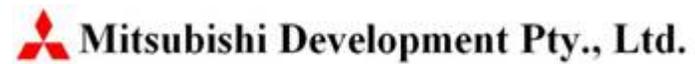


The Role for Coal an industry perspective

Milton Catelin

UNECE Committee on Sustainable Development
29 November 2006 Geneva

WCI Corporate Members



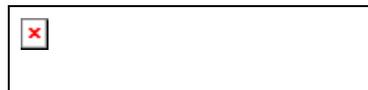
WCI Associate Members



the **COAL** Association of Canada



coalpro
confederation of uk coal producers



plus ...

CHINA (Shaanxi Coalfields)

EURACOAL

Coal - global contribution

40% of the world's electricity is produced using coal.



25% of world primary energy



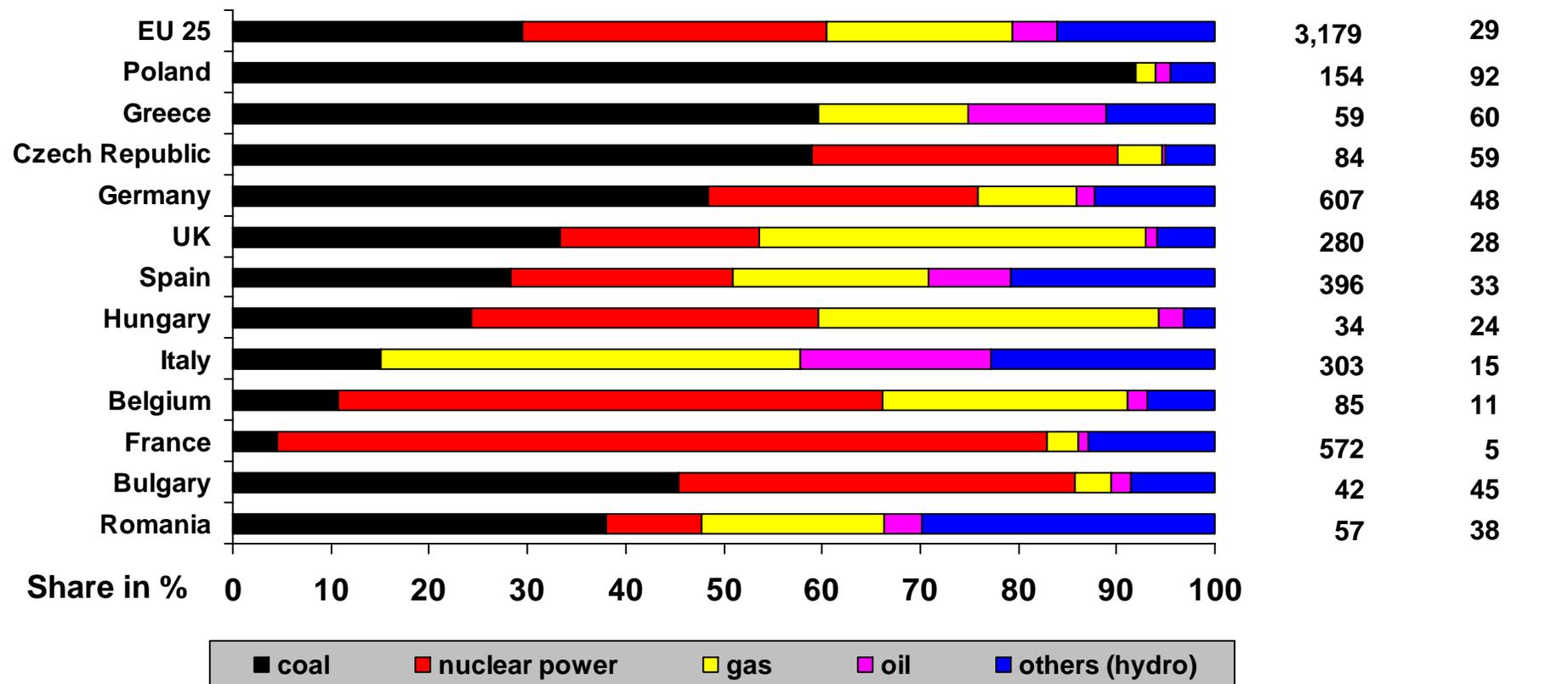
66% of the world's steel is produced using coal

Total hard coal production: 4,973 Mt (7.4% over 2004; 78% over 25 yrs)
Top 5 producers: PR China; USA; India; Australia; South Africa
Top 5 exporters: Australia; Indonesia; Russia; South Africa; PRC
Top 5 importers: Japan; RoK; Chinese Taipei; UK; Germany
Reserves in 70 countries to last 155 years at current rates

Coal in EU power generation

Power-generation structures in selected EU-25 states

Gross power generation
TWh Share of Coal in %



Data as per: 08/2006

Source: EUROSTAT – Energy / Yearly Statistics 2004

Key international developments 2005 / 2006

- > Kyoto Protocol on Climate Change / 1st MOP
- > G8 Summit - *Gleneagles Plan of Action on Climate Change*
- > Intergovernmental Panel on Climate Change
Special Report on Carbon Capture & Storage
- > **Asia-Pacific Partnership on Clean Development & Climate**
- > **Disruption of gas supplies to the Ukraine**
- > **High prices / high fuel costs in vehicle transport**
- > **Coal industry funding of CCT and CCS**
 - FutureGen in the US
 - Establishment of Coal 21 Fund (Australia)
EURO 35 million p.a. for 5 years to CCT & CCS
from Australian coal companies
 - Almost a score of other CCS coal projects scheduled for
completion within next 7 years

