



**MINISTRY OF ENERGY AND MINERAL RESOURCES
DIRECTORATE GENERAL OF OIL AND GAS**

CCS: What Need to be Done Next in Indonesia

By :

Dr.-Ing. Evita H. Legowo

Director General of Oil and Gas

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CCS WORKSHOP

“FROM RESEARCH TO REALITY”

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ROLE OF OIL AND GAS INDUSTRIES



ROLE OF OIL AND GAS FOR NATIONAL DEVELOPMENT

OIL & GAS INDUSTRY



High Capital

High Risk

High Technology

INDUSTRIAL RAW
MATERIAL
RESOURCES

FULFILL DOMESTIC
FUEL DEMAND

SOURCE OF
STATE REVENUE

CREATING
MULTIPLIER
EFFECTS

**Sustainable
National
Development**



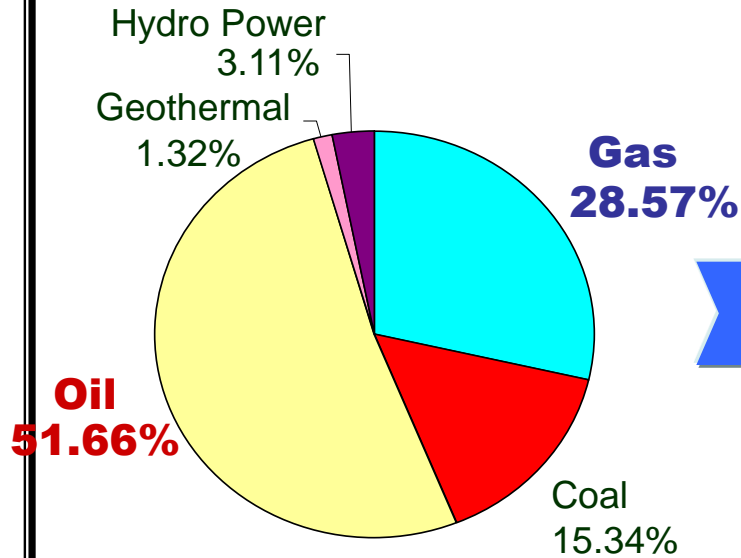
OIL & GAS POLICY AND TARGETS IN 2025



TARGET OF ENERGY MIX

(Presidential Regulation No. 5/ 2006)

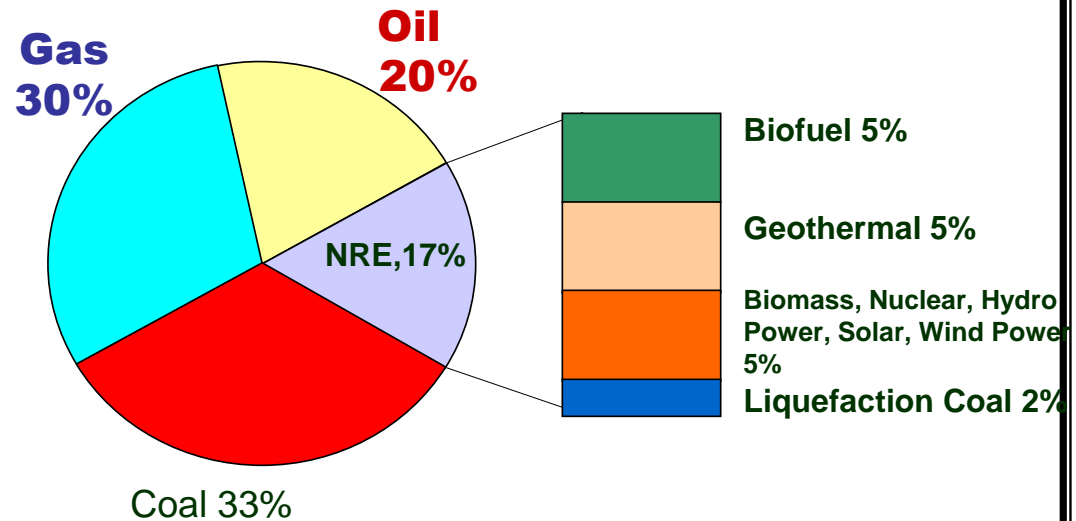
Primary Energy Mix 2006



Energy Elasticity = 1,8

NON FOSSIL ENERGY < 5%

Energy Mix 2025



Energy Elasticity < 1

NON FOSSIL ENERGY
New & Renewable Energy > 17 %



POLICY AND TARGETS **OF INDONESIA OIL & GAS MANAGEMENT**

PETROLEUM POLICY

- ❖ Oil and Gas Supply Security
- ❖ Oil And Gas Utilization
- ❖ Oil and Gas Pricing Policy
- ❖ Unconventional Oil and Gas Business
- ❖ Conservation Of Oil and Gas Production
- ❖ Increasing National Capacity In Oil And Gas Industry

