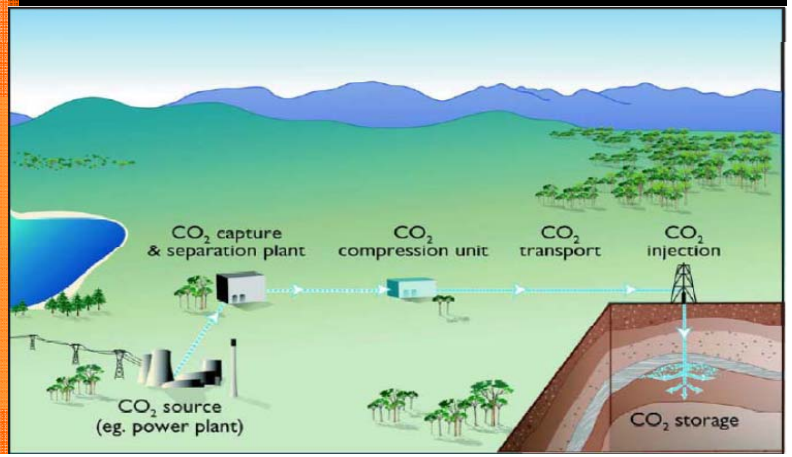
MINISTRY OF ENERGY

EPPM: Country Report Thailand





EPPM: Workshop on Regulatory Framework for Carbon Capture & Storage (CCS)

29 June – 1 July 2010

Phuket, Thailand

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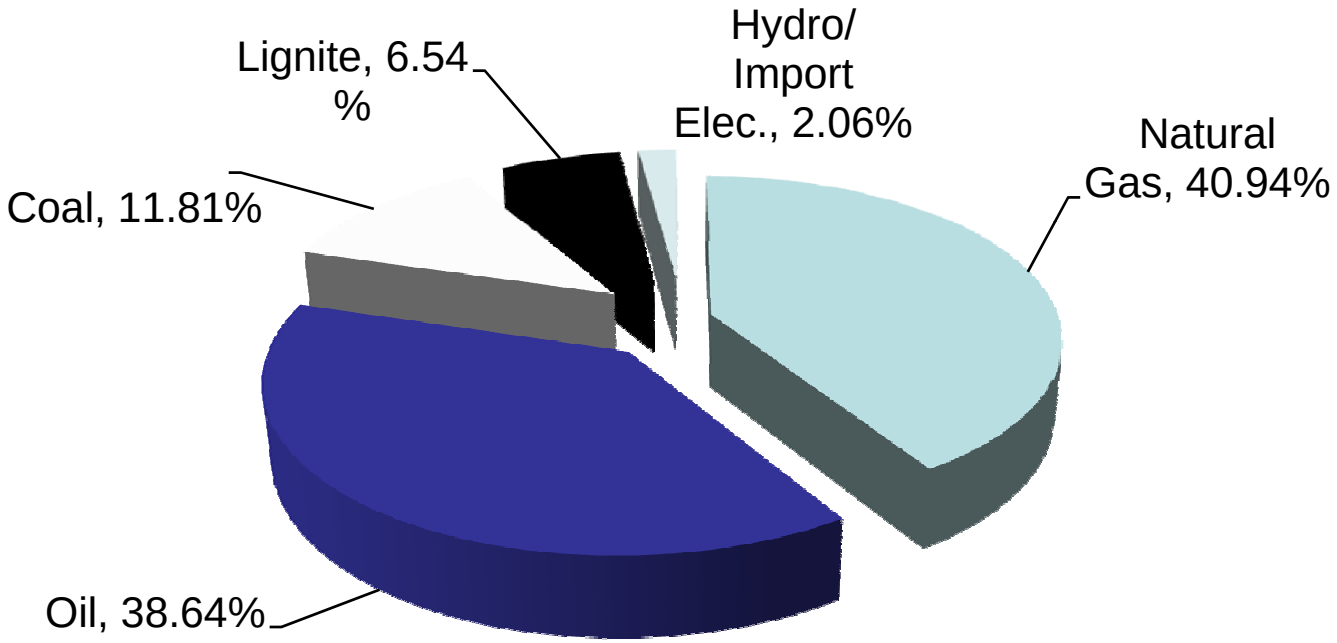
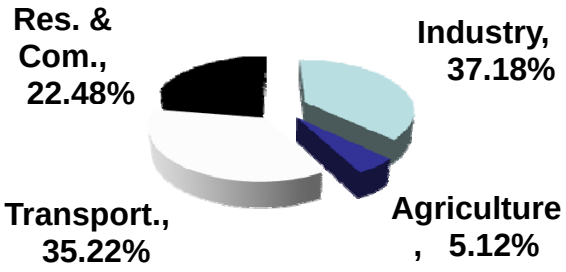
Thailand's Energy Consumption in 2009

- **Total Energy Consumption in 2009 = 1.656 MMBOED**
- **Monetary Value of 1.547 Trillion Baht**

By Fuels



By Sector



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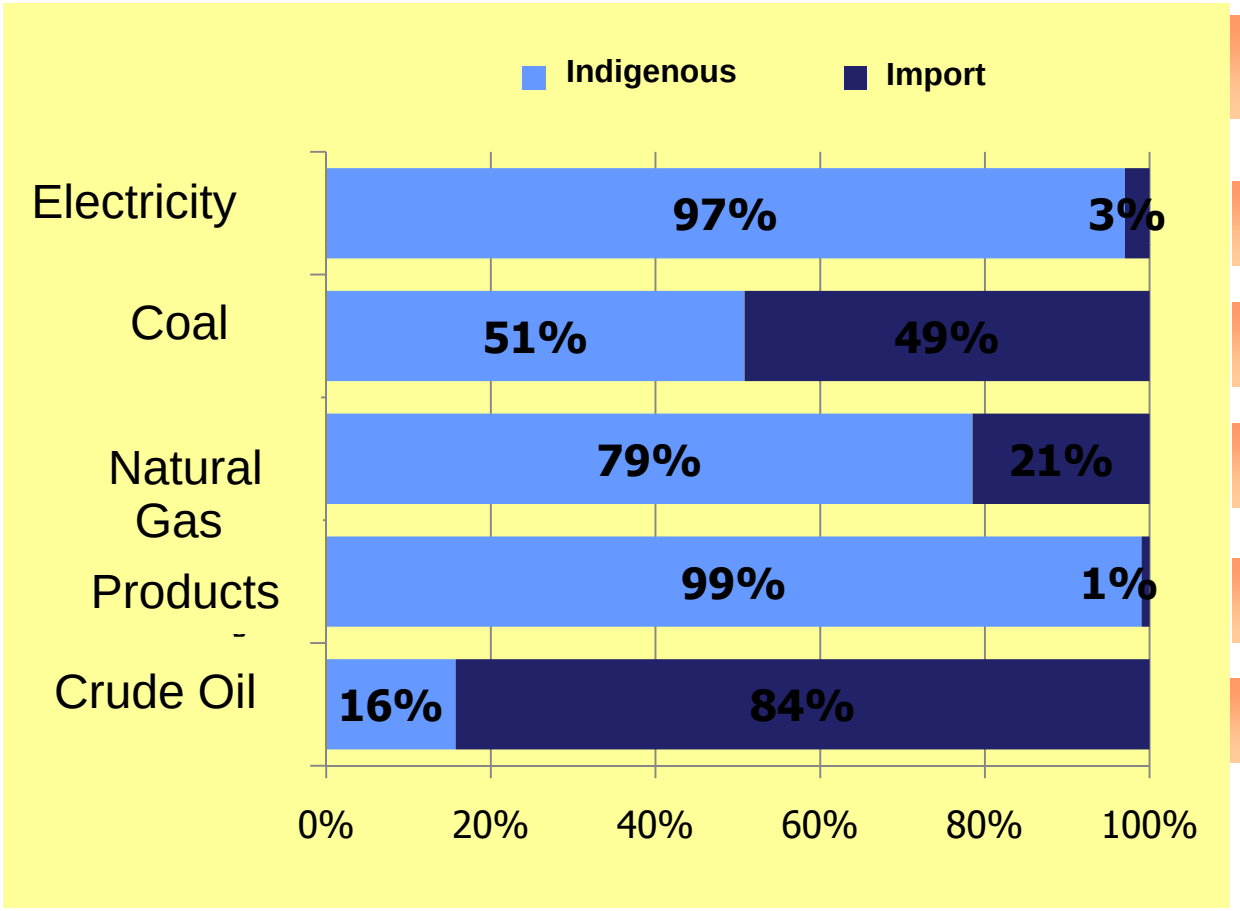
Indigenous/Import @ Dec. 2009



(Import Value) (Billion Baht)
3
37
87
15
764

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Thailand's Energy Policy

Energy Security

- Promoting the domestic oil-and-natural-gas exploration and production
- National Power Sufficiency
- Diversify National Energy Portfolio

Price

- Building market pricing mechanism
- Founding independent regulatory organization
- Encouraging investments
- QA and safety

Renewable Energy Promotion

- Promoting Biofuel → Ethanol Biodiesel
- NGV
- Power Generation with RE→ Solar Wind Biomass,…

Energy Consumption Efficiency

- Clear and Strict objective
- implementation of measures (Bulbs, Standby Power, ….)

