

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



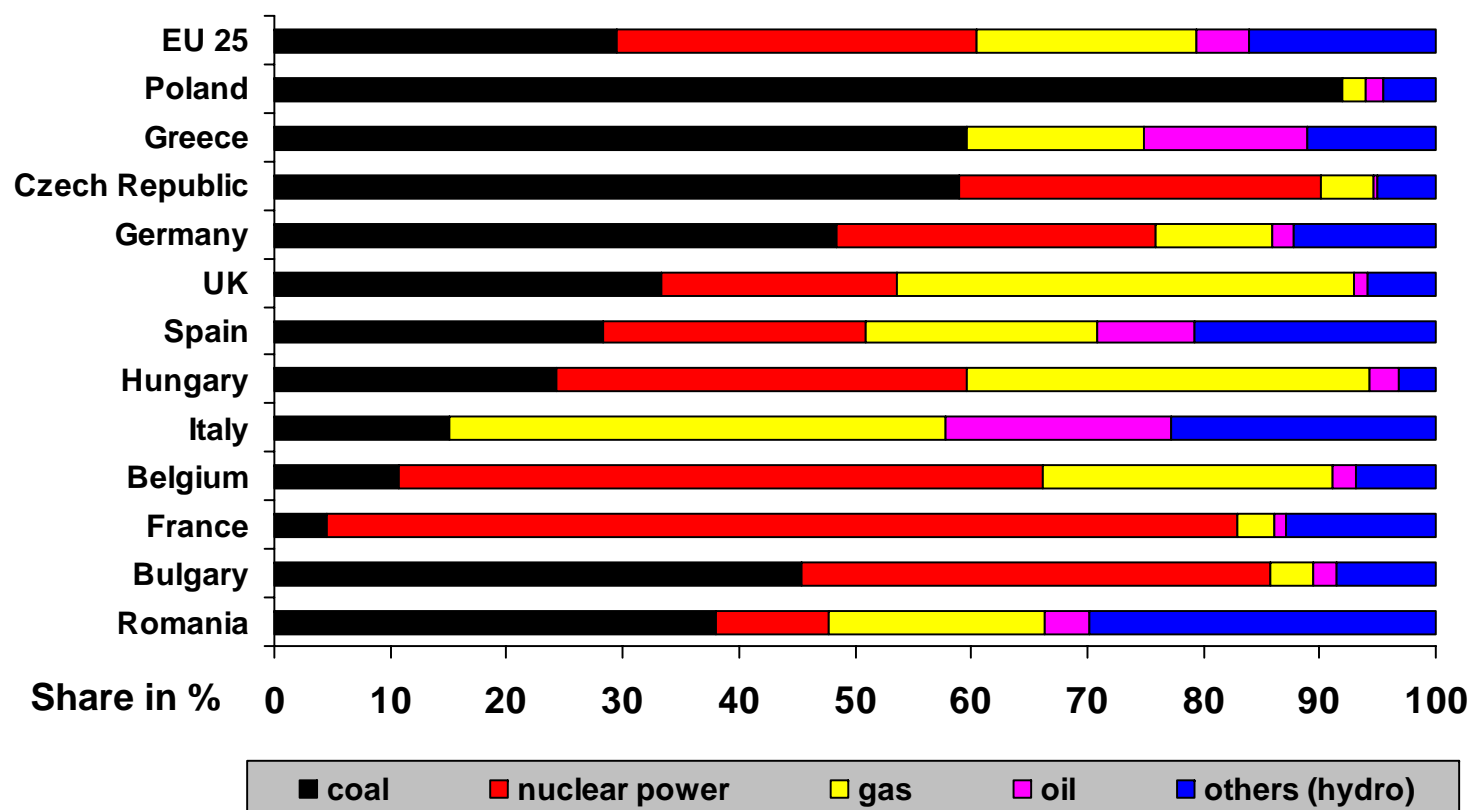
66% of the world's steel is produced using coal