FUEL POLICY

- ❖ Feedstock & Fuel Supply Security
- ❖ Fuel Categorization
- ❖ Pricing Policy
- ❖ Fuel Diversification
- ❖ Fuel Standard and Quality
- ❖ Fuel Efficiency

TARGETS FOR 2025

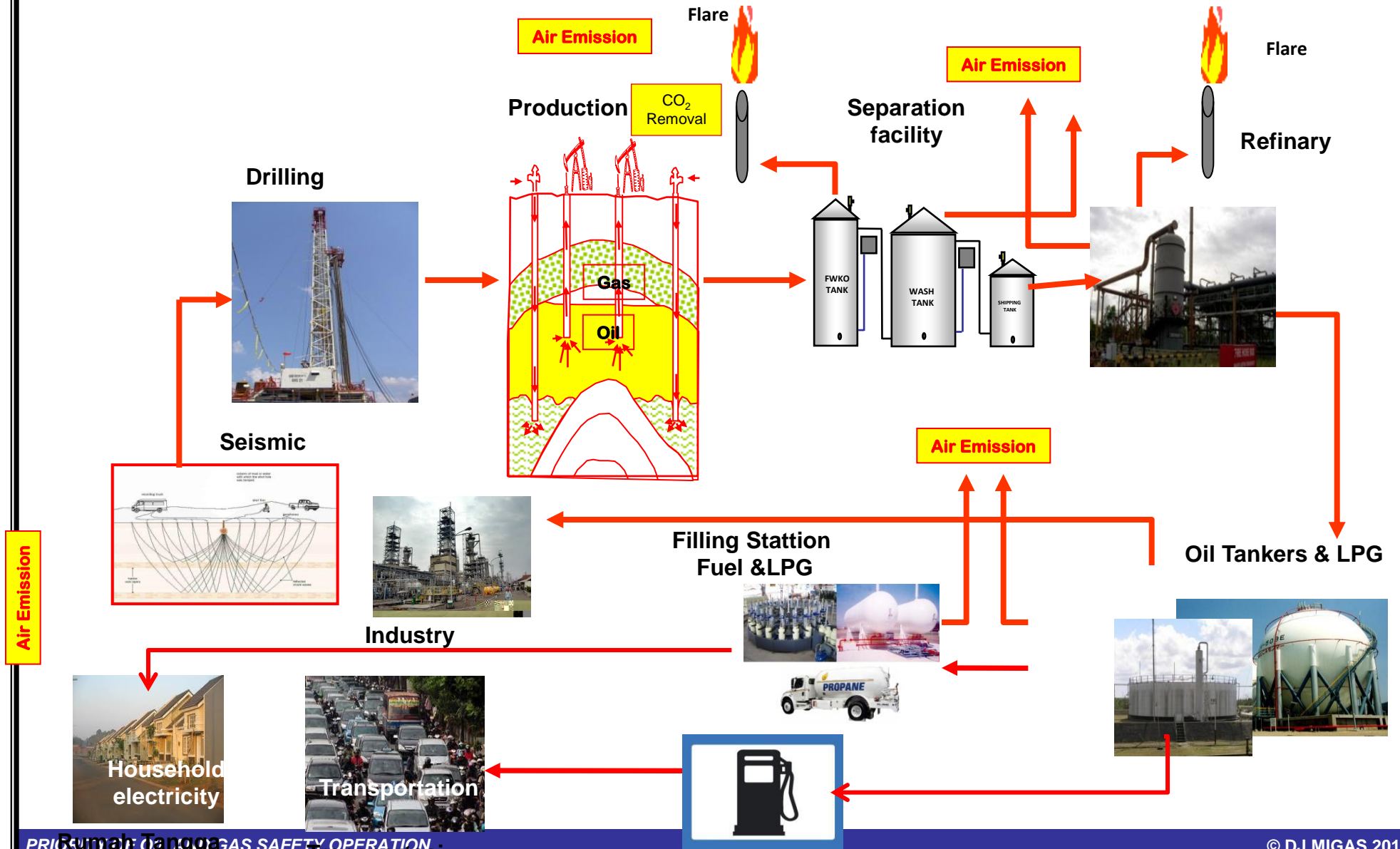
- Maintain oil production level of 1 Million BOPD
- 50% national operatorship
- Security of domestic Fuel Supply and Industrial Feedstock
- 91% local content (goods and services)
- 99% skilled national workforce
- Achieving oil and gas safety, **zero accidents, zero failure,** and achievement of **zero flares,** and **zero waste**