Environment

- Lowering CO_2 emission
- Promoting CDM
- Controlling vapour (VRU)
- Lowering Flare Gas emission

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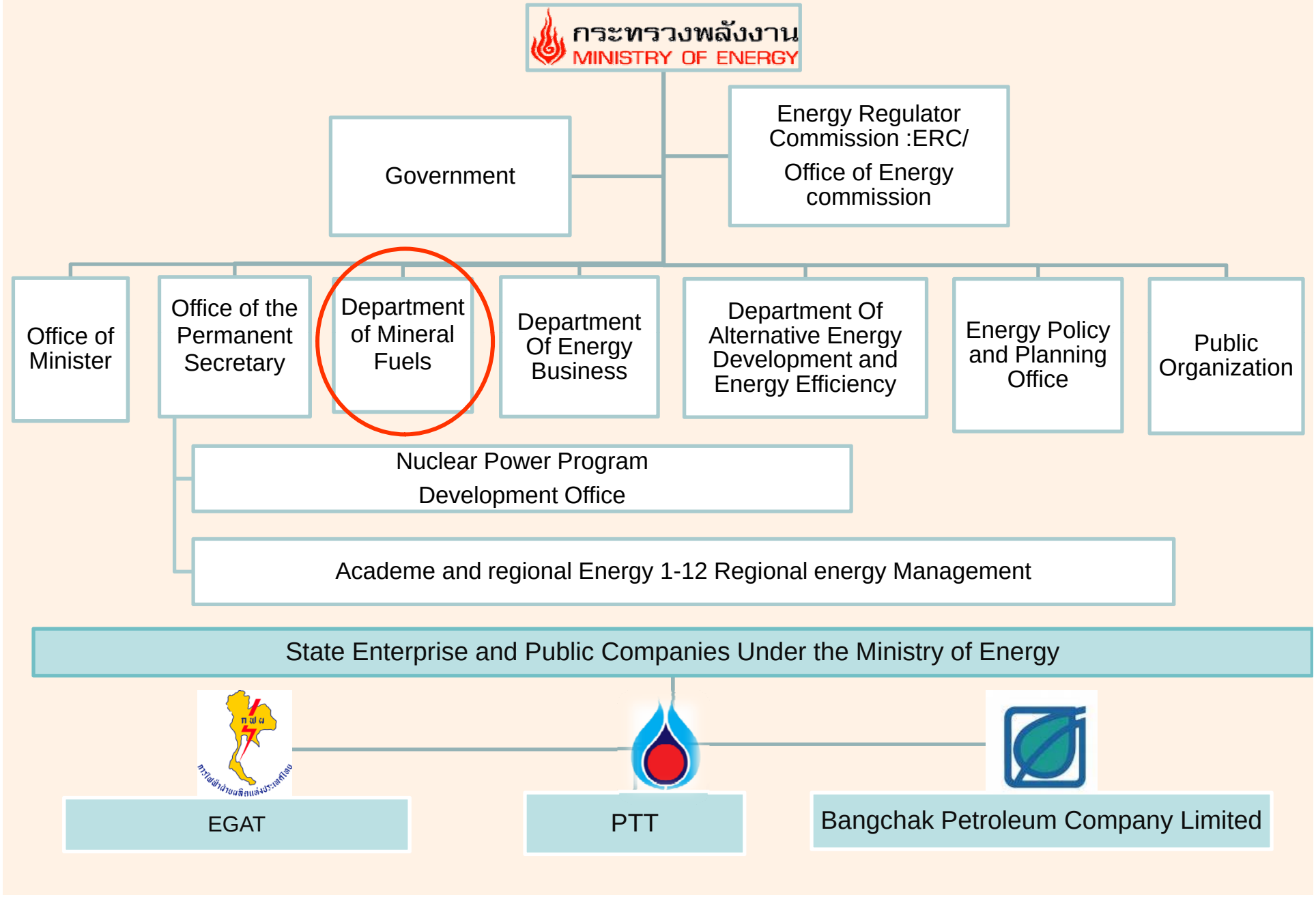
Organisation Structure



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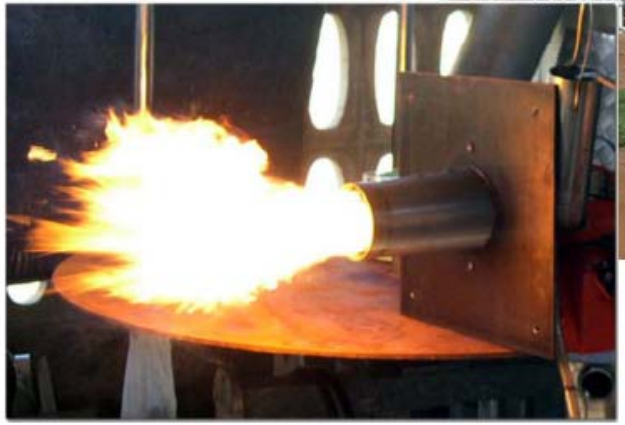
Department of Mineral Fuels (DMF)

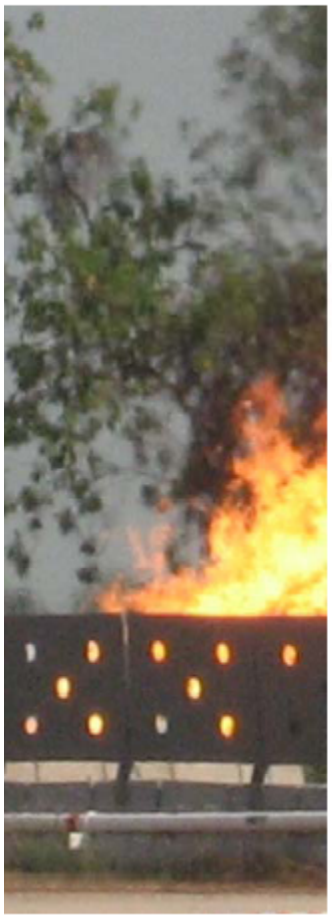
DMF is the National Hydrocarbon Executive Agent

- Planning, promoting and monitoring in policy and management of upstream petroleum business in Thailand including Joint Developing Area and Overlapping Areas
- Cooperating with other countries to encourage Thailand's E&P business



Flared Gas Utilization Projects in Thailand

Flared/Vented Gas from Production Process



Main sources of flared/vented gas

- Low pressure gas that can not send to the process **Hence need to be flared for safety**
- Associated Gas from oil production which has small volume and in the remote area has no near by infrastructures. **Hence need to be flared for safety**
- High CO_2 content gas so cannot be used and there are limitations in both technique and cost to handle the high CO_2 gas. CCS (Carbon Capture & Storage) is still not technology proven and high cost. **Hence, the gas is vented since the gas cannot be ignited**

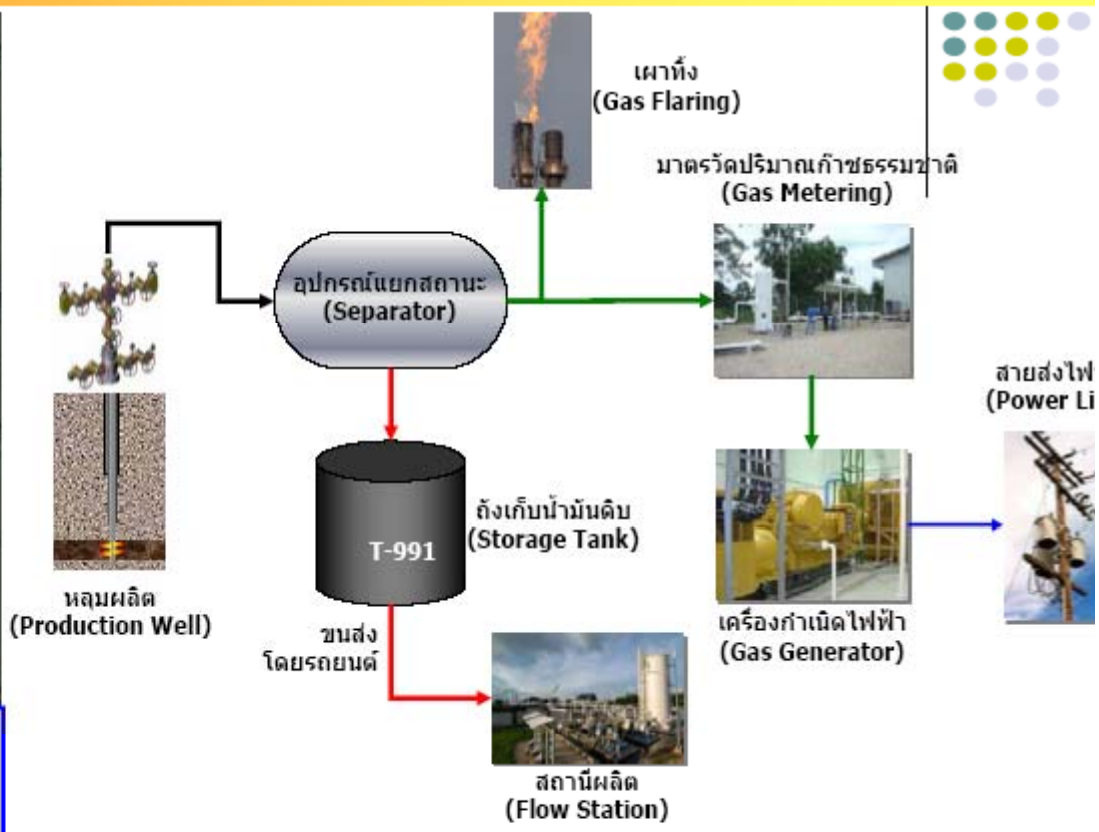
Flaring gas is safe and less GHG emission than venting gas since CH_4 has higher Global Warming Potential (GWP) 21 times than CO_2