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**



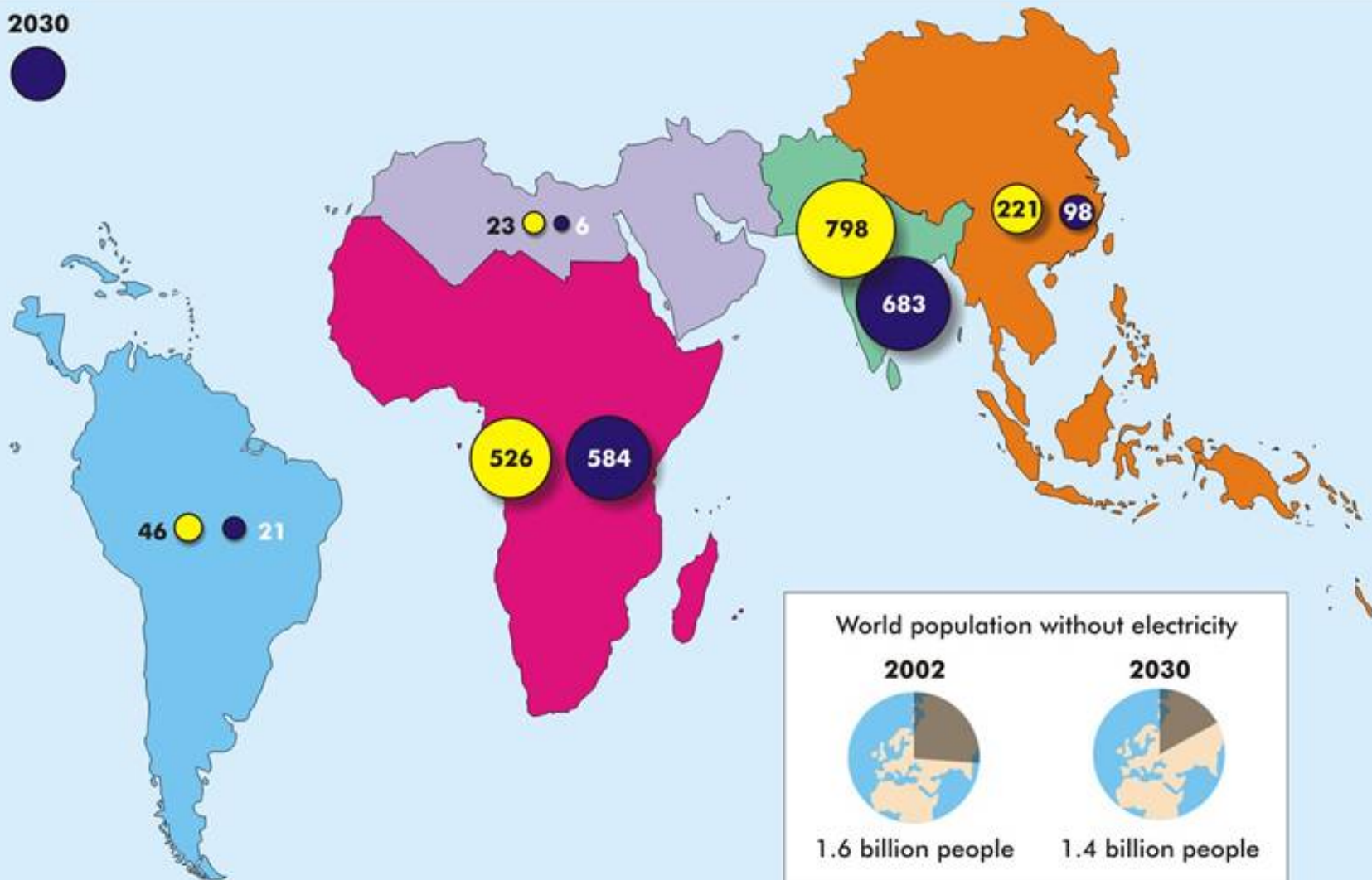
**SUSTAINABLE
DEVELOPMENT**



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

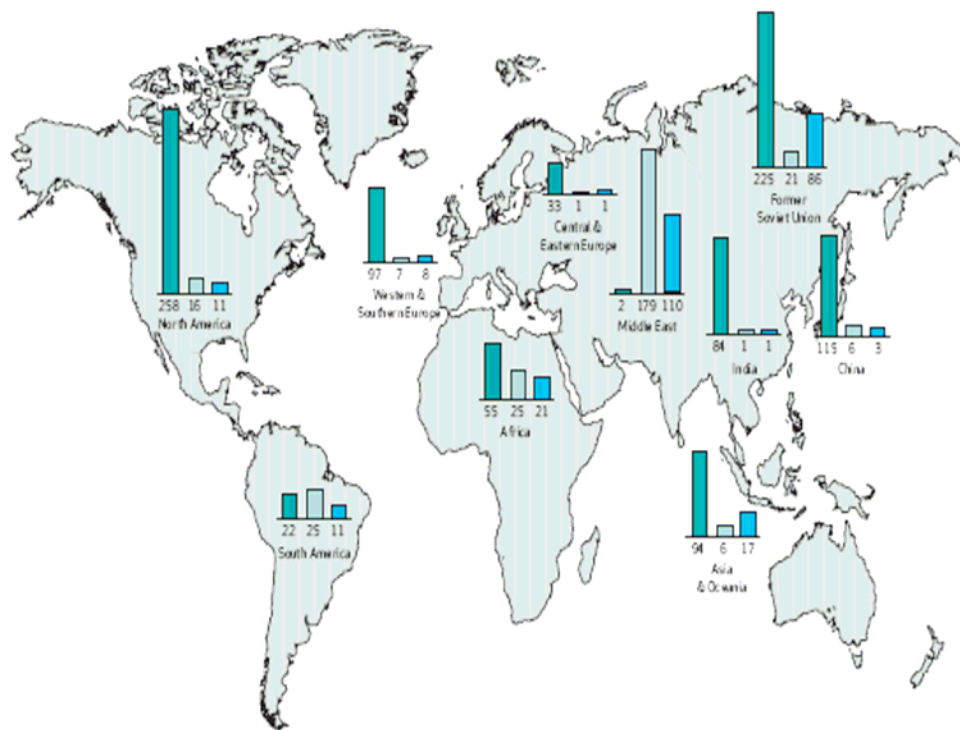
- Electrification rate of only **10%**
 - 575 million people rely on biomass for energy