OIL AND GAS INDUSTRY ACTIVITIES



OIL & GAS ACTIVITY





CONCEPT OF GREEN OIL AND GAS INDUSTRY INITIATIVE (GOGII)



Directorate General Of Oil and Gas on June, 25 th 2008 established Green Oil and Gas Industries Initiative (GOGII) to propose:

- ☑ ***zero flare,***
- ☑ ***zero discharge,***
- ☑ ***zero waste,***
- ☑ ***clean air,***
- ☑ ***clean water, and***
- ☑ ***go renewable***



GREEN OIL AND GAS INDUSTRY INITIATIVE (GOGII)

PROBLEMS

- ☑ LACK OF ENERGY
- ☑ AIR QUALITY (GLOBAL WARMING)
- ☑ POLLUTION ISSUE
- ☑ WASTE TREATMENT TECHNOLOGY
- ☑ PUBLIC'S NEGATIVE PERCEPTION
- ☑ PUBLIC'S SOSIO-ECONOMIC

MEET OIL AND GAS SAFETY

PROTECTION

MITIGATION

RECOVERY

ZERO FLARE, ZERO EMISSION, CLEAN AIR, ZERO DISCHARGE, ZERO WASTE, CLEAN WATER, GO RENEWABLE

FEEDBACK



ZERO FLARE GAS PROGRAM

1. Preparing flare gas utilization policy (CNG, LPG, EOR)
2. Socializing flare gas reduction policy to business entities – year 2010;
3. Monitoring flare gas reduction implementation – year 2010 – 2025;
4. Achieving zero flare gas target - year 2025.