Flared Gas to Small Power Generation Project

Tu Tao Oil Field, Sukothai Province,
hailand

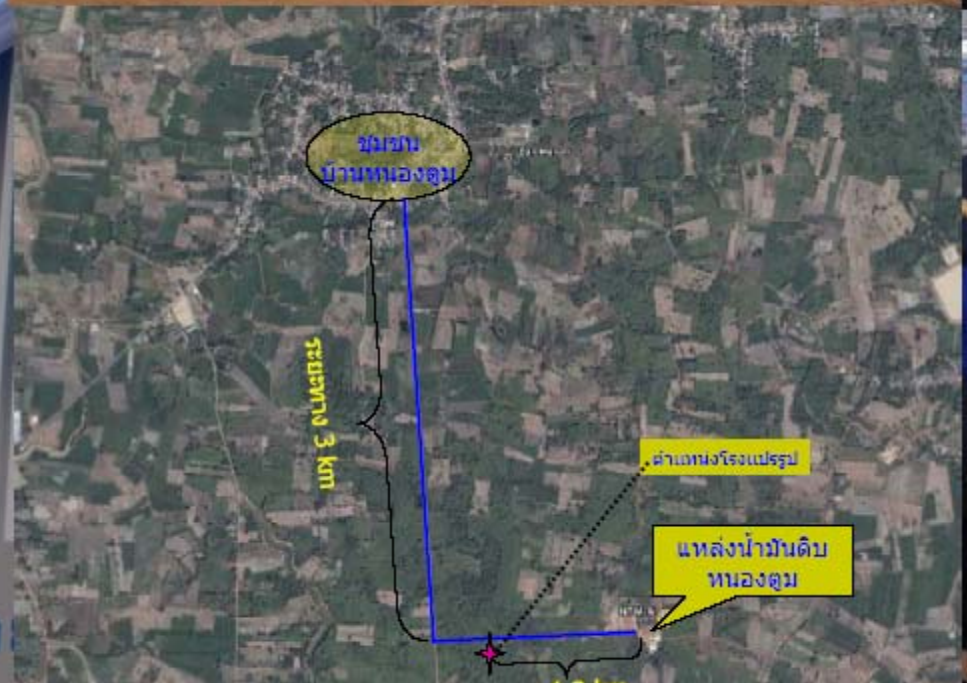
l production	600	bbl/day
as Production	1	MMSCFD
- Flared	0.6	MMSCFD
- To power plant	0.4	MMSCFD

Dec. 2008



- **Start feasibility study 2005 by Ratchburi Power & PTTEP**
- **Signed Gas Sale Contract in 2006 (26 bath/MMBT**
- **2006 – 2007 Laid 1 km pipeline & constructed 2 MW power plant**
- **Opening ceremony 13 July 2007**
- **Produce electricity 1.7 – 2 MW/hr from associate gas 0.4 MMSCFD**

Flared Gas to Substitute LPG for Producing Agriculture Products



Flared Gas to Substitute LPG for Producing Agriculture Products

Nongtum Oil Field, Sukothai Province produce crude oil 800 – 900 bbl/day & associated gas 1.8 – 2 MMSCFD, which has been flared

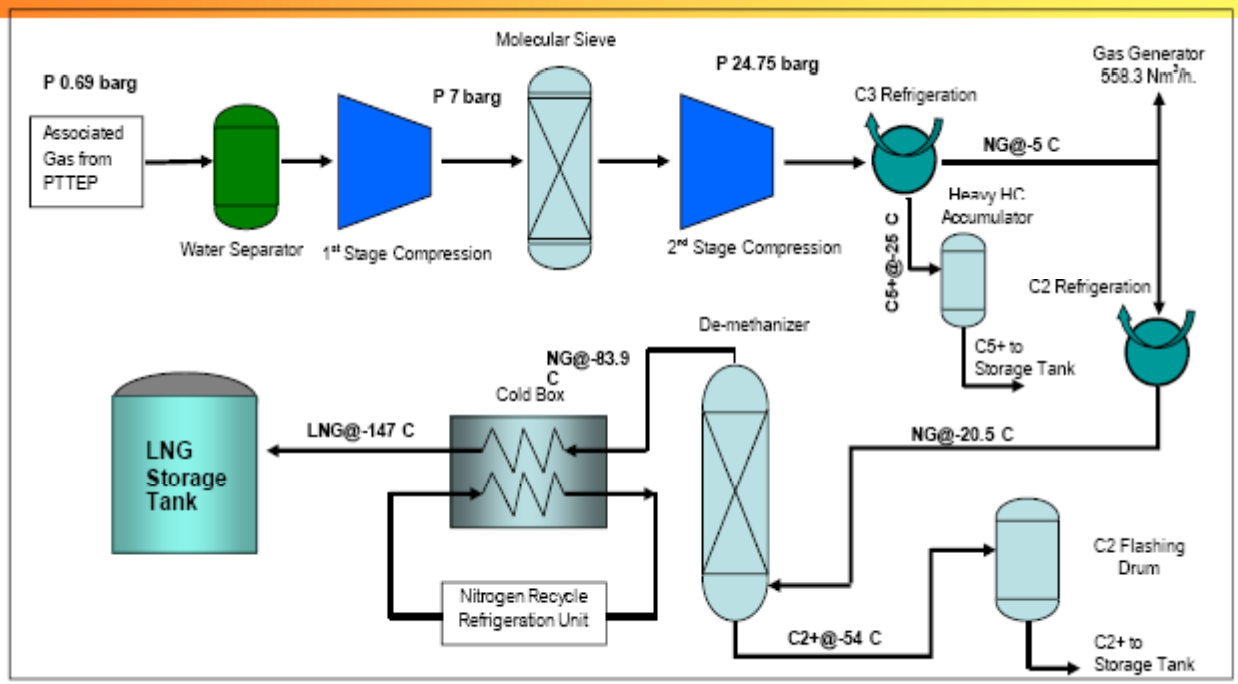
PTTEP invest 50 Million baht to lay 1 km pipeline and build the Agriculture Producing Products Center. (Construction during Dec. 2007 – Aug. 2008)

Open the Agriculture Producing Products Center in September 2008

The Agriculture Producing Products Center

- Consume 70,000 – 100,000 SCFD
- Substitute the use of LPG for 1,600 Tones/yr
- Reduce the cost of fuel (substituting LPG) by half from 30 Million baht/ to 15 Million baht/yr
- Reduce GHG emission = 3,300 Tones CO_{2eq}/yr

Flared Gas to Produce LNG Project



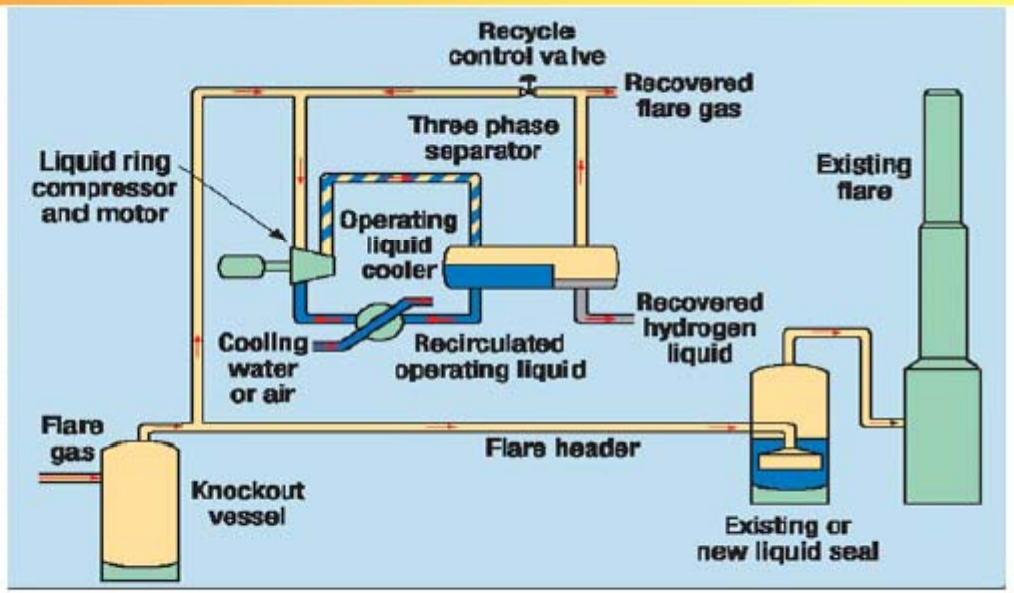
LNG Process

2 MMSCFD associated gas from Nong Tum oil fied to produce LNG & other products

- LNG; $CH_4 \approx 90\%$ to be liquid phase at – 160 °C
- C_{2+} consists of C_2, C_3, C_4 to be liquid phase at – 10 °C
- C_{5+} consists of C_5, C_6, & others to be liquid phase at room temperature

The products can be use as fuels and the LNG project will help reduce GHG emission = 71,000 Tones CO_{2eq}/yr

Flared Gas Recovery Project



- **Bongkot Gas Field in Gulf of Thailand (2008)**
  - **Produce gas 600 MMSCFD**
  - **Condensate 20,000 bbl/day**
- **Install Vapor Recovery Unit (VRU) to increase pressure for low pressure gas that used to be flared back to the gas process ≈ 3 MMSCFD**
- **Reduce GHG Emission 94,000 Tones CO_{2eq}/yr**

DMF Strategic Plan for Flared Gas Utilization Projects

- **The primary target for flare gas utilization is for energy efficiency and conservation, in addition with reducing environment impact from gas flaring.**
- **Hence, none of the projects applied for Clean Development Mechanism (CDM)**
- **DMF will support & encourage concessionaires to develop more flare gas utilization projects and apply for CDM project in order to claim the reduction of GHG emission as carbon credits.**