Coal is *indispensable* to solving
the great challenges of the 21st century

**GLOBAL
CHALLENGES ARE
INTERCONNECTED**

**POVERTY
ALLEVIATION
(electrification)**



**ENERGY
SECURITY**



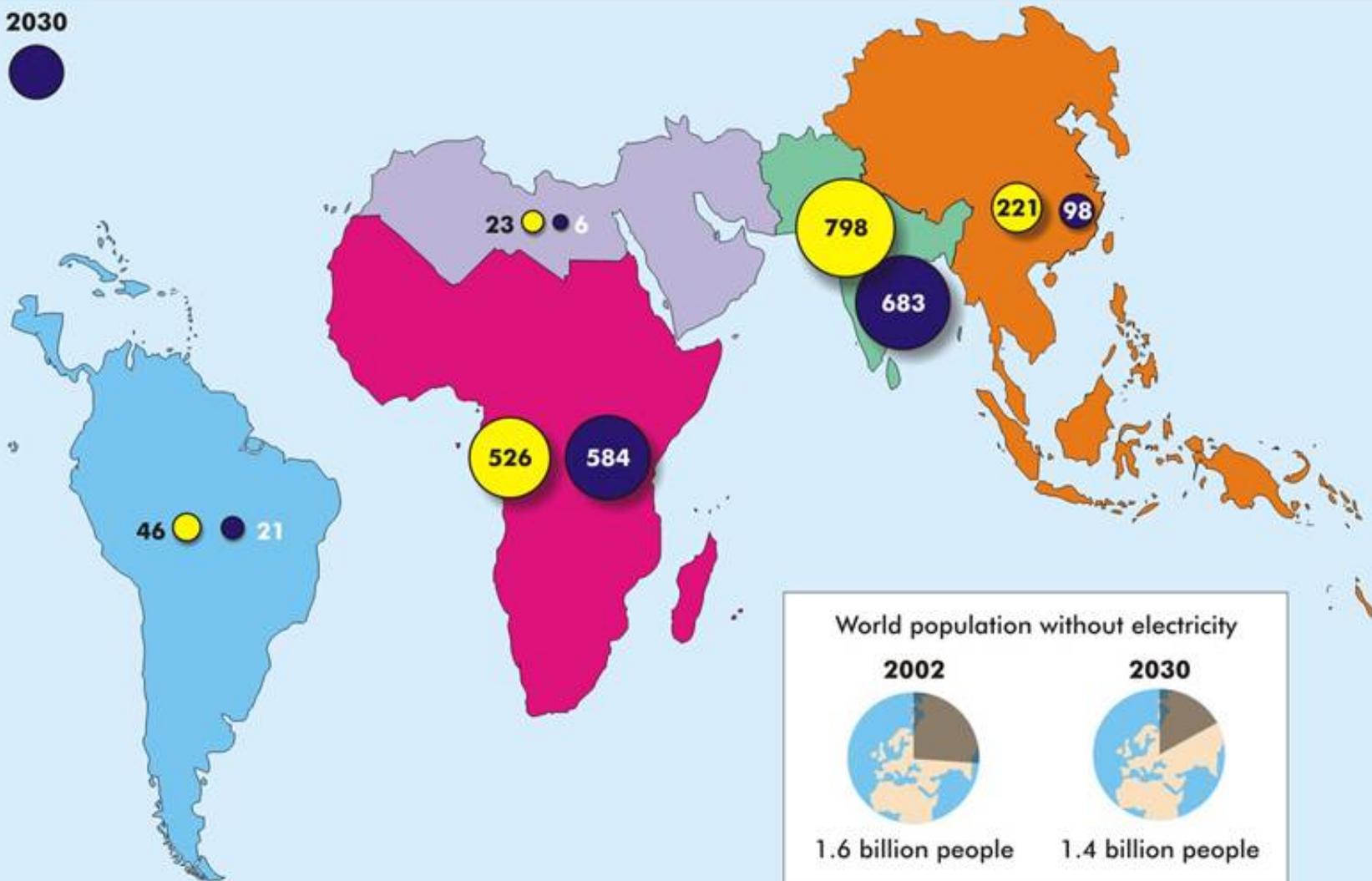
**SUSTAINABLE
DEVELOPMENT**



Poverty and electricity deprivation

(IEA - World Energy Outlook 2004)

2002 2030



Coal's role in poverty alleviation

CHINA

- 700 million people over 20 years
- Electrification rate of 99%
- Serviced by a generation industry 77% fuelled by coal

INDIA

since 1947

Electricity generation 4b to 400b KWh

30,000 kms transmission lines to more than 4 million kms

85% villages connected

Serviced by industry 68% fuelled by coal

SOUTH AFRICA

- Electrification rate doubled in a decade (35% to 66%)
- Serviced by a generation industry 90% fuelled by coal