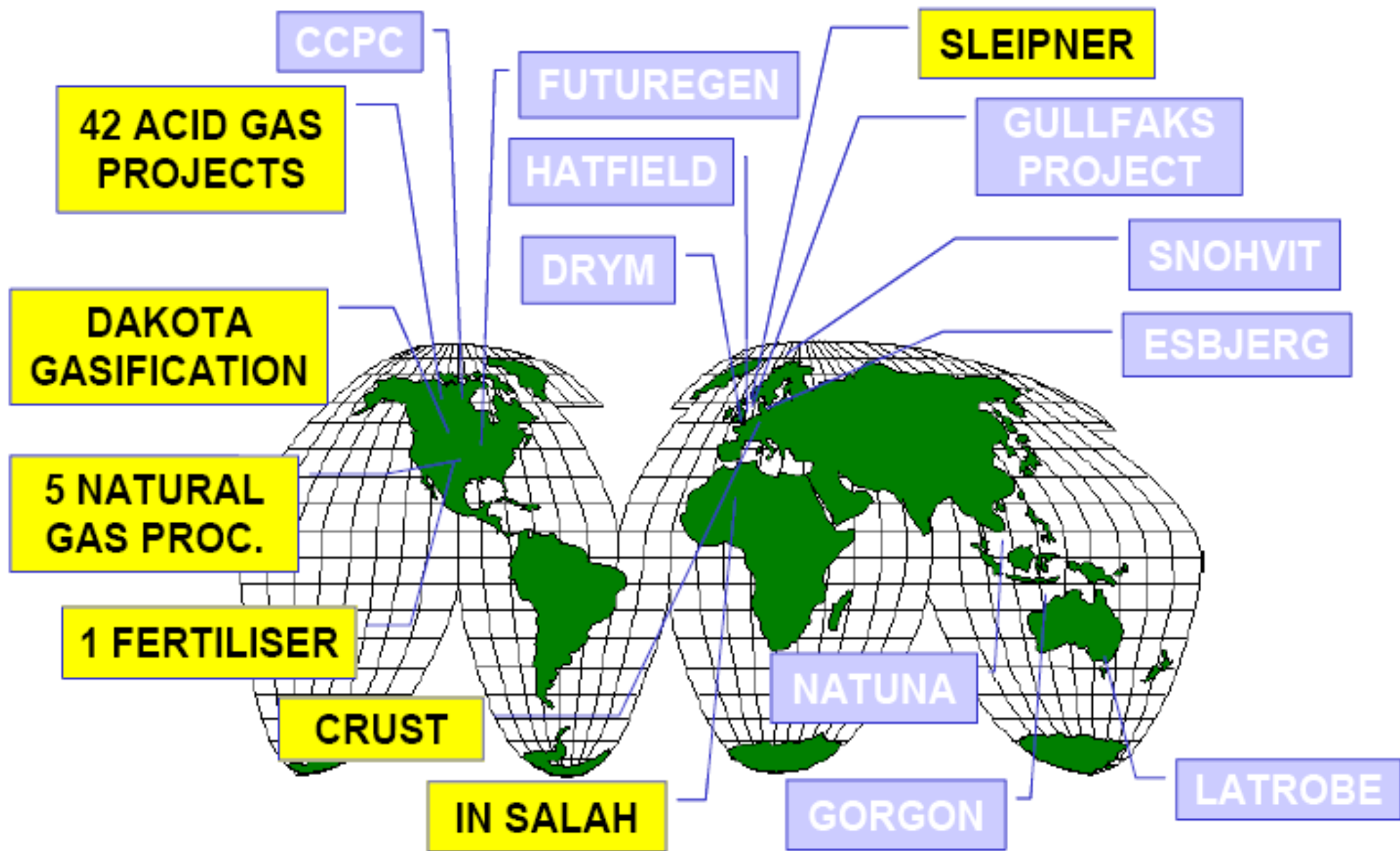
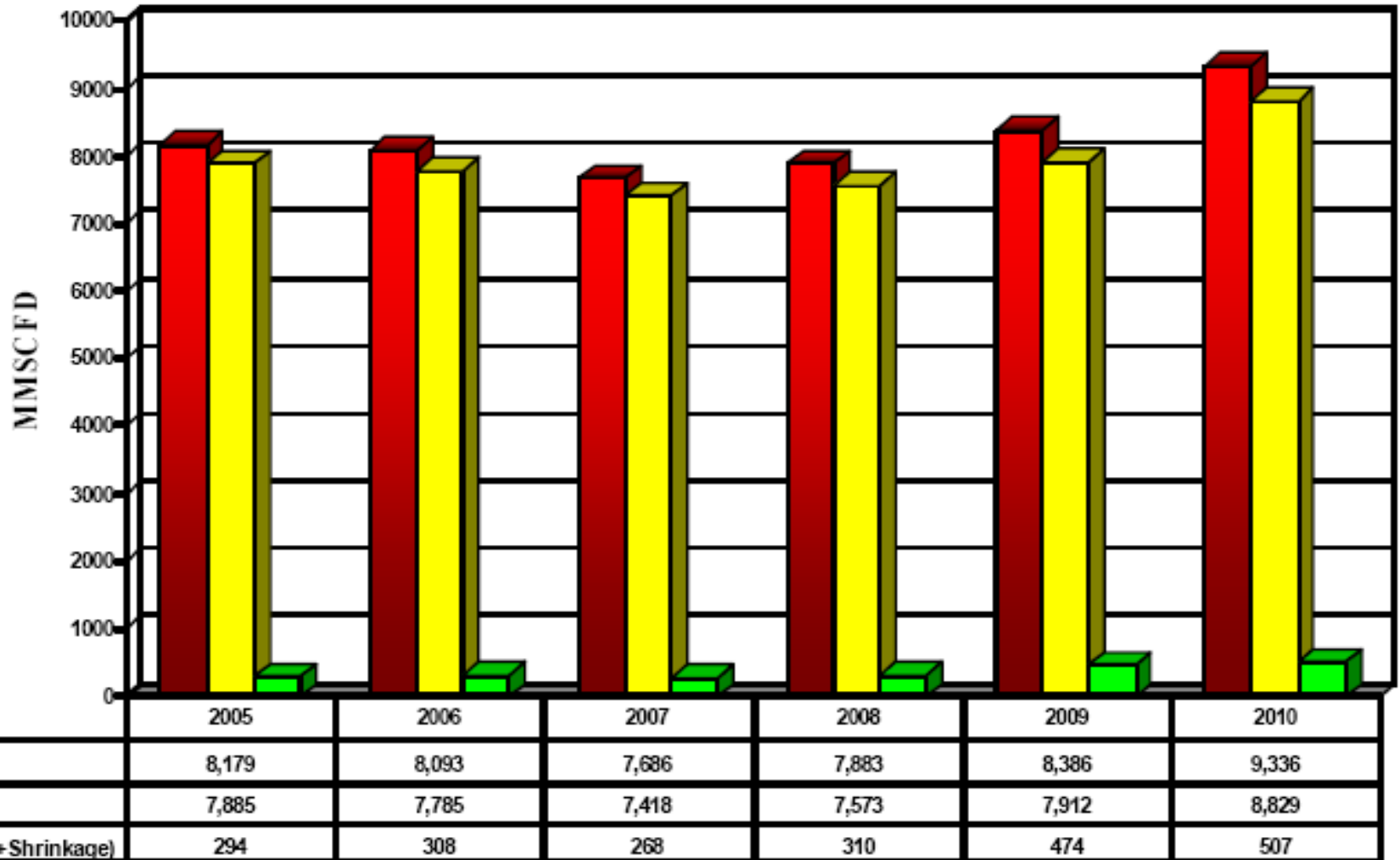