Clean Development Mechanism (CDM) Status and Trend in Thailand

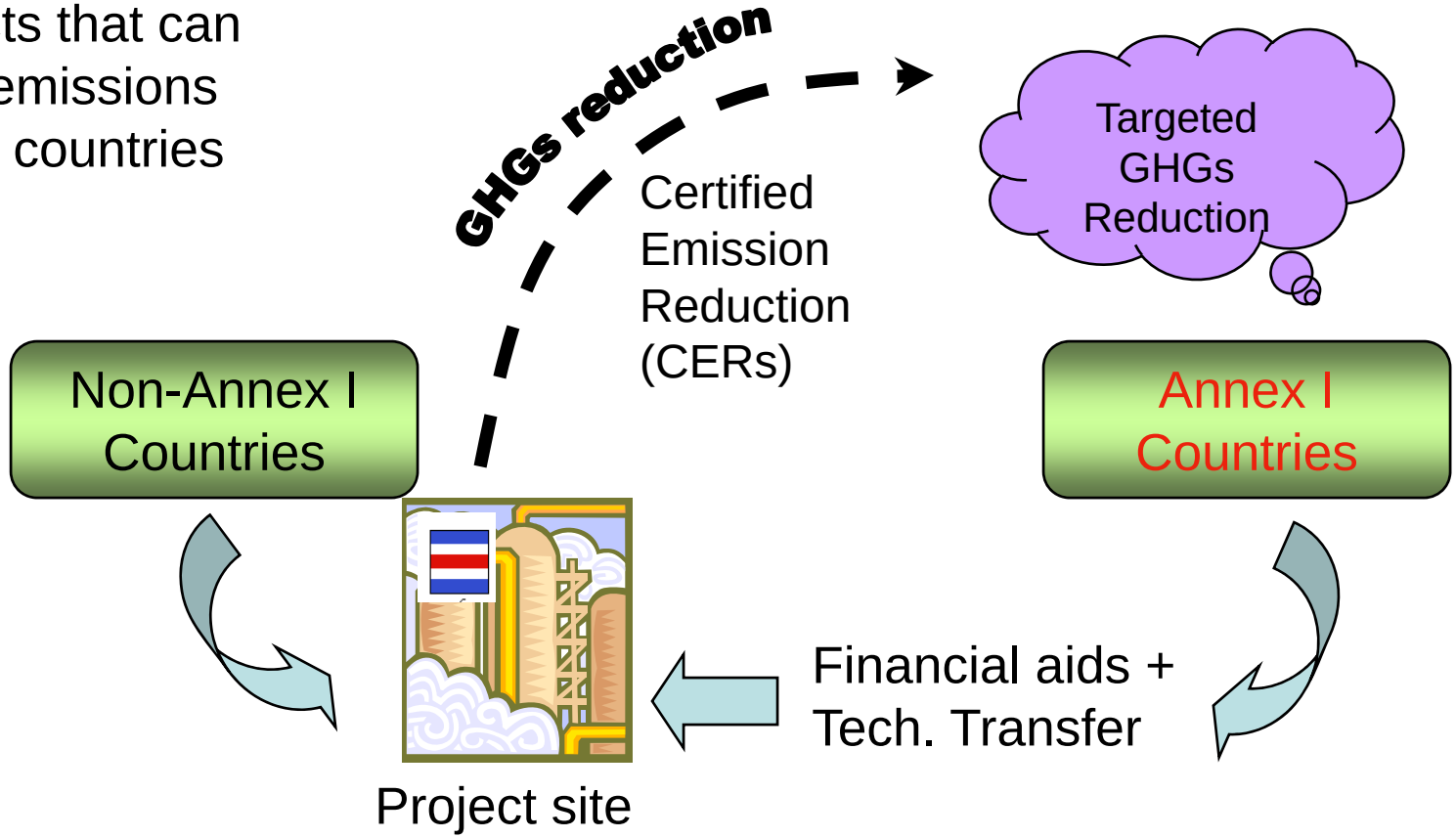
องค์การบริหารก๊าซเรือนกระจก(องค์การมหาชน)

Thailand Greenhouse Gas Management Organization (Public Organization)

CDM Project

Annex I countries may invest in projects that can reduce GHGs emissions in Non-Annex I countries

The resulting ***certified emission reductions (CERs)*** can be used to achieve the target under Kyoto protocol for Annex I contries



CDM Concept

Voluntary Basis

- ✓ **Voluntary participation by Parties involved**

Additionality

- ✓ **NOT Business as Usual (BAU) in terms of Finance and investment, Technology, Environment, common practice**
- ✓ **Emission reductions are additional to any that would occur in the absence of the CDM project**

CDM Concept (Cont'd)

Sustainable Development

✓ **Contribute to sustainable development in host country**

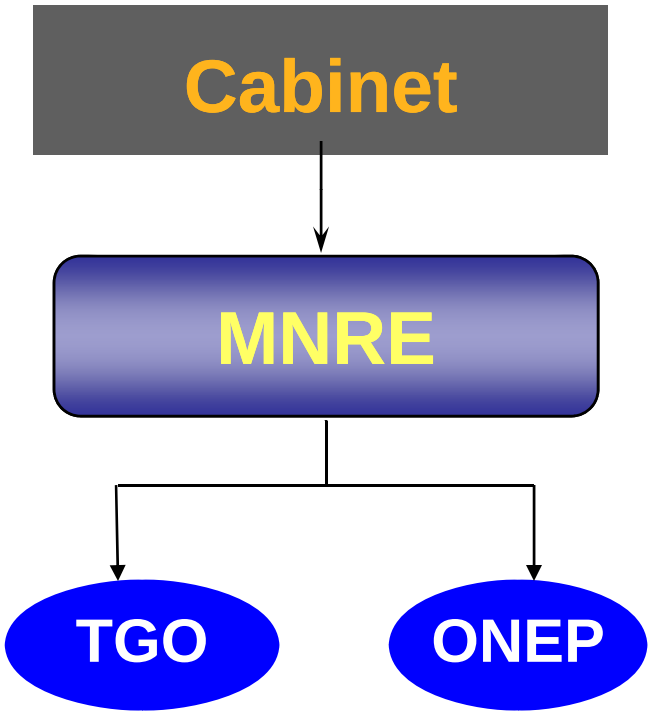
Transparency & Accountable

✓ **Real, measurable & long-term benefits related to the mitigation of climate change**

Certify

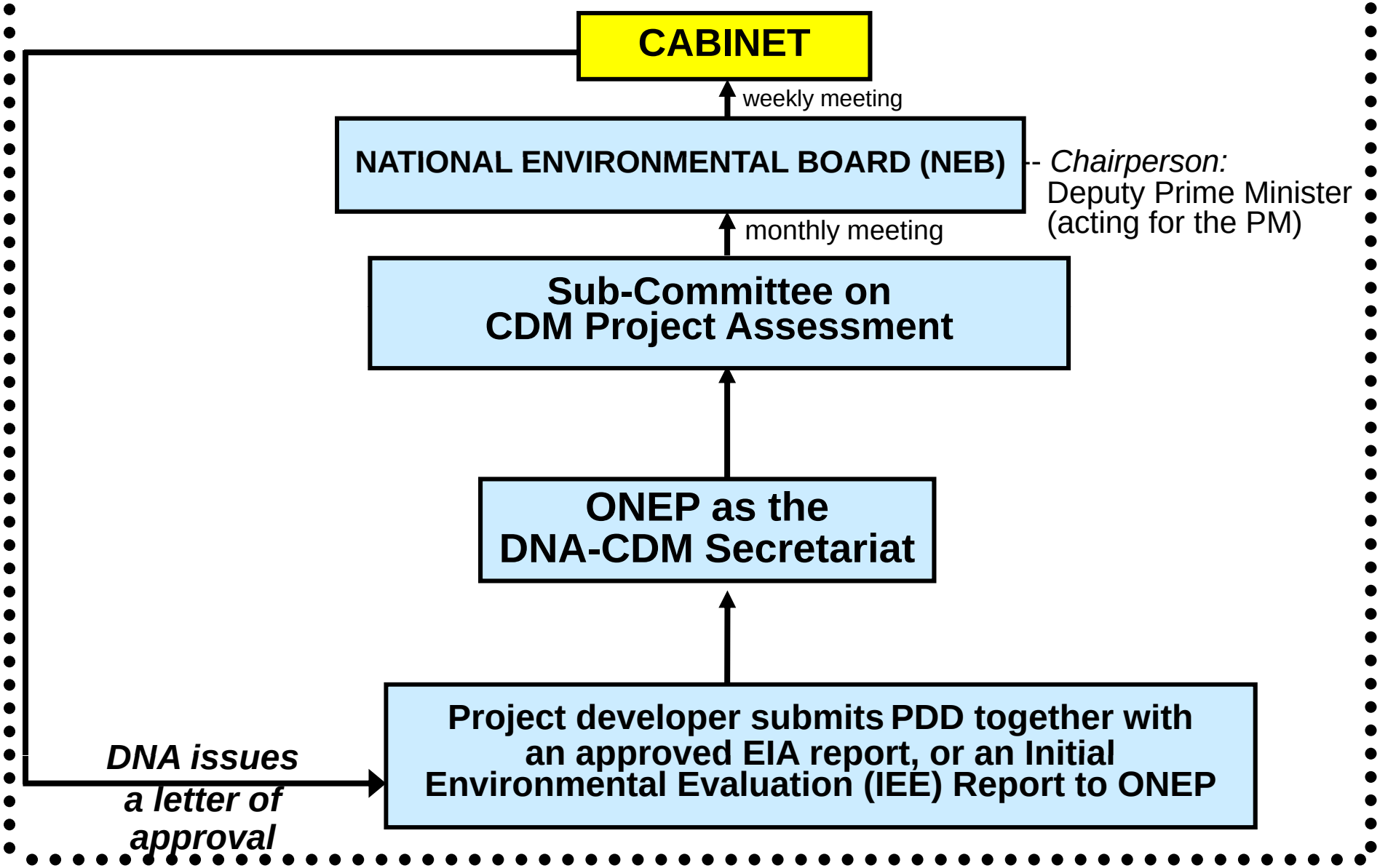
✓ **Certified by UNFCCC CDM-Executive Board at Bonn, Germany**