Coal enhances global energy security

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

■ Coal
■ Oil
■ Gas

Source: Optima 2005



FINANCIAL TIMES FRIDAY OCTOBER 20 2006

WORLD NEWS

Opec vows to defend minimum \$60 for oil

By Carole Hays in Doha

The Organisation of Petroleum Exporting Countries, the cartel that controls 40 per cent of the world's supply, yesterday declared its intention to defend the price of oil at \$60 a barrel. The group's decision, which was announced in a statement, comes as oil prices have risen to a record high of \$70 a barrel. Opec's decision is seen as a signal that the cartel is determined to defend its members' interests and to prevent a collapse in oil prices.



✓ Abundant

✓ Globally distributed

✓ Affordable & stable in price

✓ Safe & reliable



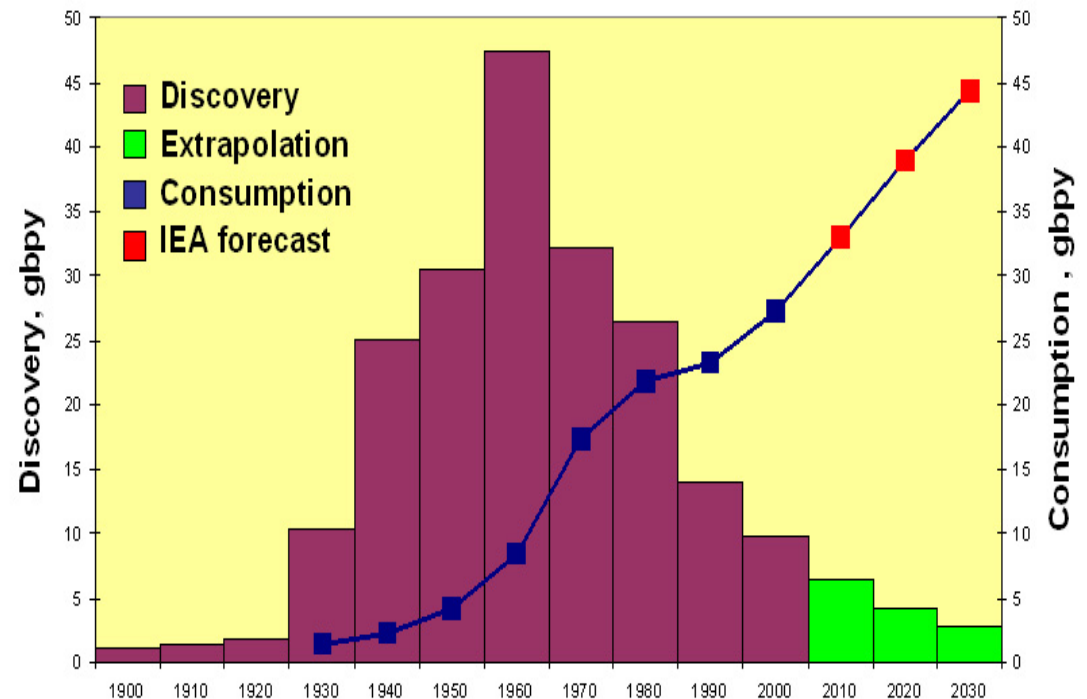
Limited energy options: oil and gas

■ 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

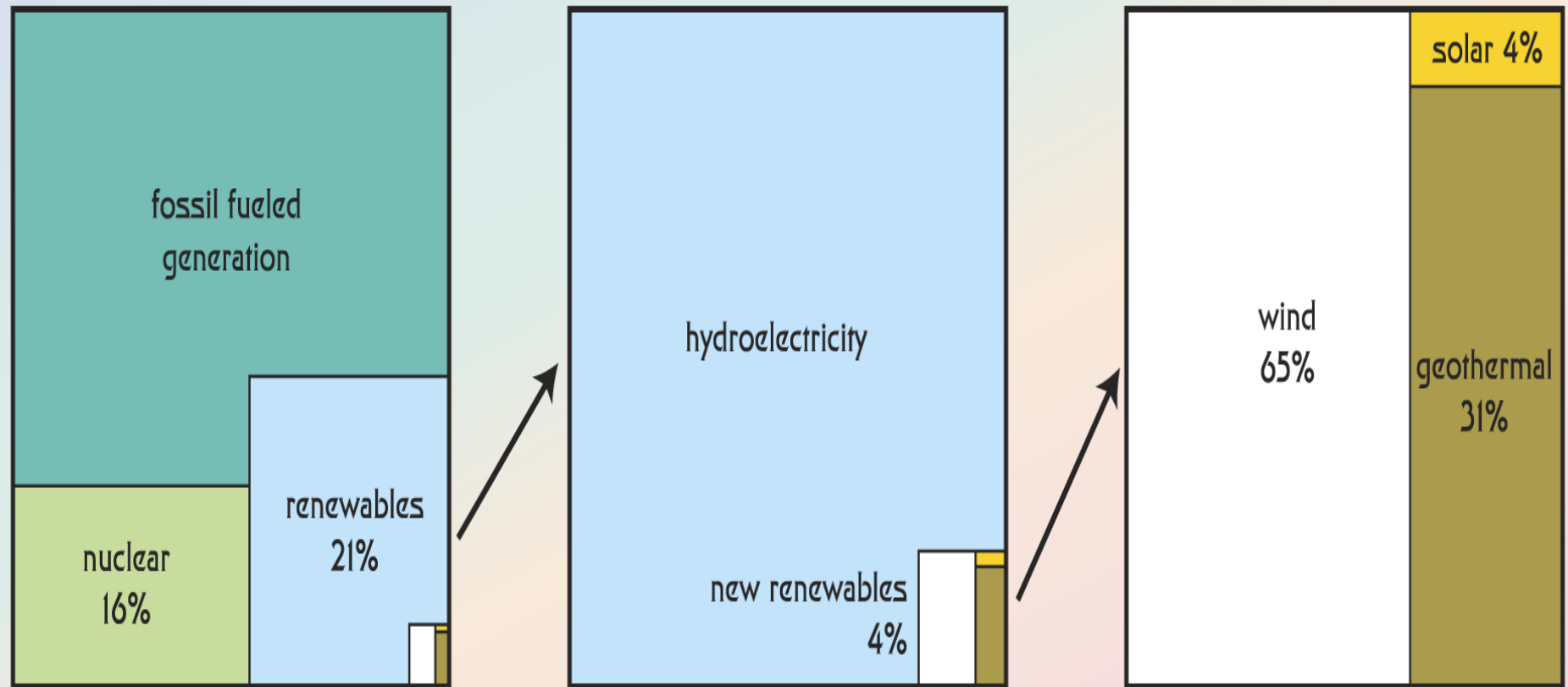


Source: World Watch Magazine, January-February 2006.
Published by the World Watch Institute.
"Oil: A Bumpy Road Ahead", Kjell Aleklett

Limited energy options: nuclear & renewables

(... size does matter)

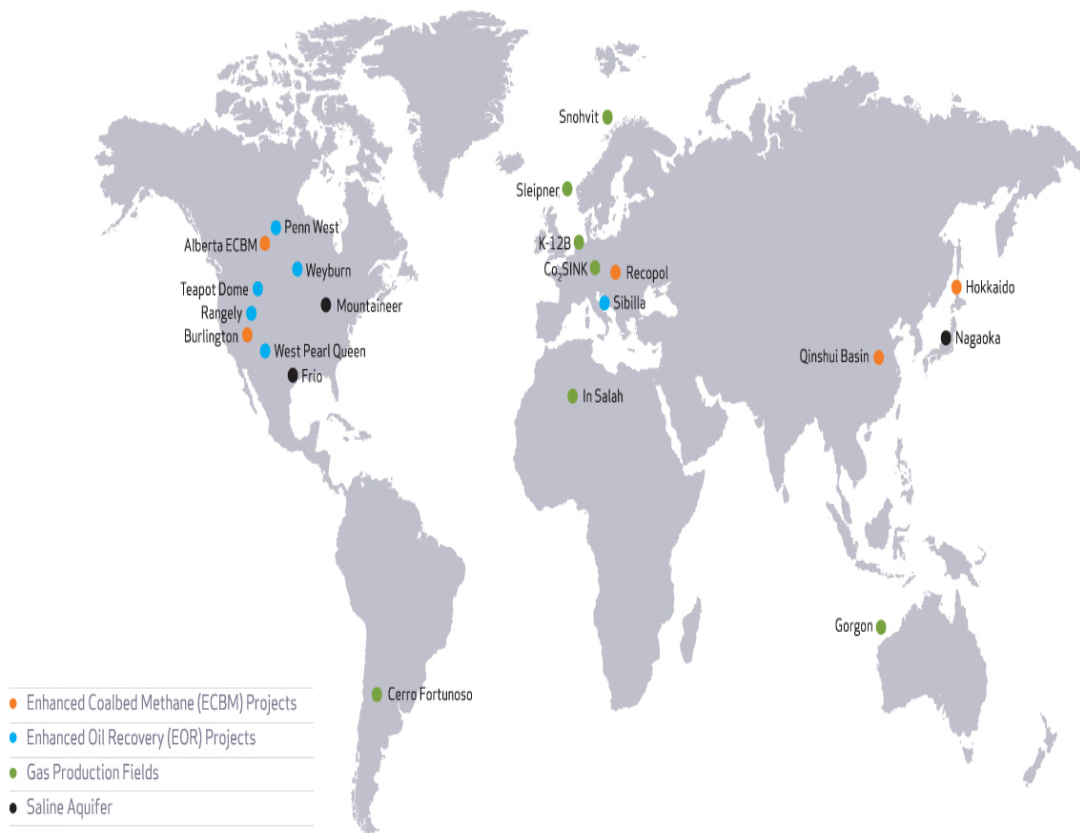
global electricity generating capacity (2000)