REST OF SUB-SAHARAN AFRICA

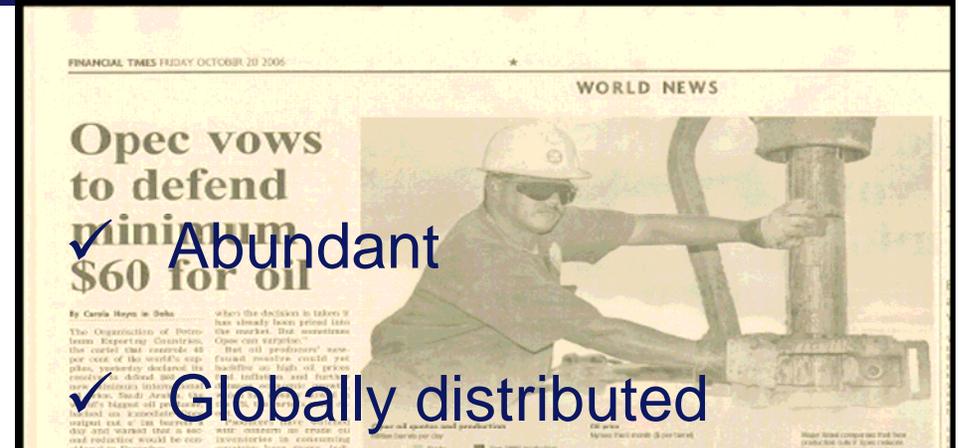
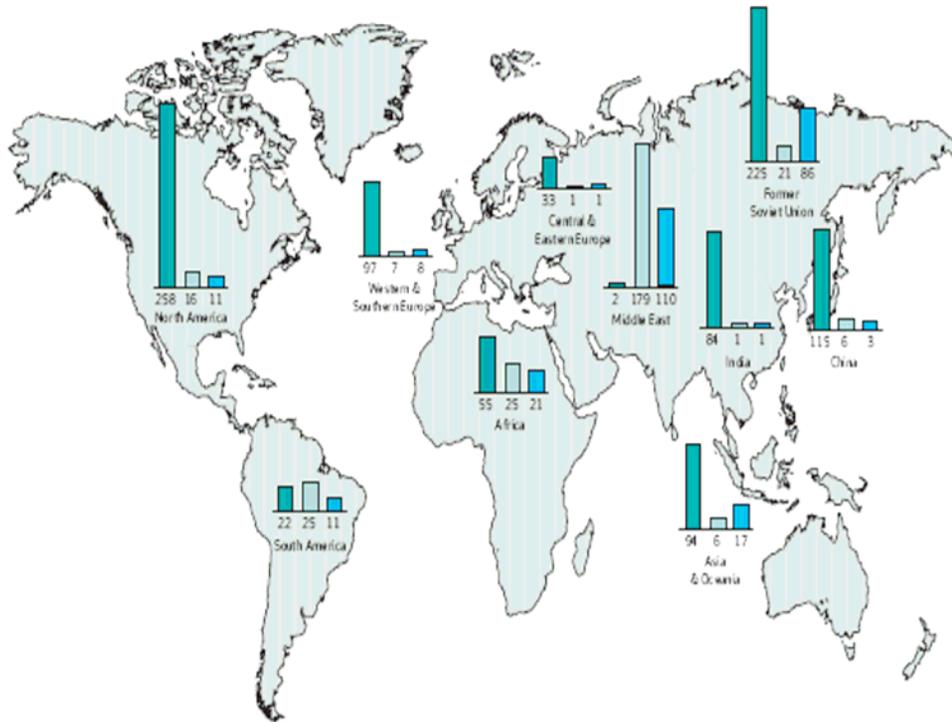
- Electrification rate of only **10%**
 - 575 million people rely on biomass for energy

Coal enhances global energy security

Location of the World's Main Fossil Fuel Reserves (Gigatonnes of coal equivalent¹)