Institutional Framework

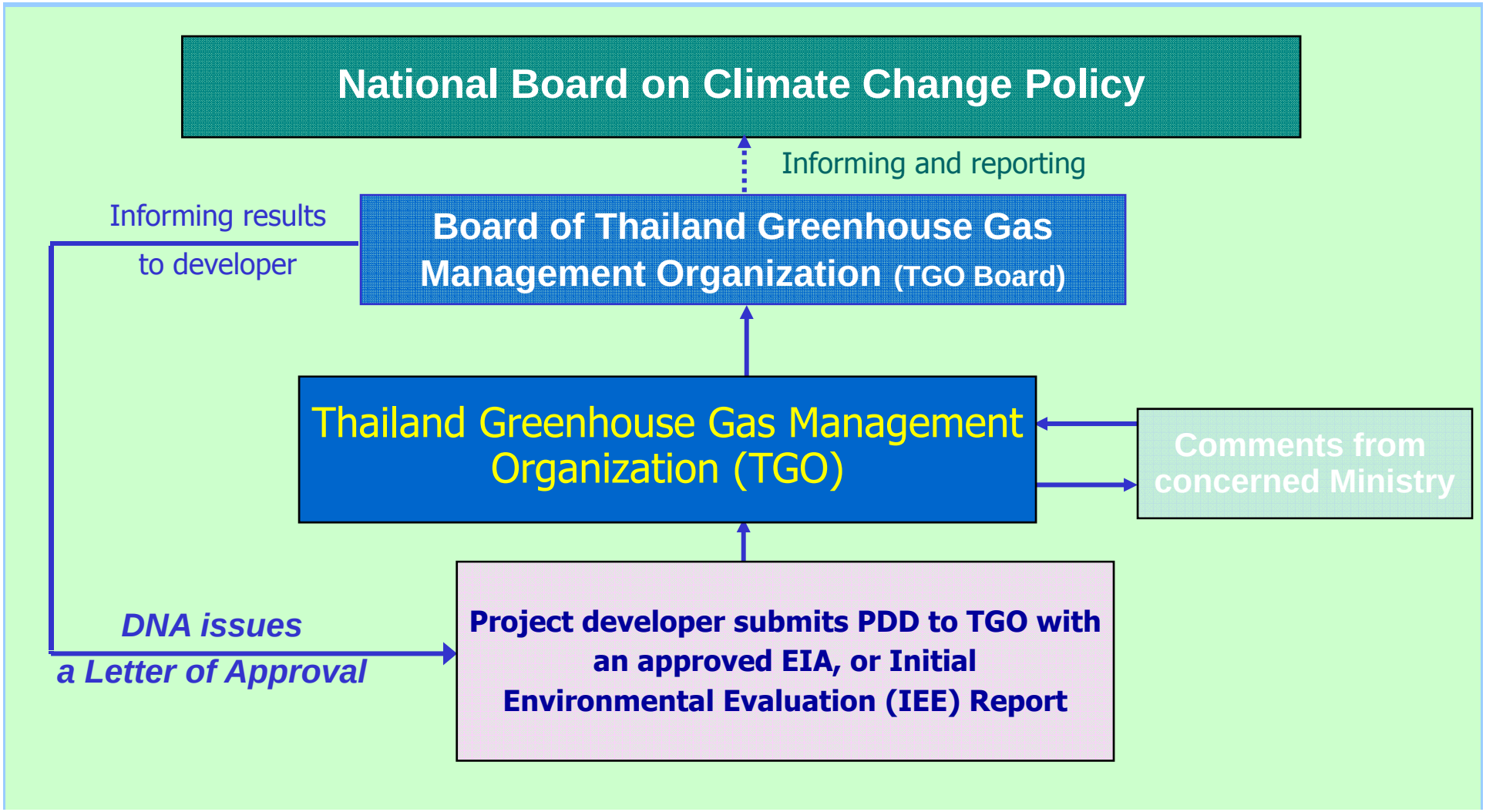


- Ministry of Natural Resources & Environment (MNRE) as **DNA-CDM THAILAND** in July 2003
- **TGO** is **the DNA-CDM Office since July 7, 2007**
- Office of Natural Resources & Environmental Policy & Planning (ONEP) under **MNRE** as **National focal point of UNFCCC , the secretariat of National Committee on CC**

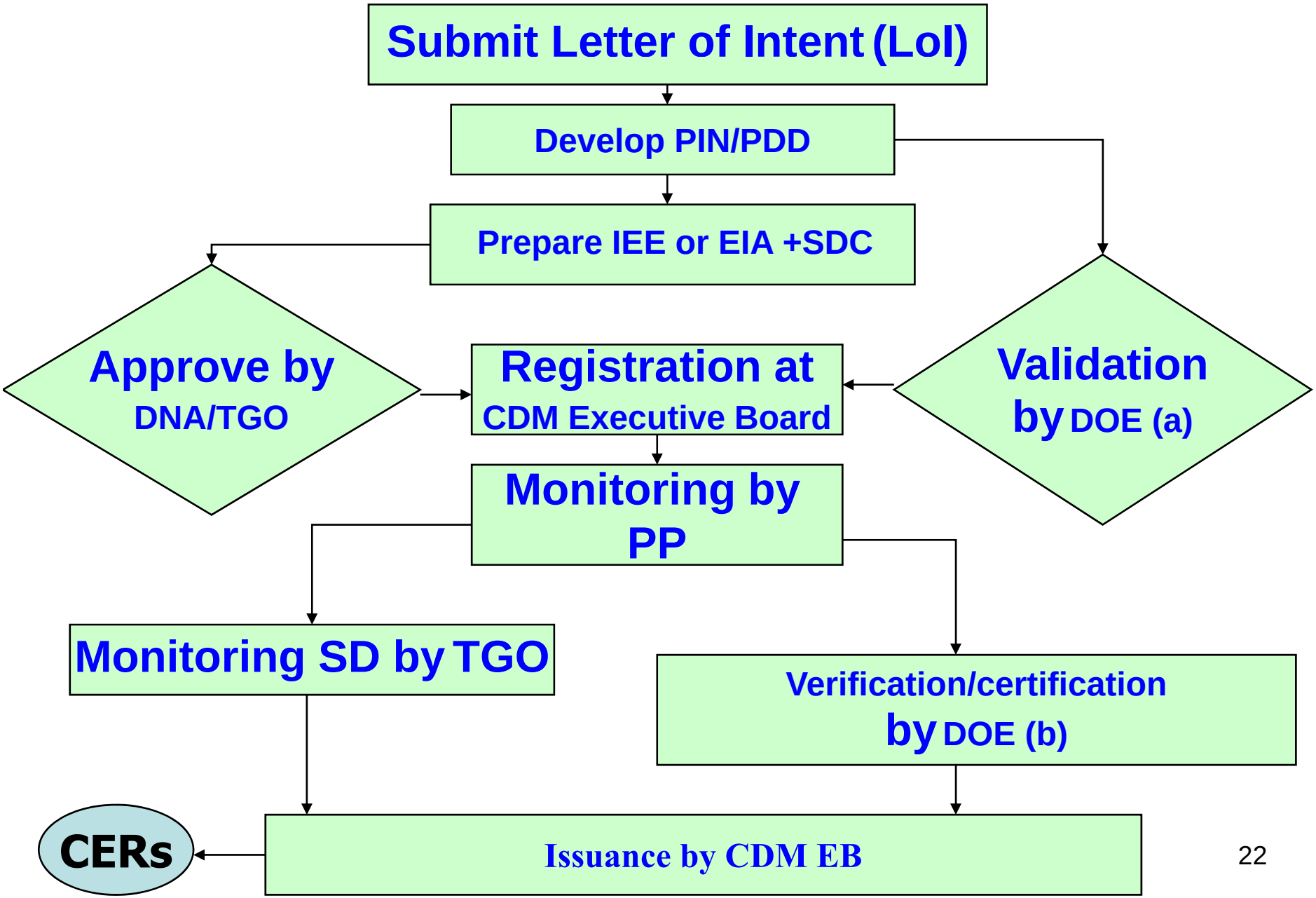
Previous CDM Approval procedure – with the Cabinet approval



Current CDM approval procedure in Thailand – with the Thailand Greenhouse Gas Management Organization (Public Organization)



CDM Approval Process in Thailand



More information in CDM Project

Thailand Greenhouse Gas Management Organization (Public Organization)

- 9th floor, Auditorium B, Government Office Complex
- 120 Moo 3, Changwattana Road,
- Laksi, Bangkok 10210 THAILAND
- Tel. +662 141 9790
- Fax +662 143 8400
- E-mail: info@tgo.or.th
- URL: www.tgo.or.th

CDM project from Flare/Vent Gas

Offshore, Gulf of Thailand

- Install Vapor Recovery Unit (VRU) to recover flared gas back into gas processing
- Install compressor/pump to recover vented gas from Well Unloading Unit at wellhead platform back to the production process

Onshore, Oil Field

- Flared gas to small power plant (1 MW)

Benchamas Oil Field

Location : B8/32, Gulf of Thailand

Production (2008):