Figure 1 Overview of current (yellow) and possible (blue) capture and storage projects (source: IEA GHG)



INDONESIA GAS PRODUCTION 2005 – 2010





CO₂ AND GHG EMISSION REDUCTION



Using Casing Vapour Collection (CVC) for producing condensate from associated gas (Chevron Pacific Indonesia)



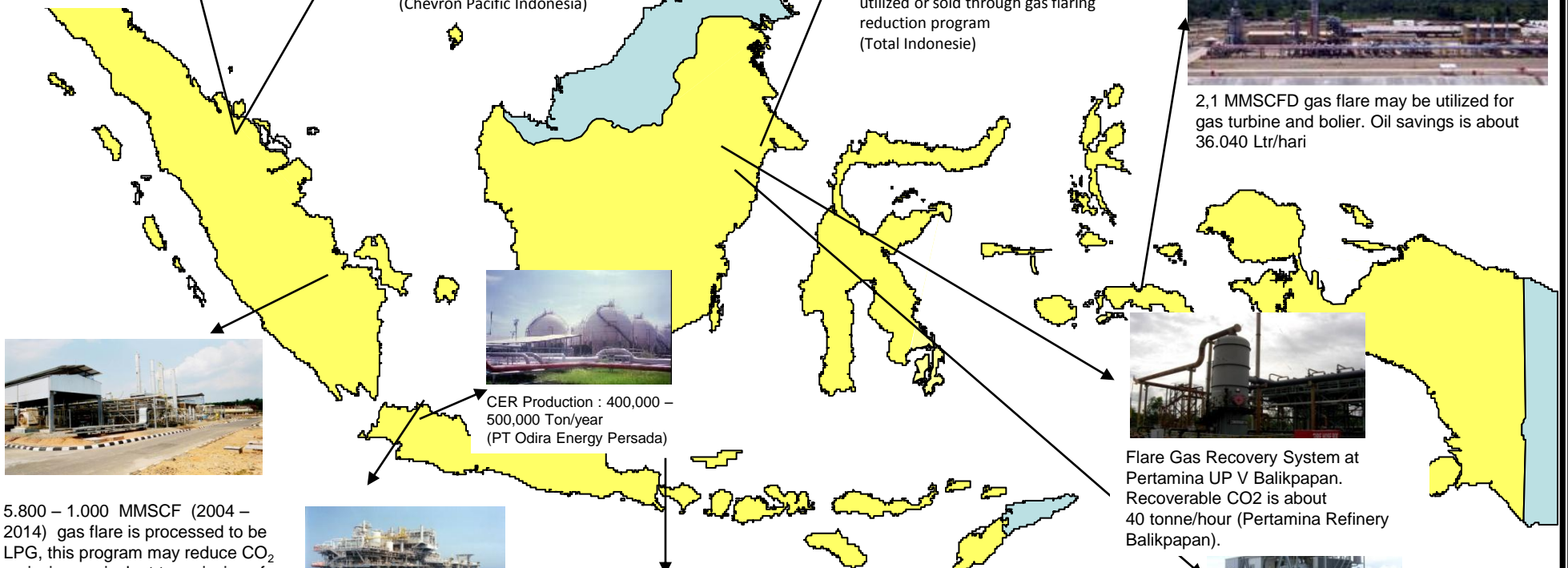
Utilizing heat from power generation (gas turbine), fuels savings is about 200.750 BOPD (Chevron Pacific Indonesia)