- Coal
- Oil
- Gas

Source: Optima 2005



✓ Abundant

✓ Globally distributed

✓ Affordable & stable in price

✓ Safe & reliable



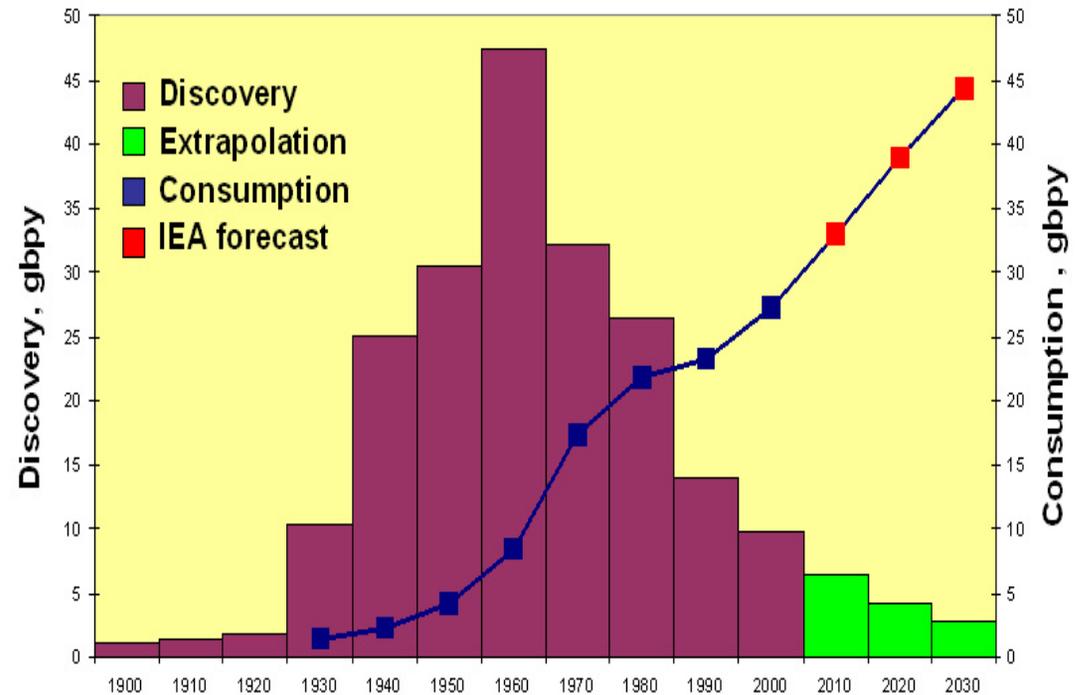
Limited energy options: oil and gas

- **OIL** **45 years**
- **GAS** **65 years**
- **COAL** **155 years**

(BP Statistical Review
of World Energy 2006)

*By the middle of this
century (or earlier) oil will
no longer be an affordable
fuel for common use*

Comparison between discovery and consumption

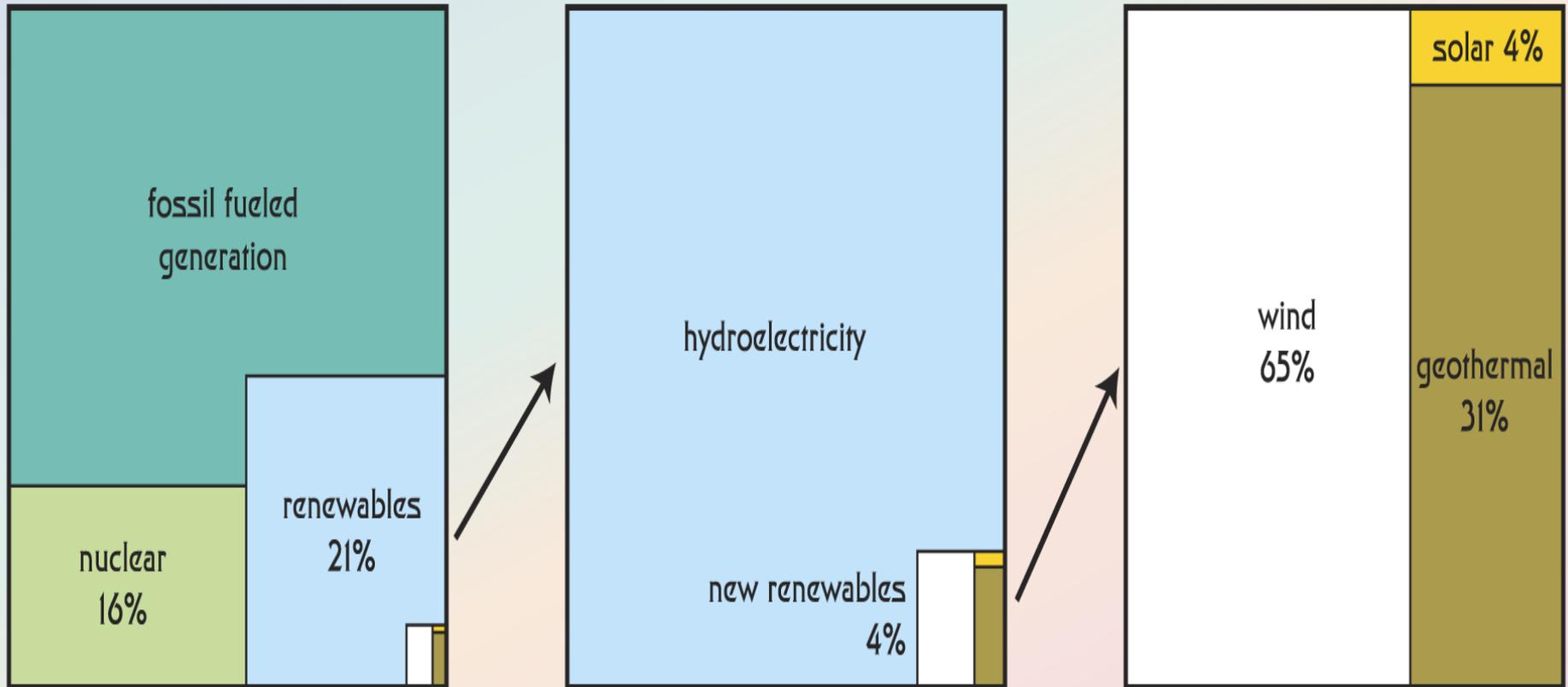


Source: World Watch Magazine, January-February 2006.
Published by the World Watch Institute.
"Oil: A Bumpy Road Ahead", Kjell Aleklett

Limited energy options: nuclear & renewables

(... size does matter)