Crude Oil	16.60	MMbbls
Natural Gas	55,132	MMSCF

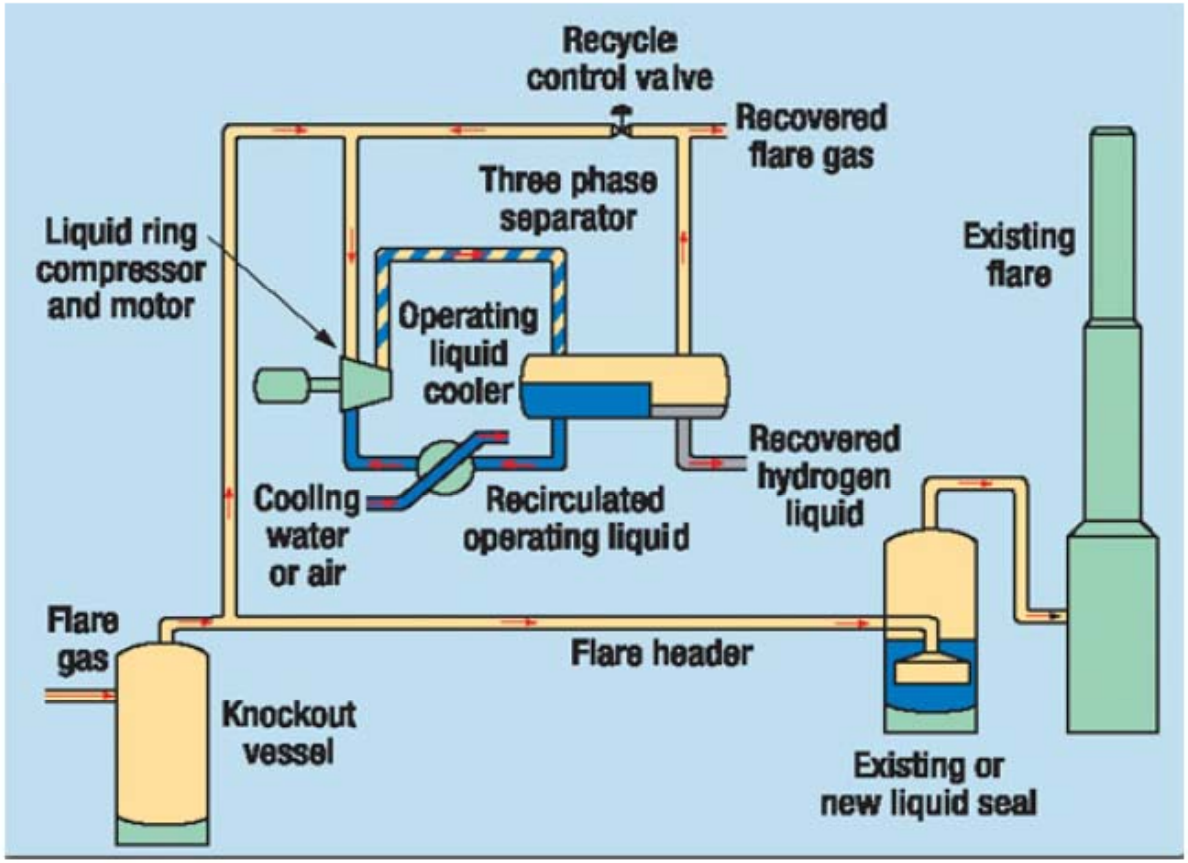
Concessionaire: Chevron & groups

Project: 1. Vapor Recovery Unit (VRU) to recover flared gas back into gas processing

2. Install compressor/pump to recover vented gas from Well Unloading Unit at wellhead platform back to the production process

Vapor Recovery Unit (VRU) Project

Vapor Recovery Unit (VRU) to increase pressure for low pressure gas that has been flared back to the gas process. Hence the VRU can reduce GHG emission ≈ 49,000 tCO_2eq/yr



Recover Vented Gas from Well Unloading Unit Project

To recover natural gas which is vented from well unloading unit at wellhead platform by using compressor or Pump to increase the gas pressure back to the production process.

Hence the unit can reduce GHG emission ≈ 160,000 TCO_2eq/yr

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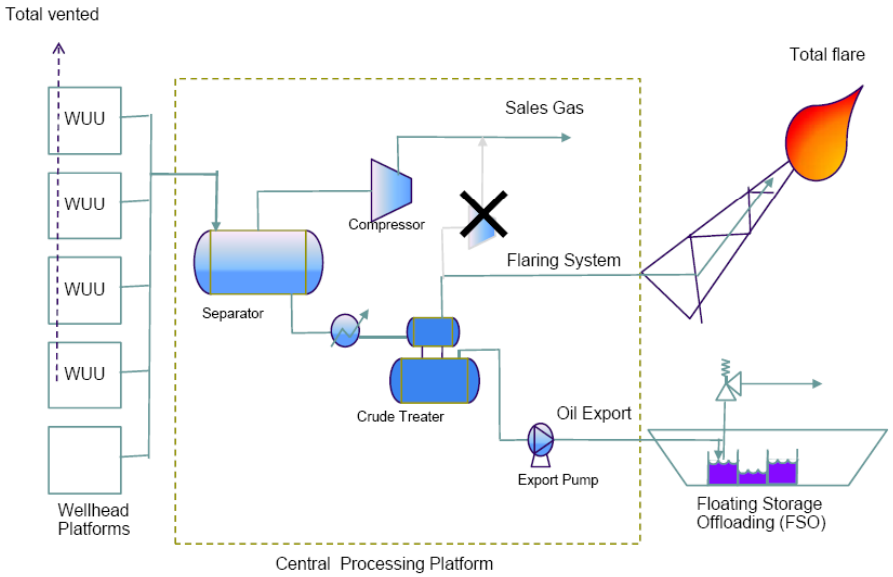
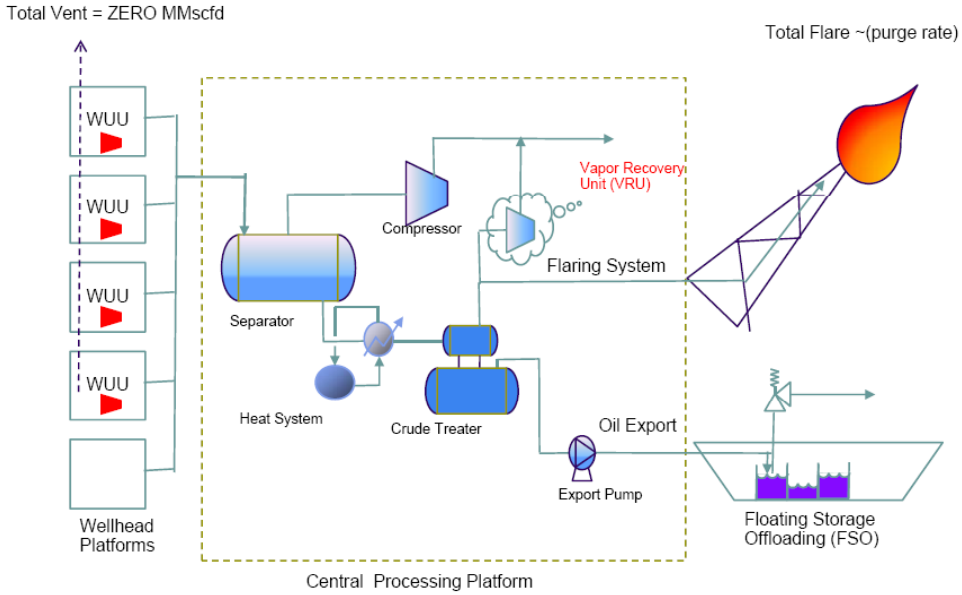
Benchamas Oil and Gas Processing
Current Operation as of Jun 09



Benchamas Oil and Gas Processing
Total Reduction of Flare and Vent



Sao Tian Oil Field

Location : S1, Sukothai Province

Production (2008)

Crude Oil	99,646	bbls
Natural Gas (Flared)	71.31	MMSCF

Concessionaire: PTTEP

Project: 1. Flared gas to small power plant (1MW)

Flared Gas to Small Power Generator

To lay pipeline and install small power generator (1MW) for each field that can help to reduce flare gas about 200 MSCFD/generator

Hence the projects can reduce GHG emission ≈ 10,000 TCO_2eq/yr

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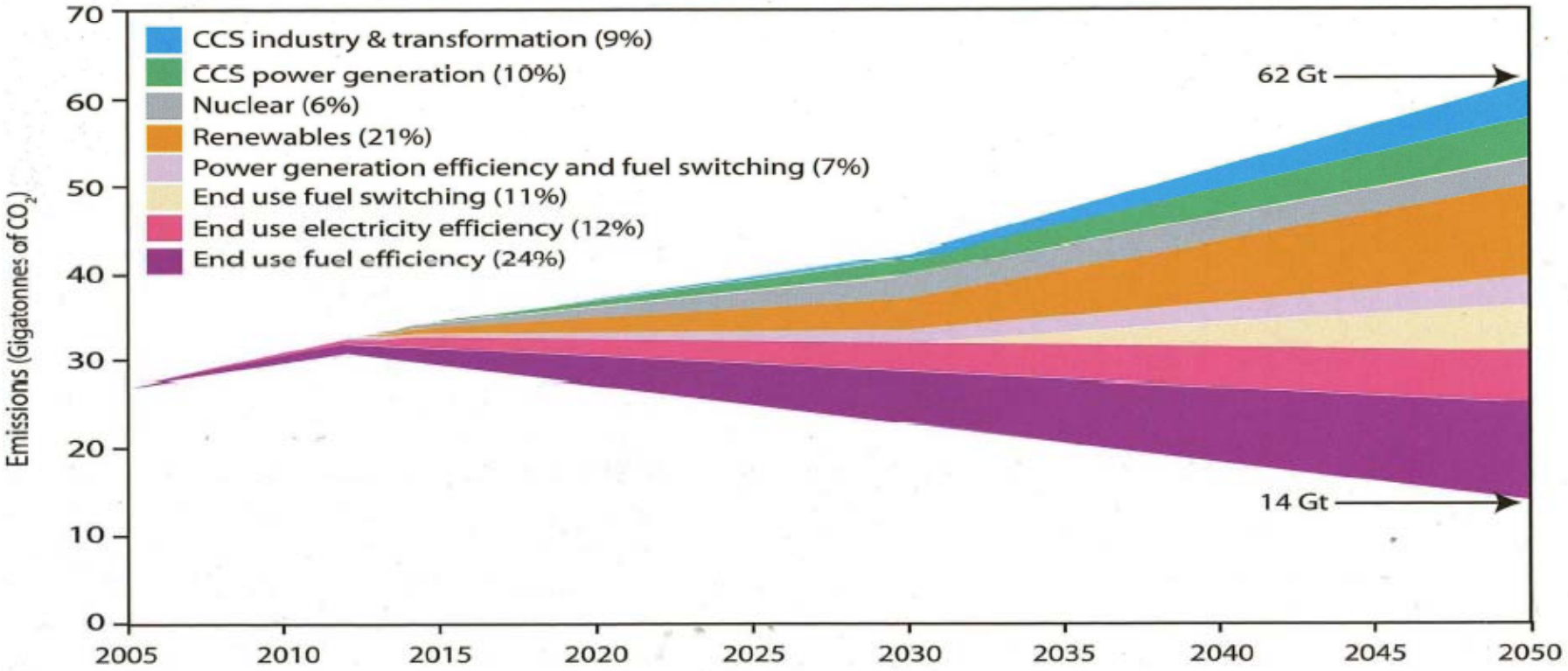
CCS Status in Thailand

- **Currently no specific regulations for CCS in Thailand**
- **CCS may be the solutions but we need more understanding**



An analysis by the International Energy Agency shows the measures needed to cut emissions in half by 2050. Most of the needed emissions reduction can be achieved by CCS in the power generation and industrial sectors, energy efficiency and renewable energy sources.