Carbon Capture & Storage (CCS)

CO₂ Storage Demonstration Projects

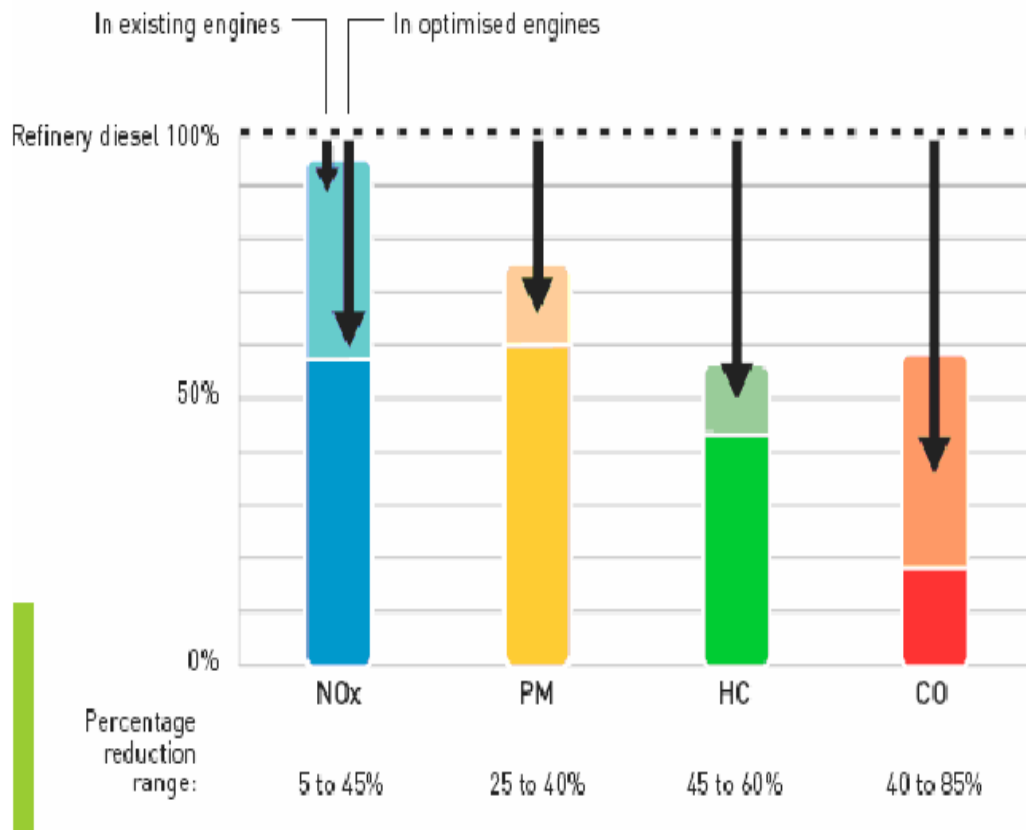
Source: IEA Greenhouse Gas R&D Programme



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

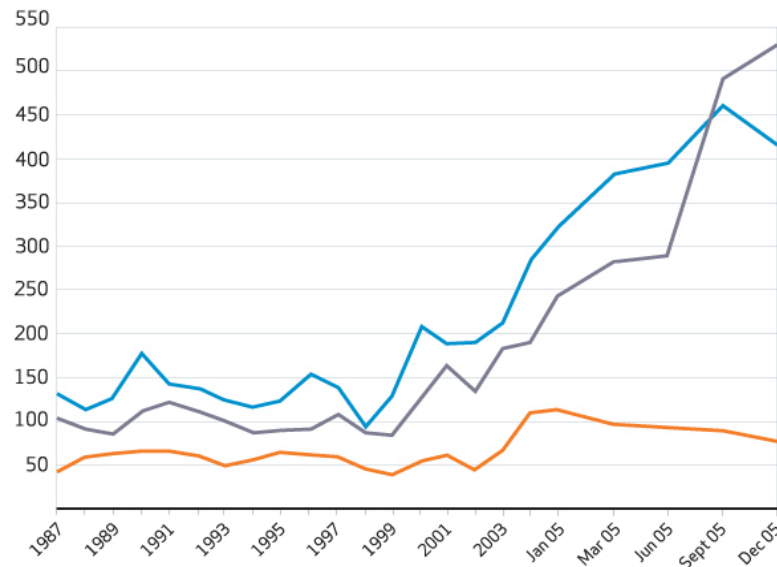
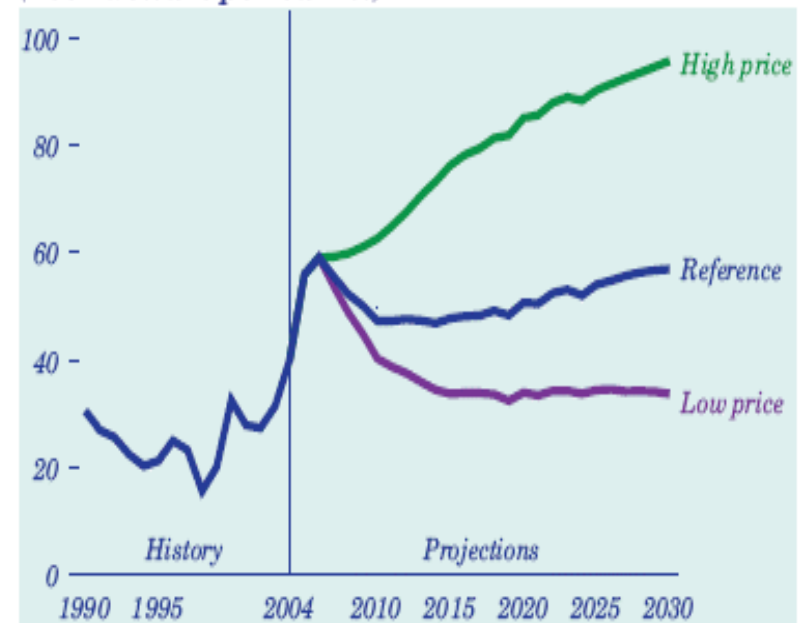