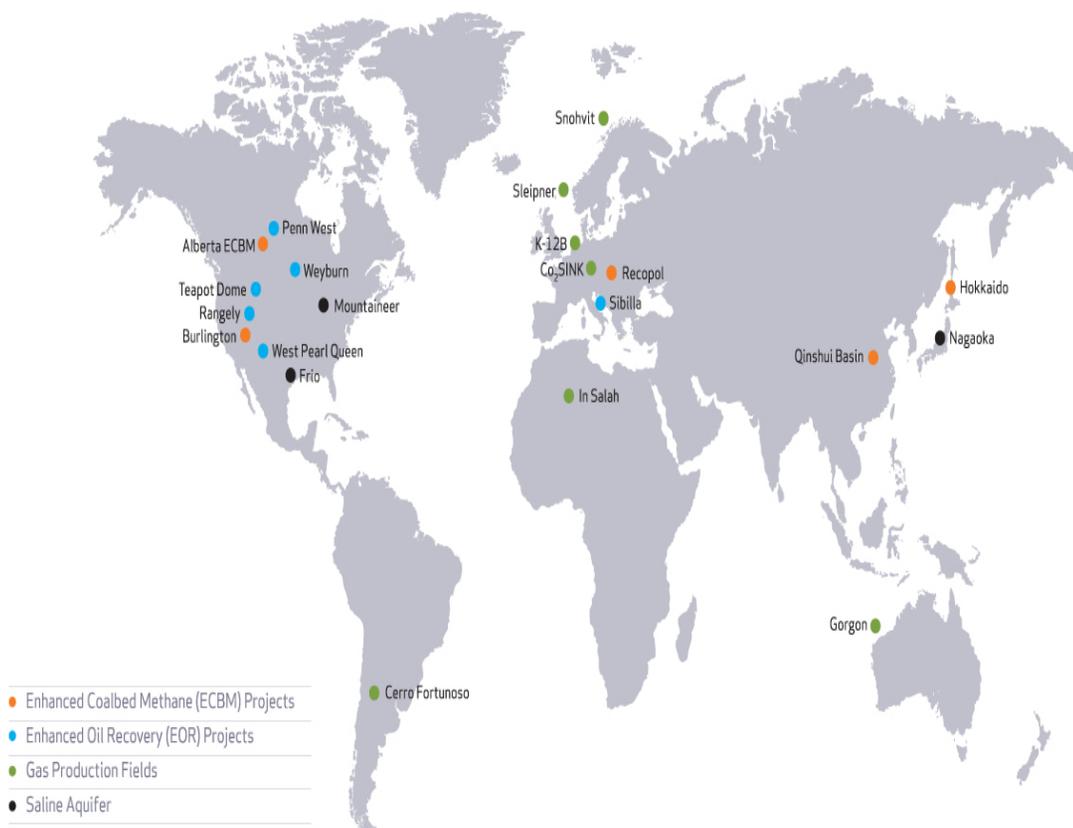
global electricity generating capacity (2000)



Carbon Capture & Storage (CCS)

CO₂ Storage Demonstration Projects

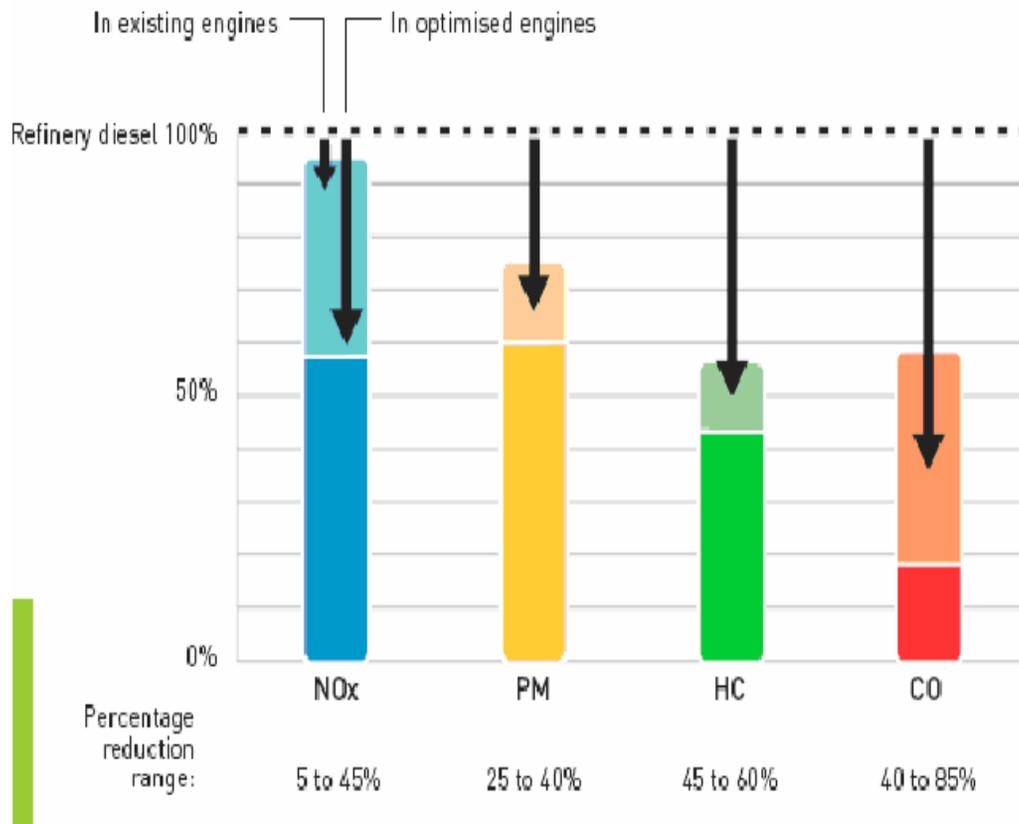
Source: IEA Greenhouse Gas R&D Programme



IPCC Special Report CSS (2005)