Image Source: Based on International Energy Agency, Energy Technology Perspectives, 2008: Scenarios and Strategies to 2050, OECD/IEA, Paris, June 2008.

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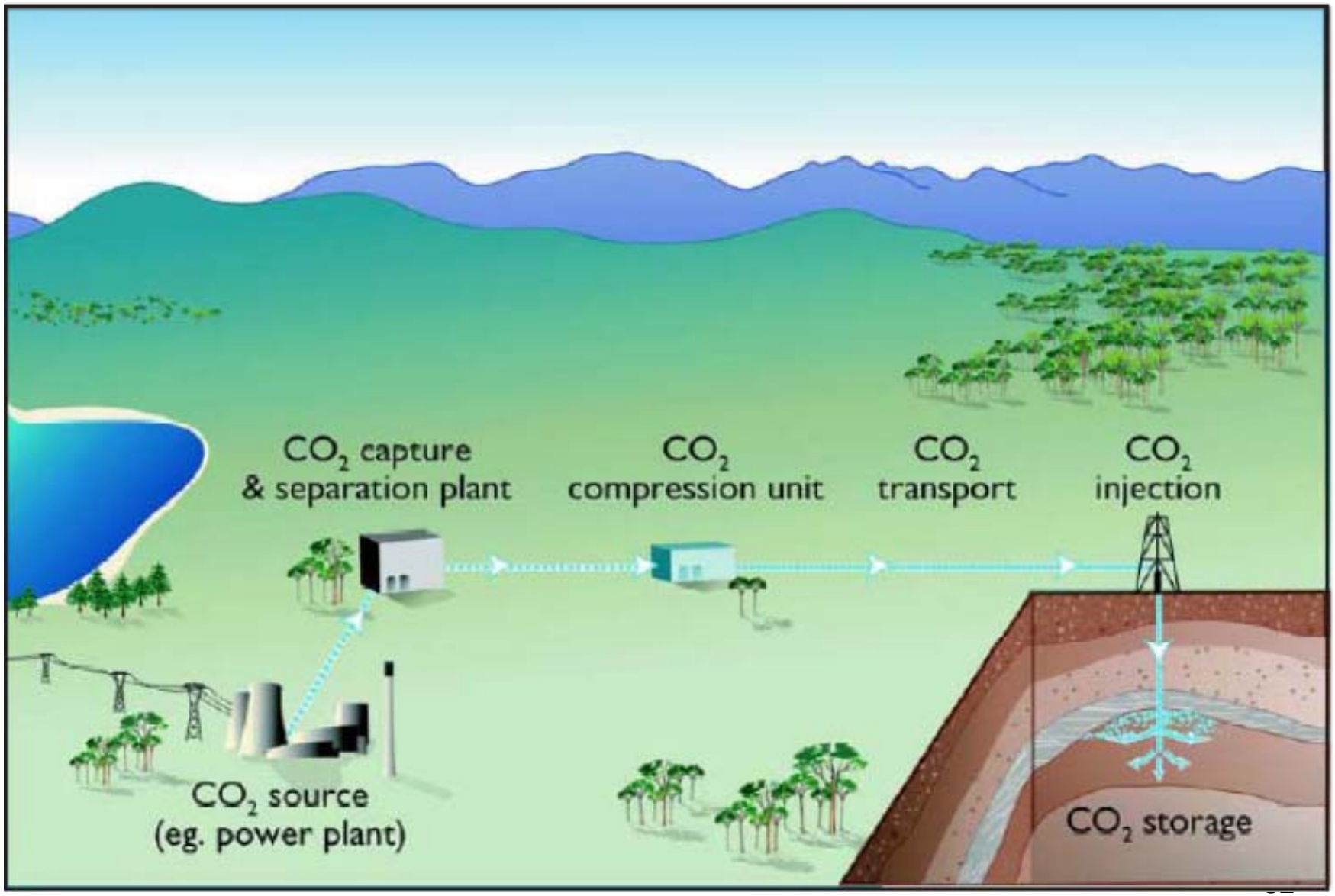
We need to learn more about CCS



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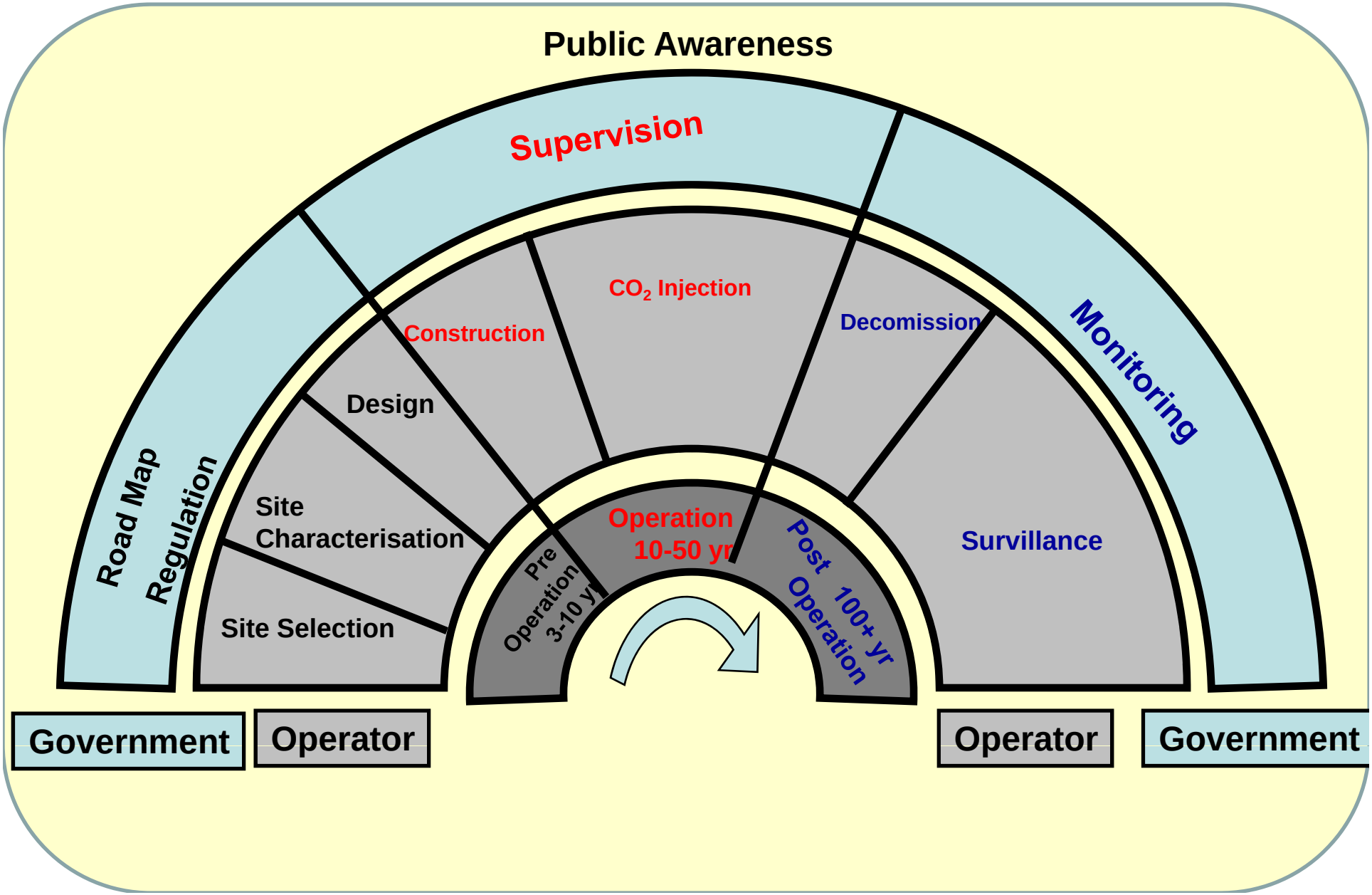
CCS Cycle