Figure 85. World oil prices in three cases, 1990-2030 (2004 dollars per barrel)



[[Source: US Energy Information Administration, 2005]

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

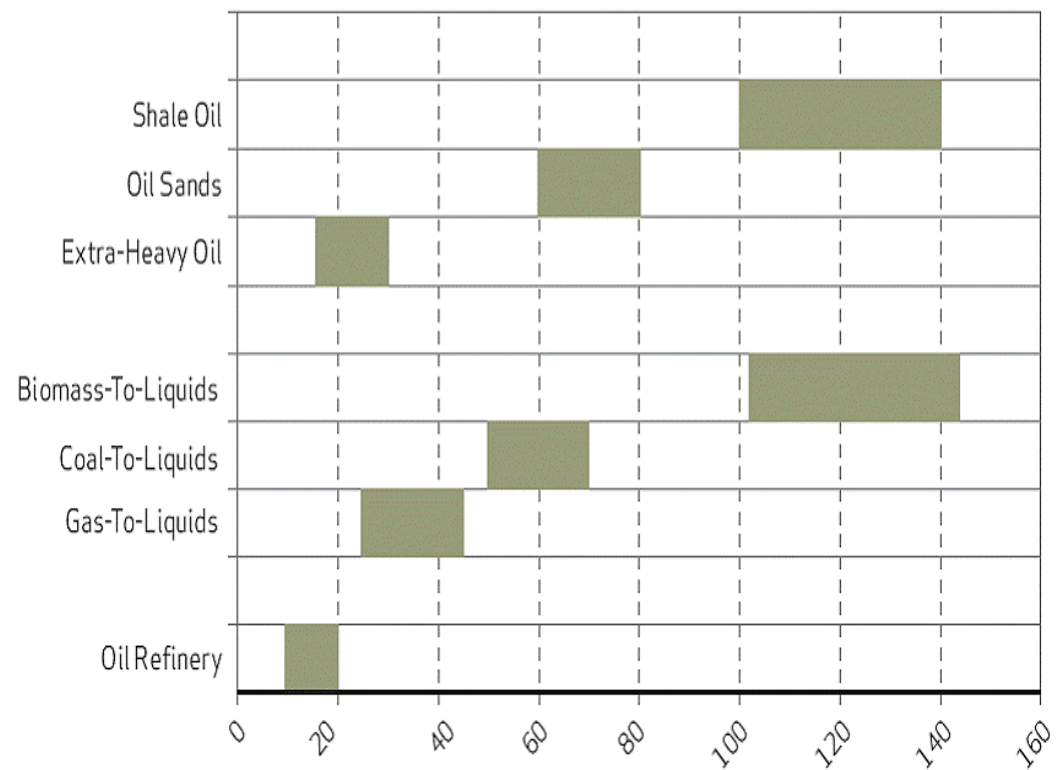
(Princeton University)