- Potential for 2,000 Gt CO₂ geological storage
- Ocean storage could add thousands Gts to this
- Power plants with CCS could reduce CO₂ emissions by 80-90% net
- Majority of CCS technologies either *economically feasible under specific conditions* or part of a *mature market* now
- Potential leakage – very likely < 1% over 100 years; likely < 1% over 1,000 years

Coal-to-Liquids (CTL): the ultra-clean fuel



□ CTL use

- No SO_x – smog/acid rain
- Low NO_x – acid rain
- Low Particulates – smog
- Low CO – health risks
- More efficient, Lower CO_2 – climate change

□ CTL production

- High concentration CO_2 - particularly suited to carbon capture & storage

CTL - prices

- 2006: Oil over \$70 per barrel
- 2030: Oil up to \$90 per barrel

Energy Price Trends (US\$ per tonne of oil equivalent)

Oil
Gas
Coal

Sources: BP 2005; NYMEX; IEA 2006a; MCR 2005

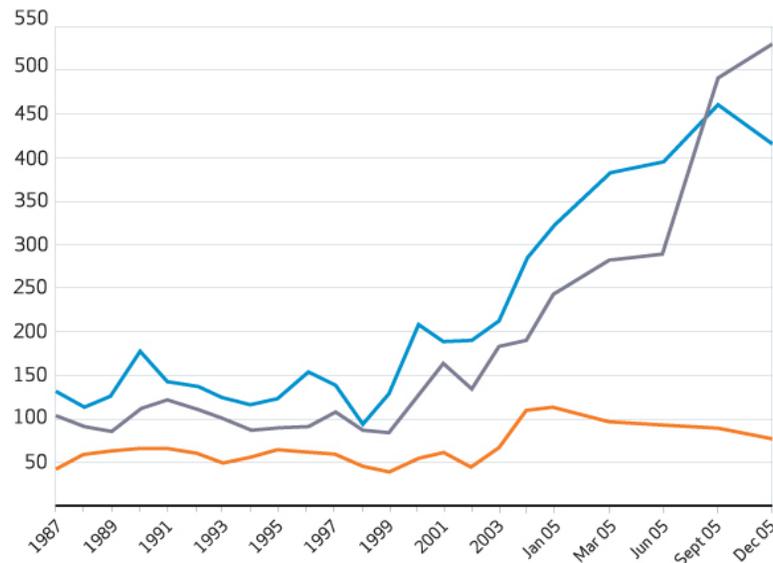
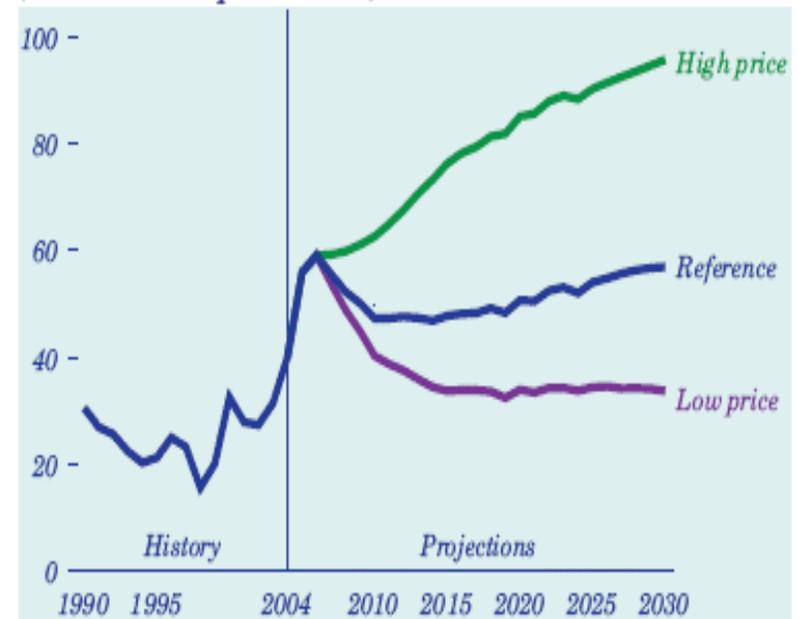


Figure 85. World oil prices in three cases, 1990-2030 (2004 dollars per barrel)



[[Source: US Energy Information Administration, 2005]