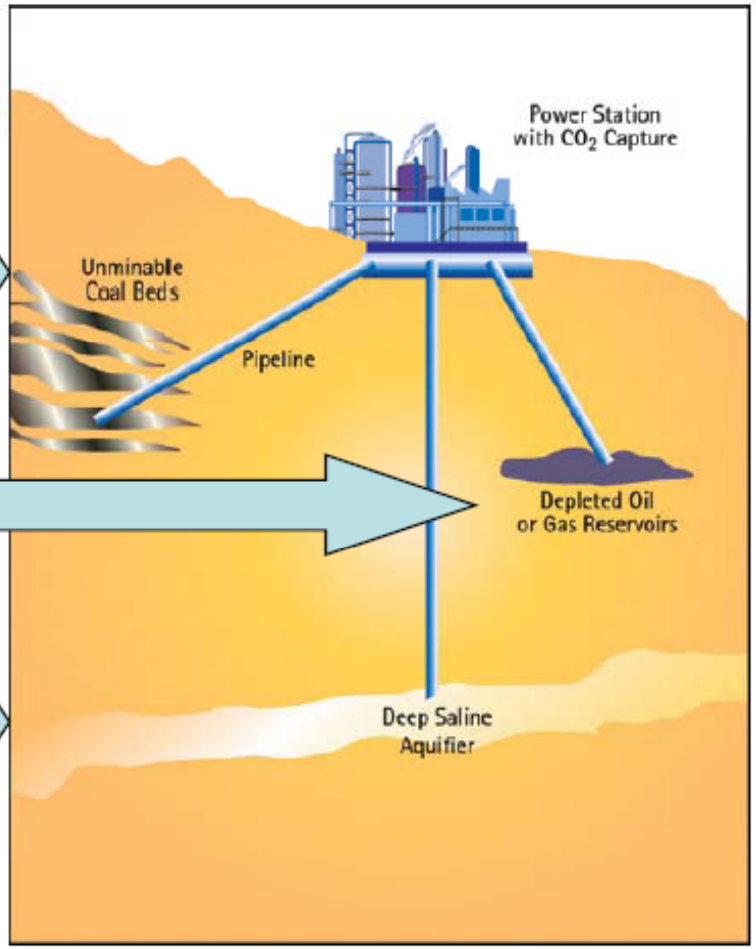


1st Step Geological Challenge

Unminable Coal Seams
30 Gt CO_2
Able to store <2 Years of 2030 Emissions

Depleted Oil & Gas Fields
930 Gt CO_2
Able to Store 50 Years of 2030 Emissions

Deep Saline Aquifers
400-10 000 Gt CO_2
Able to store 20 - 530 Years of 2030 Emissions



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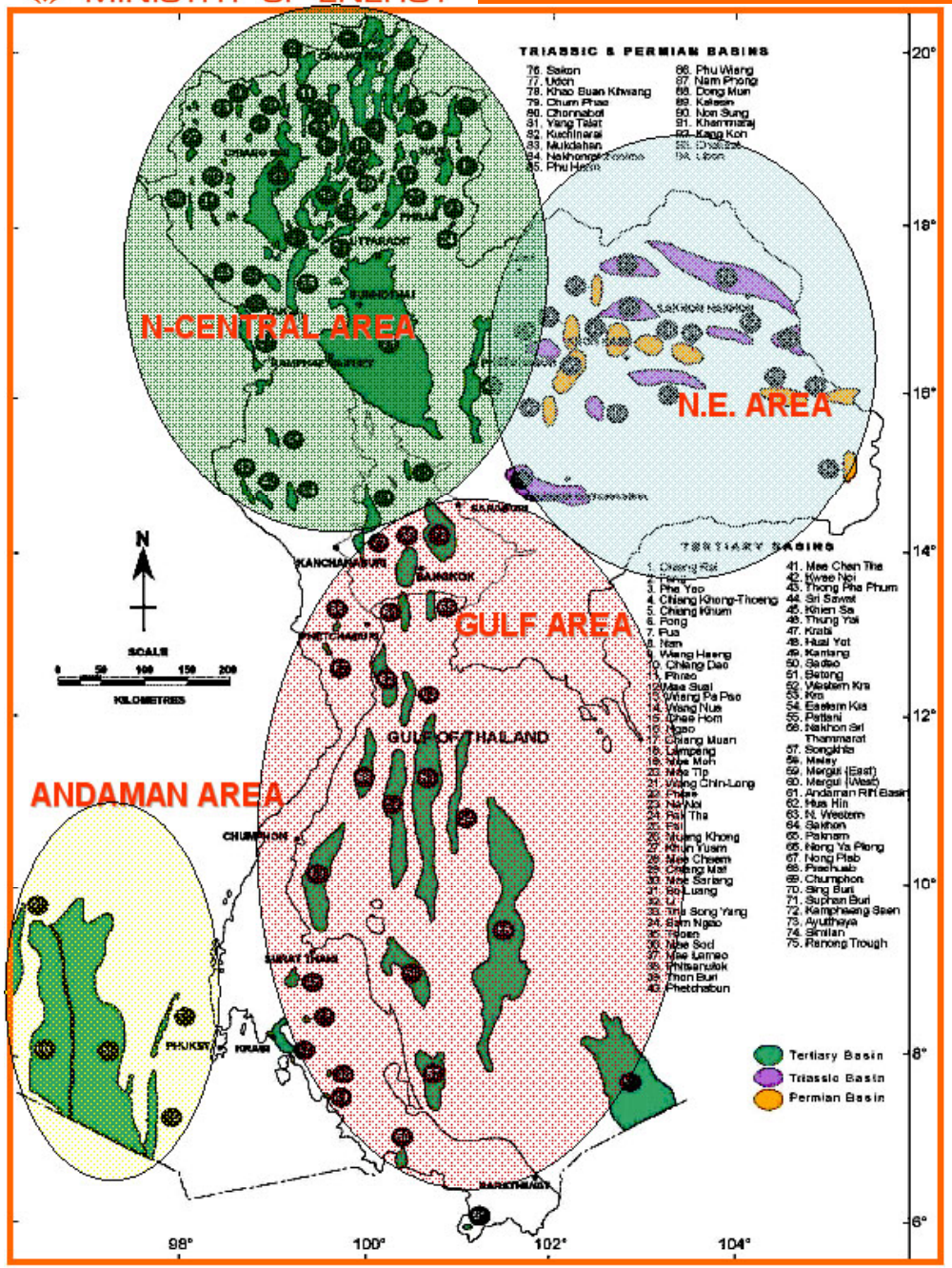
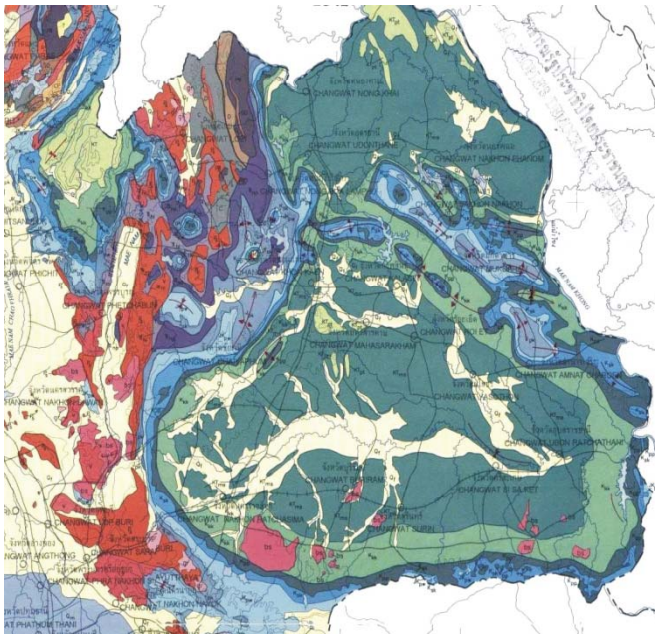
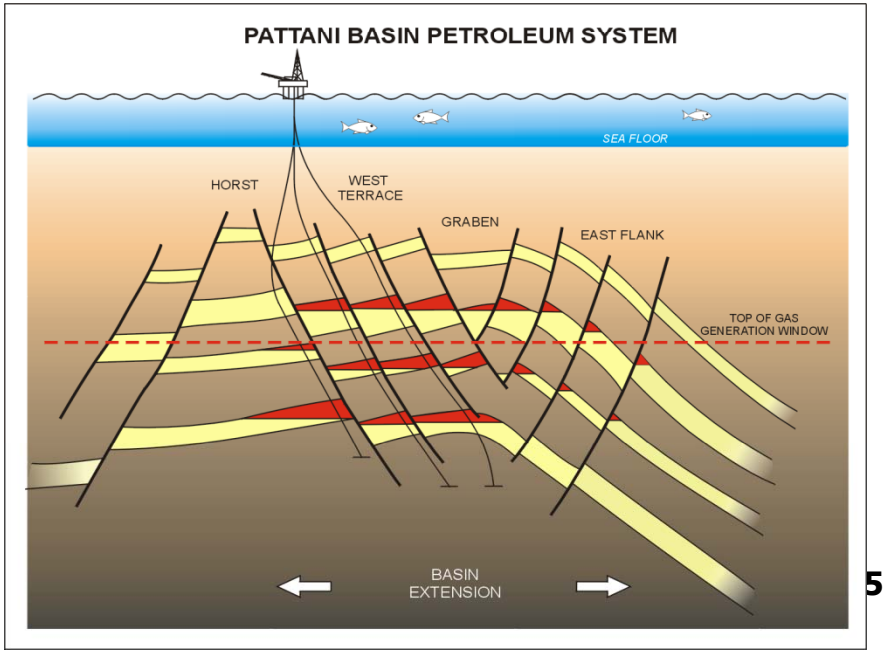
Geological Challenge in Thailand







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Plan for CCS

• Study the potential Geological storage

• **Develop CCS Road Map**

-Technology

- Legal

- Safety & Environment

- Financial

- Public Acceptance

• **Study the feasibility of CCS project in Thailand**

• *Prepare the possibility site for Demonstration project (This is beyond 2013)*

CDM & CCS

DMF will promote E&P business along with prevent and minimize environmental impact from E&P activities

1. **Reduce GHG from flared gas by promoting flared gas utilization & CDM Project**

2. **Set standard for Emission and discharge volume to the environment**

   - **Reduce the discharge volume of produce water from petroleum production**
   - **Study the feasibility of CCS project in Thailand**

     - The Challenging issues are technology, legal , cost and public acceptance

THANK YOU

www.dmf.go.th