CTL – capital cost

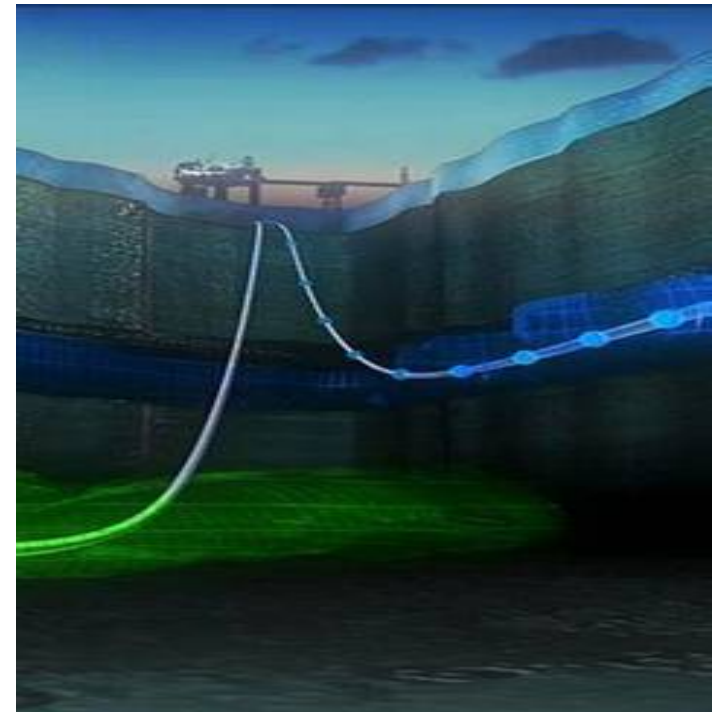
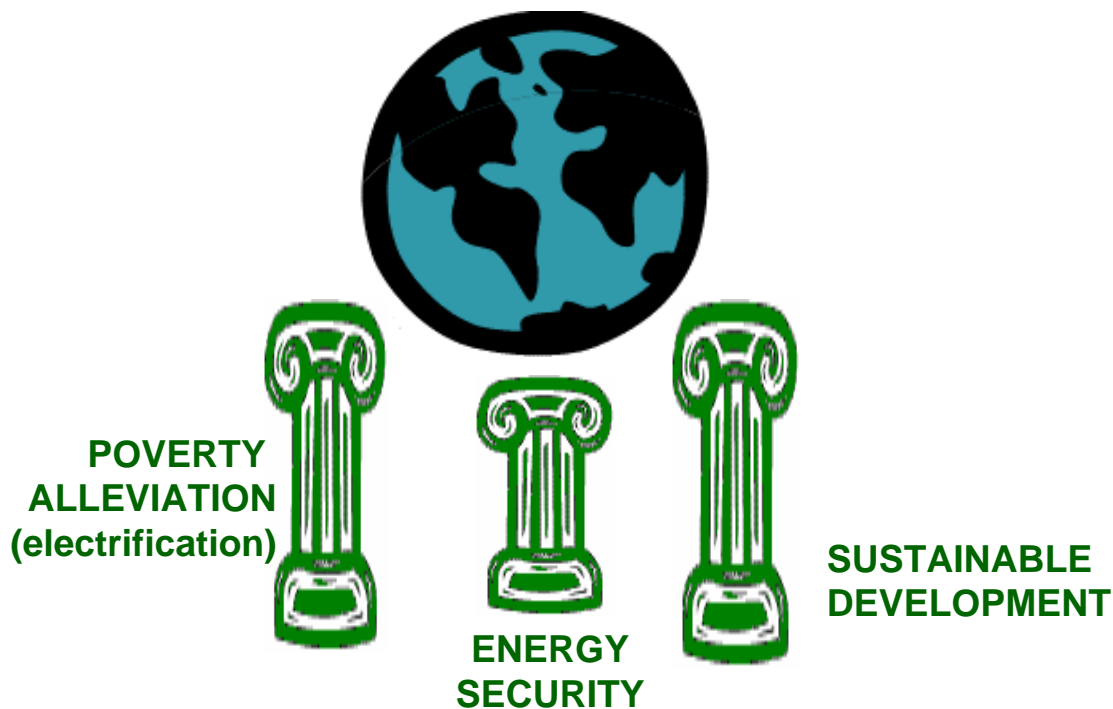
Unconventional Petroleum Liquids Capital Cost Investment (Thousand 2004 per daily barrel of capacity)