- \$27-\$45 / barrel “break even crude oil price” for CTL including CCS

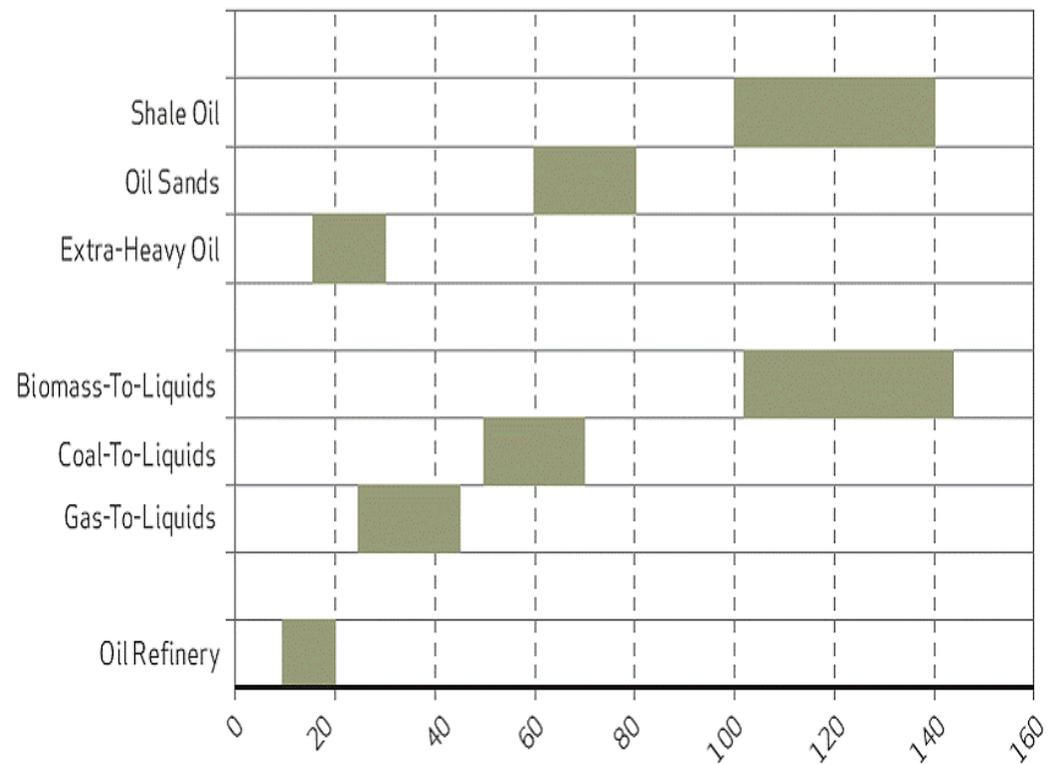
(Princeton University)

CTL – capital cost

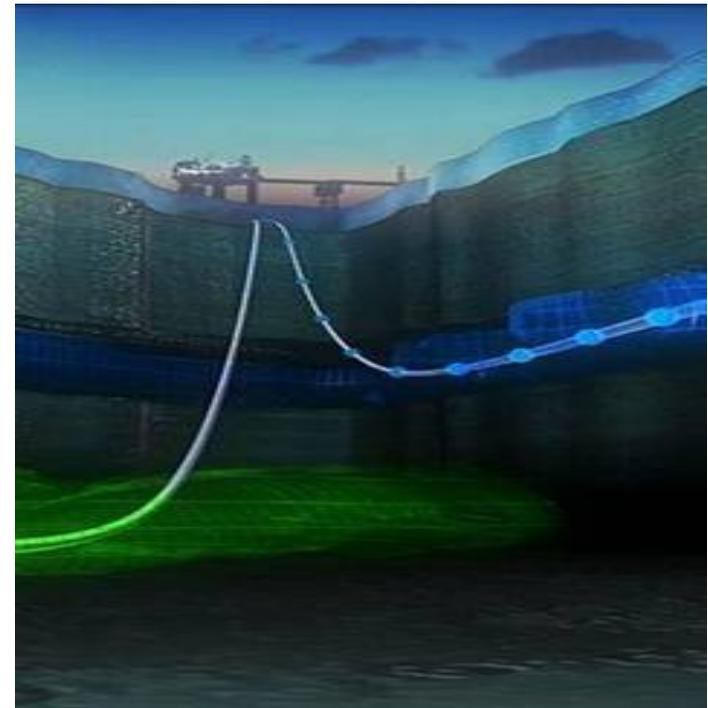
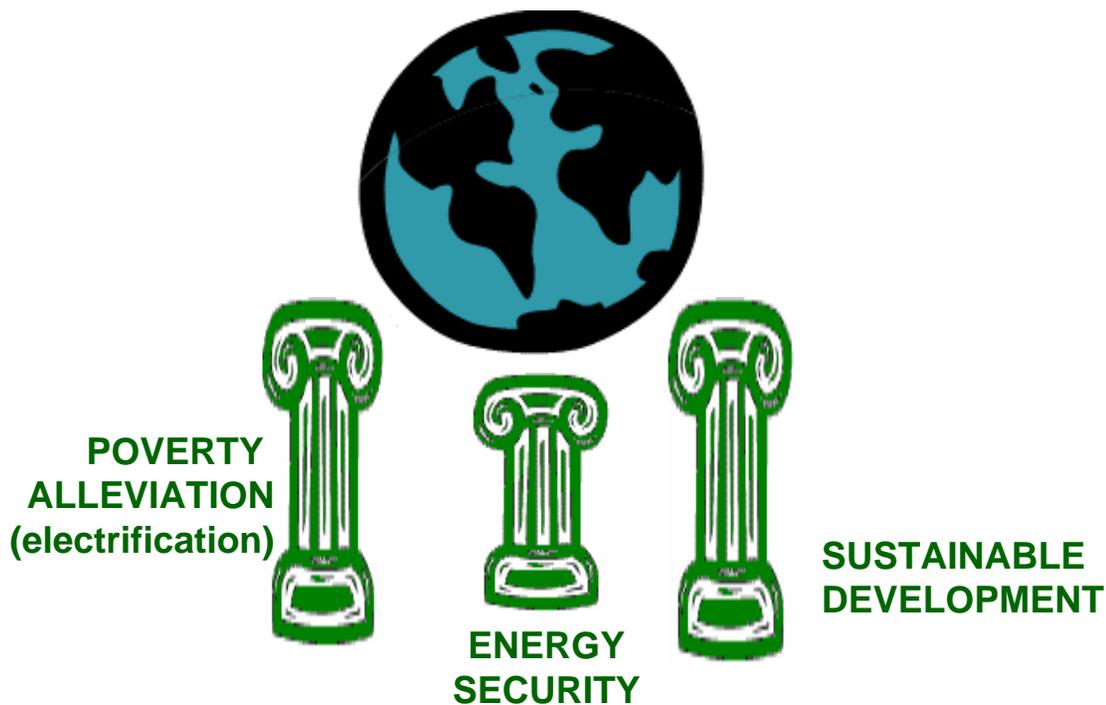
Unconventional Petroleum Liquids Capital Cost Investment (Thousand 2004 per daily barrel of capacity)