14-16 MMSCFD gas flare may be utilized or sold through gas flaring reduction program (Total Indonesia)



2,1 MMSCFD gas flare may be utilized for gas turbine and boiler. Oil savings is about 36.040 Ltr/hari



5.800 – 1.000 MMSCF (2004 – 2014) gas flare is processed to be LPG, this program may reduce CO₂ emission equivalent to emission of 19.549 vehicles/day (PT Medco E&P Indonesia)



CER Production : 400,000 – 500,000 Ton/year (PT Odira Energy Persada)



2,5 MMSCFD gas flare savings through vapour recovery program. The gas is used for gas lift or is sold (BP West Java Ltd)



3,5 – 20 MMSCFD gas is re-injected into reservoir as energy conservation program (temporary stored before re-produced) (Kodeco Energy Co Ltd)



Flare Gas Recovery System at Pertamina UP V Balikpapan. Recoverable CO₂ is about 40 tonne/hour (Pertamina Refinery Balikpapan).



540 tonne CO₂ emission can be reduced in 2006 by using Mobile Blow Down Compressor (Chevron Indonesia)



FUTURE DEVELOPMENT



FUTURE DEVELOPMENT

Future development in order to achieving zero gas flare target at 2025 :

- LPG Plants
- CNG Plants
- EOR and marginal field developments
- Infrastructure for gas businesses



Some potential projects on Oil and Gas Sector which can be adopted as CDM projects are:

- **Utilization of gas flaring**

The total volume of gas flaring Year 2009 is 364 MMSCFD

Some of these gases are utilized as Gas Fuel, Raw material in CNG & LPG Plant

- **Enhanced Oil Recovery (EOR)**

- **CO₂ Emission Reduction through utilizing as EOR and dry ice**

- **Improvement of Energy Efficiency**

- **Fuel Substitution**

- **Carbon Capture and Storage (CCS)**



POLICY STATEMENT ON CCS REGULATION

Establish such legislative and/or regulatory structure should include provisions governing :

1. Capture and Transportation of CO₂
2. Injection and Geologic storage of CO₂, including
 - Site and permit
 - Construction
 - Monitoring, Measurement, and verification
 - Optimizing of the existing wells into depleted reservoir
 - Obligation post activities



3. Potential Intersections with other substantive laws(e.g environmental laws)
4. Appropriate Incentive for project development, such as funding and tax incentives
5. Provisions addressing issues of long term responsibility (addressed in further detail in a separate policy Statement)
6. Provision addressing use of CCS as a CO2 mitigation technology (addressed in further detail in a separate Policy Statement)
7. Provision recognizing that developers and operators of enhanced natural gas recovery project should be eligible to opt into CCS regulatory regime if the project meet applicable regulatory requirements.



ANNEX



Issues Driving CCS in The UE, US and Australia

	EU	US	Australia
Climate Policy	Signatories to Kyoto with existing climate policy and established trading scheme. Must establish how CCS fits into CO ₂ trading and accounting system.	Not a signatory to Kyoto, no coordinated federal policy. Several bills are pending in Congress. Currently, state level initiatives dominate.	Ratified Kyoto in December 2007.
Energy infrastructure	Coal dependence heavier in Germany and several new Member States, anti-nuclear power sentiment in many northern EU countries ⁶ .	Heavy coal dependence in Midwest and mountain states. Large coal reserves and many new coal plants (without capture) currently proposed. Several coal to liquids projects under discussion.	Steady demand growth coupled with strong dependence on coal for electricity generation. Economic dependence on coal exports and technology exports.
Classification of CO ₂	Will be defined as either 'waste' or 'special category' under the EU Landfill, Waste and Water Directives.	Underground injection regulatory stringency is based upon the origin and disposal site, not classification of CO ₂ ⁷ .	Australian regulators have been active at ensuring CO ₂ classification will not block CCS.
Location of projects	Off-shore locations are important. No significant on-shore underground injection experience. The Utsira formation under the North Sea is estimated to have the capacity to store all of Europe's emissions for centuries. Coordination with international treaties necessary for CCS deployment.	Significant on-shore geological storage capacity. Target reservoirs often contain high densities of abandoned wells. Potential ecological and human health risk must be actively managed given the import of on-shore injection.	Australia has both on-shore and off-shore targets sites for CCS. However many are far from population centres, changing the potential human health and safety risks.
Subsurface property rights	Mineral rights and pore space ownership controlled by central government, making the legal framework for pore space acquisition more straightforward.	On private lands, mineral rights and surface/pore space ownership may be held by different parties, with the surface estate holder owning the pore space once hydrocarbons have been removed. On public lands, lessees of mineral rights may have an interest.	Mineral rights and pore space owned by the central government.