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

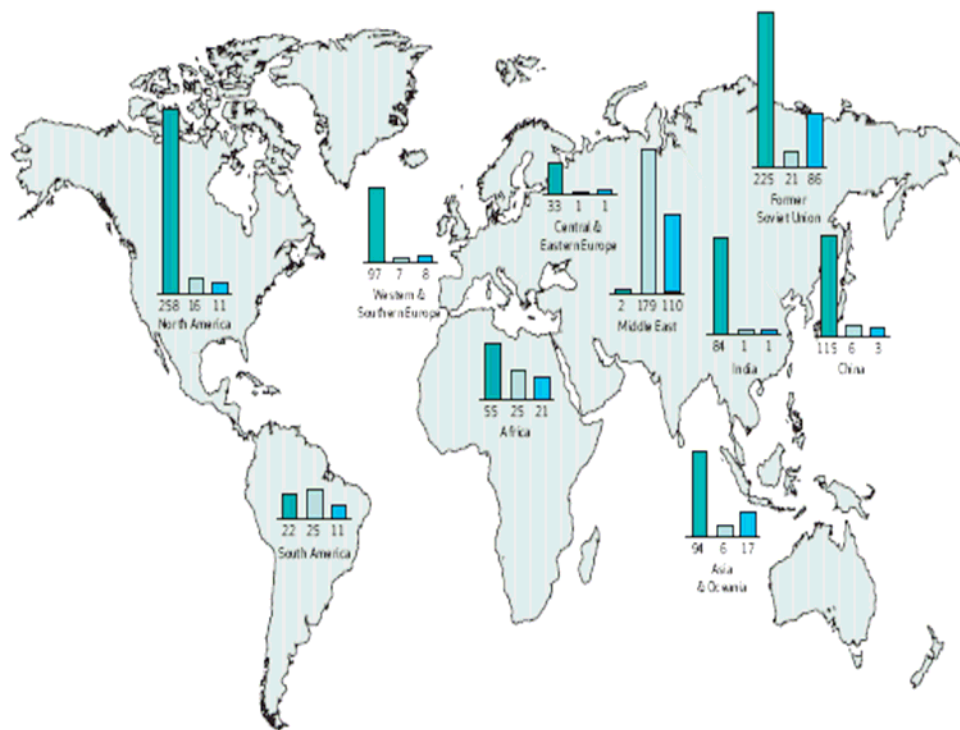


Coal enhances global energy security

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

■ Coal
■ Oil
■ Gas

Source: Optima 2005



FINANCIAL TIMES FRIDAY OCTOBER 20 2006

WORLD NEWS

Opec vows to defend minimum \$60 for oil

By Carole Hays in Doha

The Organisation of Petroleum Exporting Countries, the cartel that controls 40 per cent of the world's supply, yesterday declared its resolve to defend oil at a new minimum international oil price. Saudi Arabia, the world's biggest oil producer, backed an immediate Opec output cut of 1m barrels a day and warned that a second reduction would be considered if necessary.

when the decision is taken it has already been priced into the market, that sometimes Opec can surprise. But oil producers' new-found resolve could yet backfire as high oil prices fuel inflation and further damage economic growth, which has already slowed in the US, the cartel's main oil

Producers have watched with concern as crude oil prices rose to over \$80 a barrel in recent weeks, and



Opec oil output and production

Oil price

Major oil companies that have production cuts if Opec reduces



Coal enhances global energy security

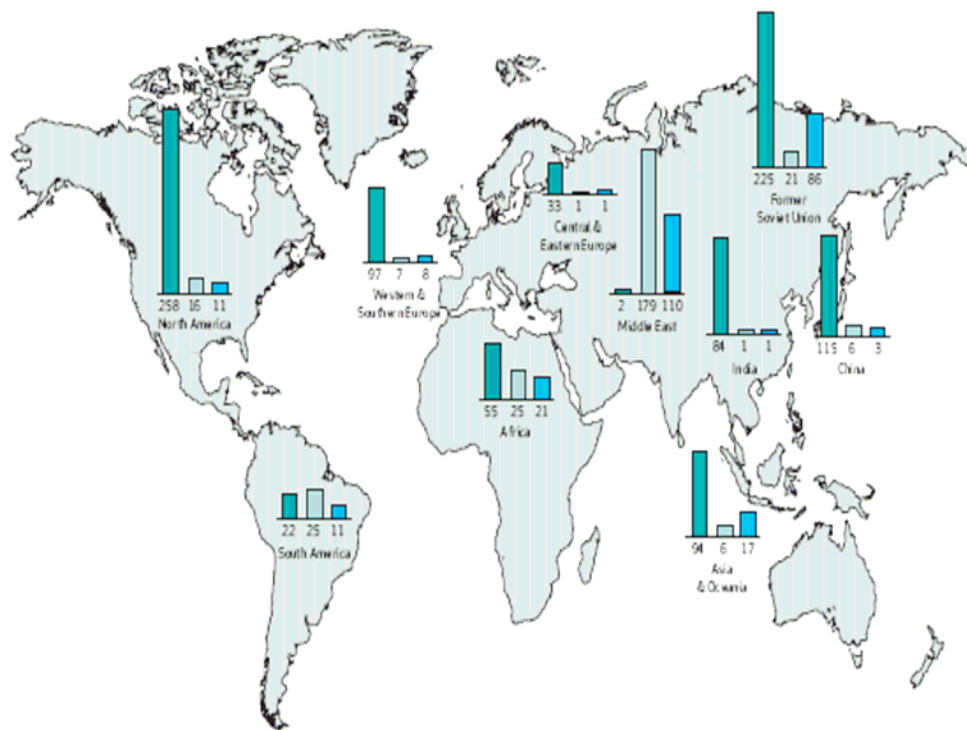
Location of the World's Main Fossil Fuel Reserves (Gigatonnes of coal equivalent⁵)

■ Coal

■ Oil

■ Gas

Source: Optima 2005



- ✓ Abundant
- ✓ Globally distributed
- ✓ Affordable & stable in price
- ✓ Safe & reliable