Source: Energy administration agency

- ❑ Higher than conventional oil
- ❑ Lower than other alternatives
- ❑ *May* require government support



Coal is *indispensable* to solving the great challenges of our world



Technology
clean coal technologies
carbon capture & storage
coal to liquids

Thank you

www.worldcoal.org

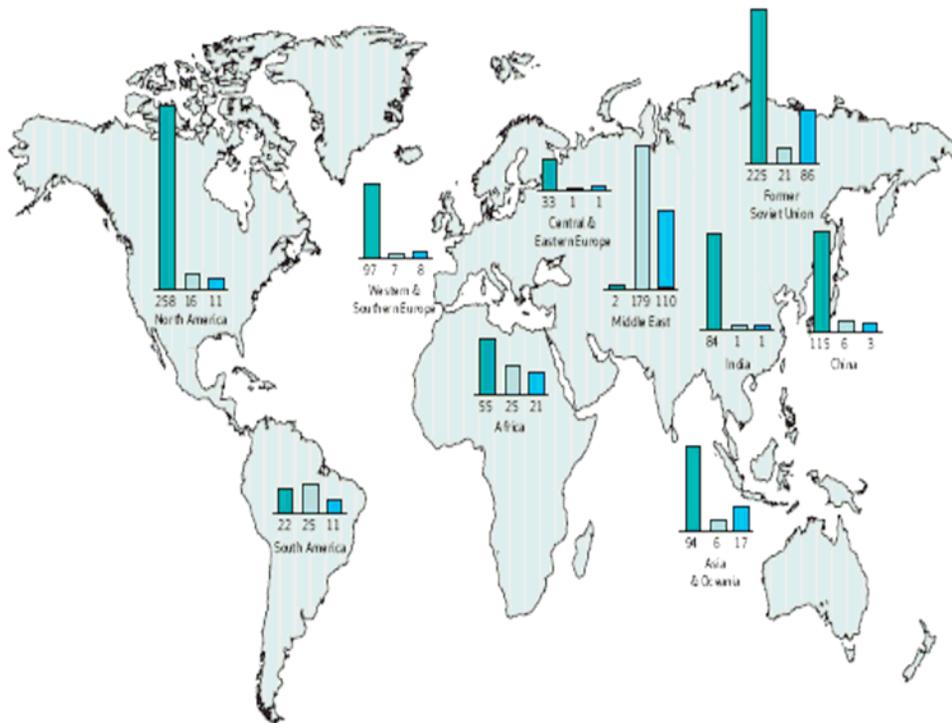


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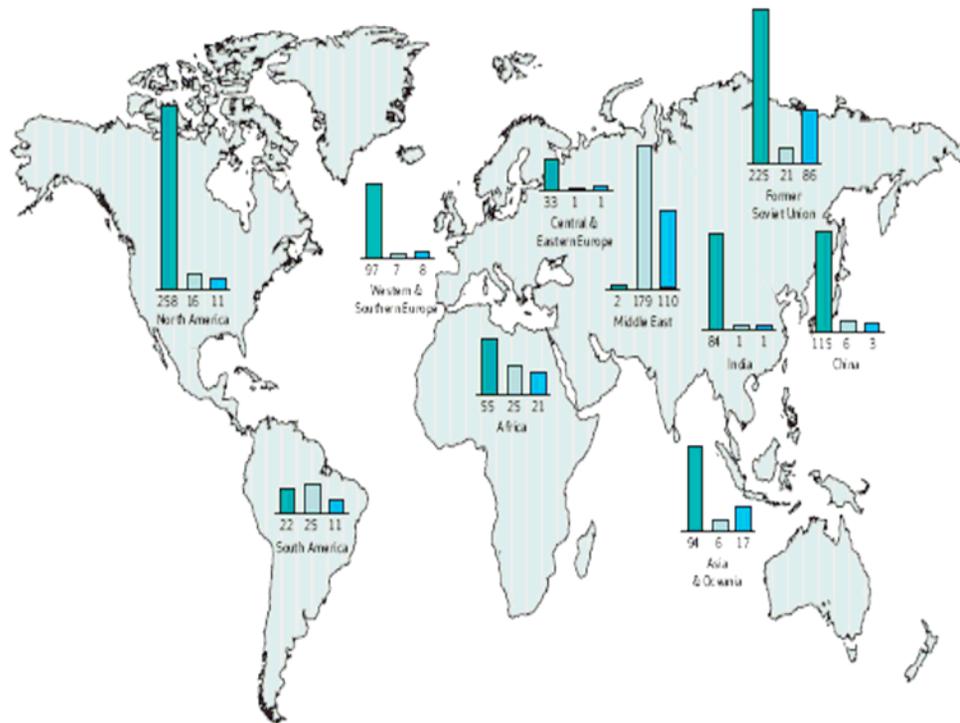


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