CCS Regulatory Initiatives

Type of initiative	Location	Description
Site selection guidelines, monitoring and verification protocols	EU	Modifications to the Convention of Environmental Impact Assessment (EIA) Directive, the Integrated Pollution Prevention and Control (IPPC) Directive, the Seveso II Directive, the Environmental Liability Directive and the Landfill Directive are being considered to include CCS in the EU-ETS. Freestanding regulations for geological storage of CO ₂ are being drafted.
	UK	Cross government task force on CCS; licensing, monitoring and verification guidelines expected in late 2007.
	North Sea	North Sea Basin CCS task force (UK, Norway) pipelines, trans-national grid, value chain model.
	US	Environmental Protection Agency Underground Injection Control Program is developing regulations aimed at ensuring consistency in permitting commercial-scale geological sequestration projects, scheduled for release in the summer of 2008.
	IEA GHG	Best practices database. (http://www.co2captureandstorage.info/BPIntro.php)
	UNFCCC CDM	Consultations underway on inclusion of CCS in the CDM. Possible approaches to CCS methodology are under discussion [IEA, 2007].



GHG accounting	International	IPCC 2006 Guidelines for National GHG inventories includes CO ₂ transport, injection and geological storage [IPCC, 2006].
Incentives	EU	It will be possible to opt-in CCS in EU-ETS from 2008 onwards. Target of 10-12 full-scale demonstrations in 2015 (mechanism under discussion). A mandate on CCS in all fossil-fuel-based power production is considered for 2020.
	Netherlands	Investment subsidies for a number of CCS demonstrations.
	Norway	CO ₂ tax led to CCS projects at Sleipner and Snøhvit.
	UK	Tender for CCS demonstrations with investment subsidies. Announced 9 October 2007.
General	International	Carbon Sequestration Leadership Forum - working on institutional, regulatory, and legal constraints and issues (www.cslforum.org).
	Australia	Carbon Dioxide Capture and Geological Storage Australian Regulatory Guiding Principles [MCMPR, 2005].
	EU	Zero Emissions Platform, Working group on policy, markets and regulation [ZEP, 2007].
	US	Department of Energy (DOE) Regional Carbon Sequestration Partnerships, FutureGen Draft Environmental Impact Statement (http://www.netl.doe.gov/technologies/coalpower/futuregen/EIS/).



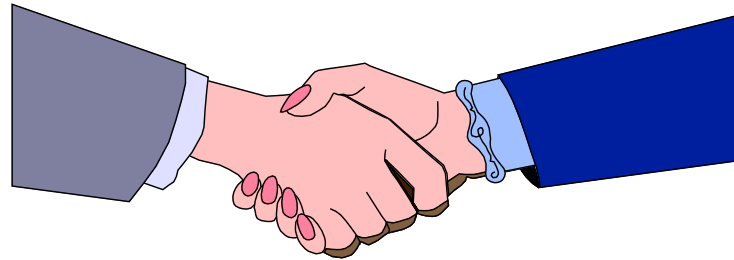
Key unknowns for development of CCS Regulations

	Unknown
Capture and transport	1. Capture reliability, cost, energy penalty
	2. Effects of varying purity of CO ₂ streams
Geological storage	3. Geological performance (leakage risk profiles) in a variety of geological settings and reservoir types
	4. Basin-scale impacts (fluid displacement, induced seismicity)
	5. Adequacy of models to predict reservoir performance at scale
Geological storage: operation and long-term stewardship	6. Monitoring methodology, detection limits
	7. Remediation techniques, costs
Socio-political and climate considerations	8. Industrial organisation
	9. Public acceptance
	10. Climate regime/incentive structures

* More details on the impact of key CCS unknowns can be found in the IRGC workshop report downloadable from <http://www.irgc.org/Expert-contributions-and-workshop.html>



THANK YOU



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