



INTERNATIONAL ENERGY AGENCY



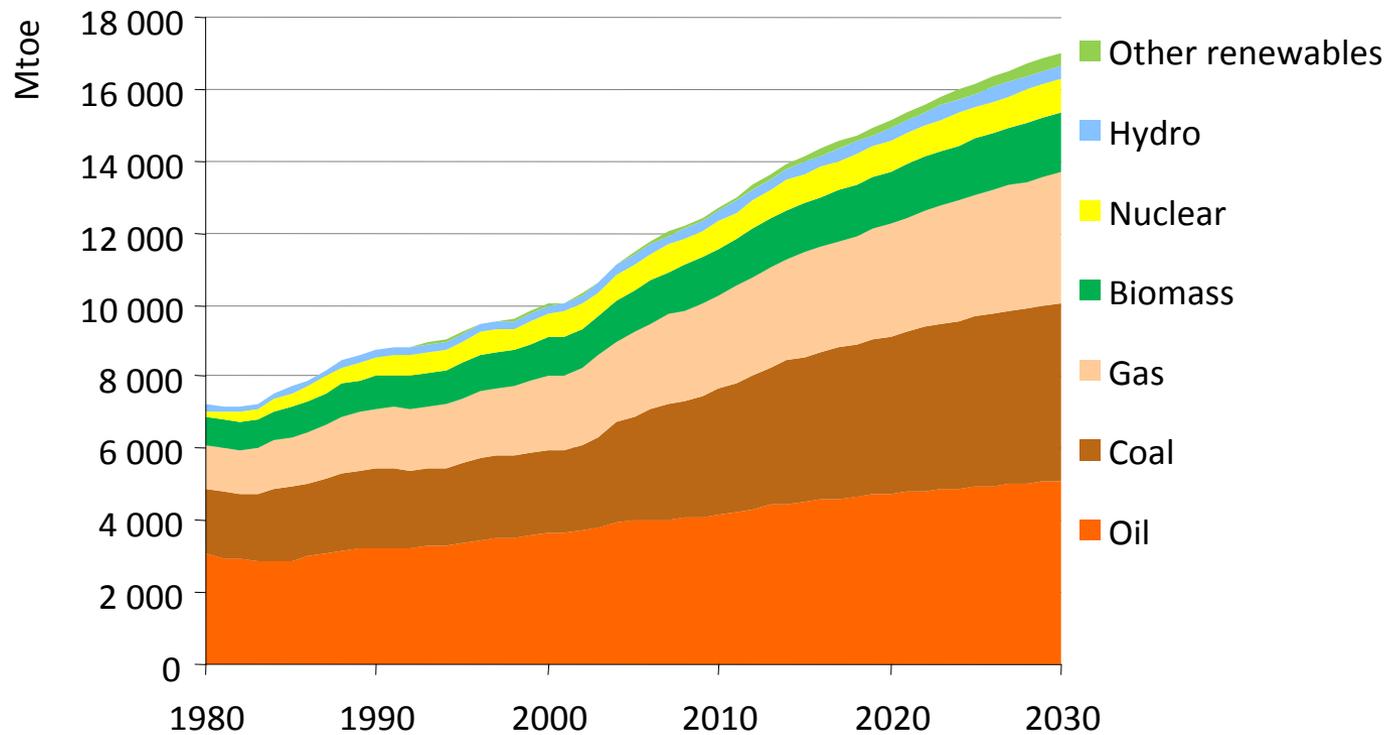
Energy Security: A Global Challenge

National Defense University
29-30 September 2009

The emerging petroleum and natural gas economy

Ambassador Richard H. Jones
Deputy Executive Director
International Energy Agency

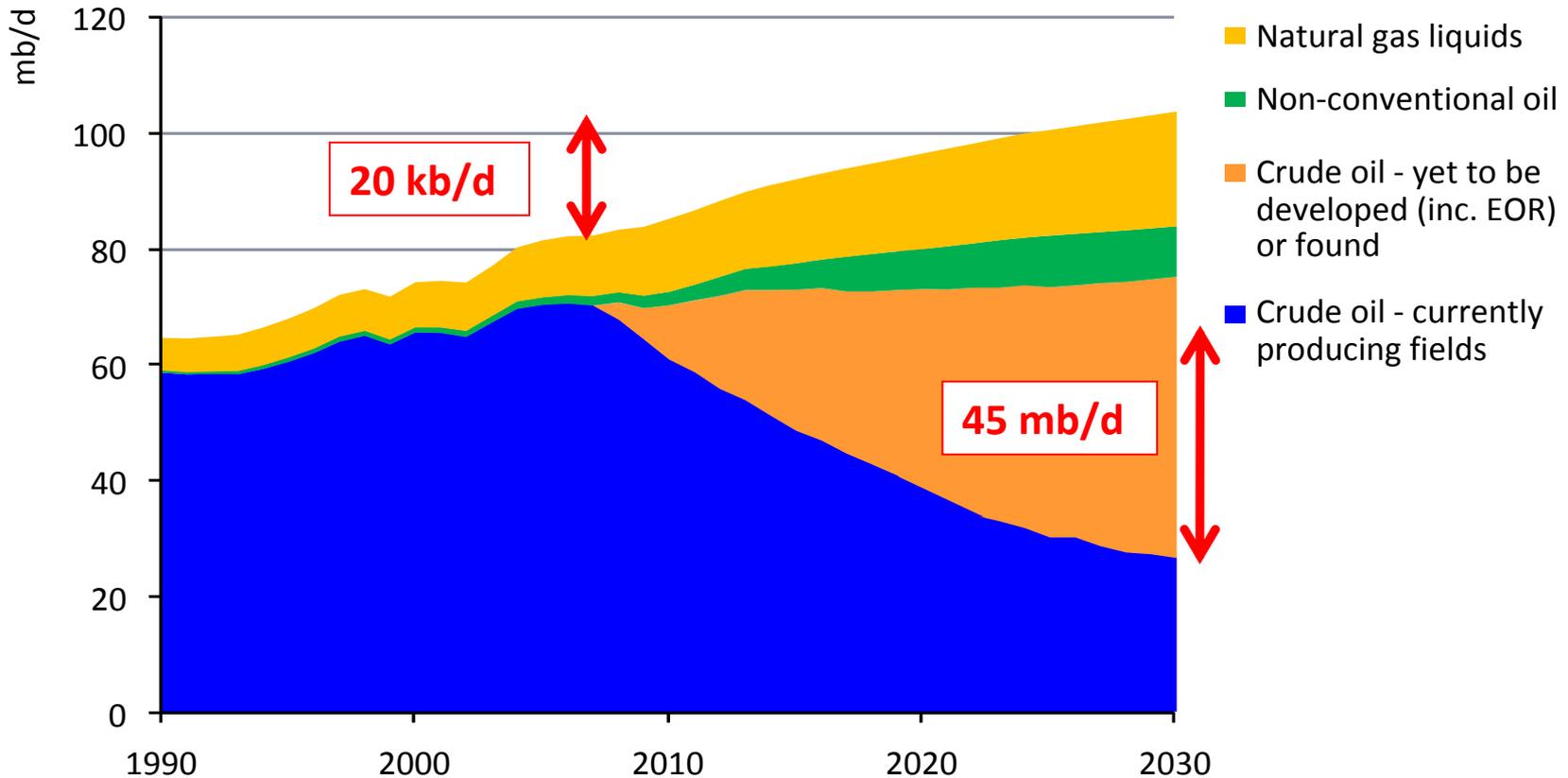
World primary energy demand in the Business as Usual Scenario



World Energy Outlook 2008, IEA

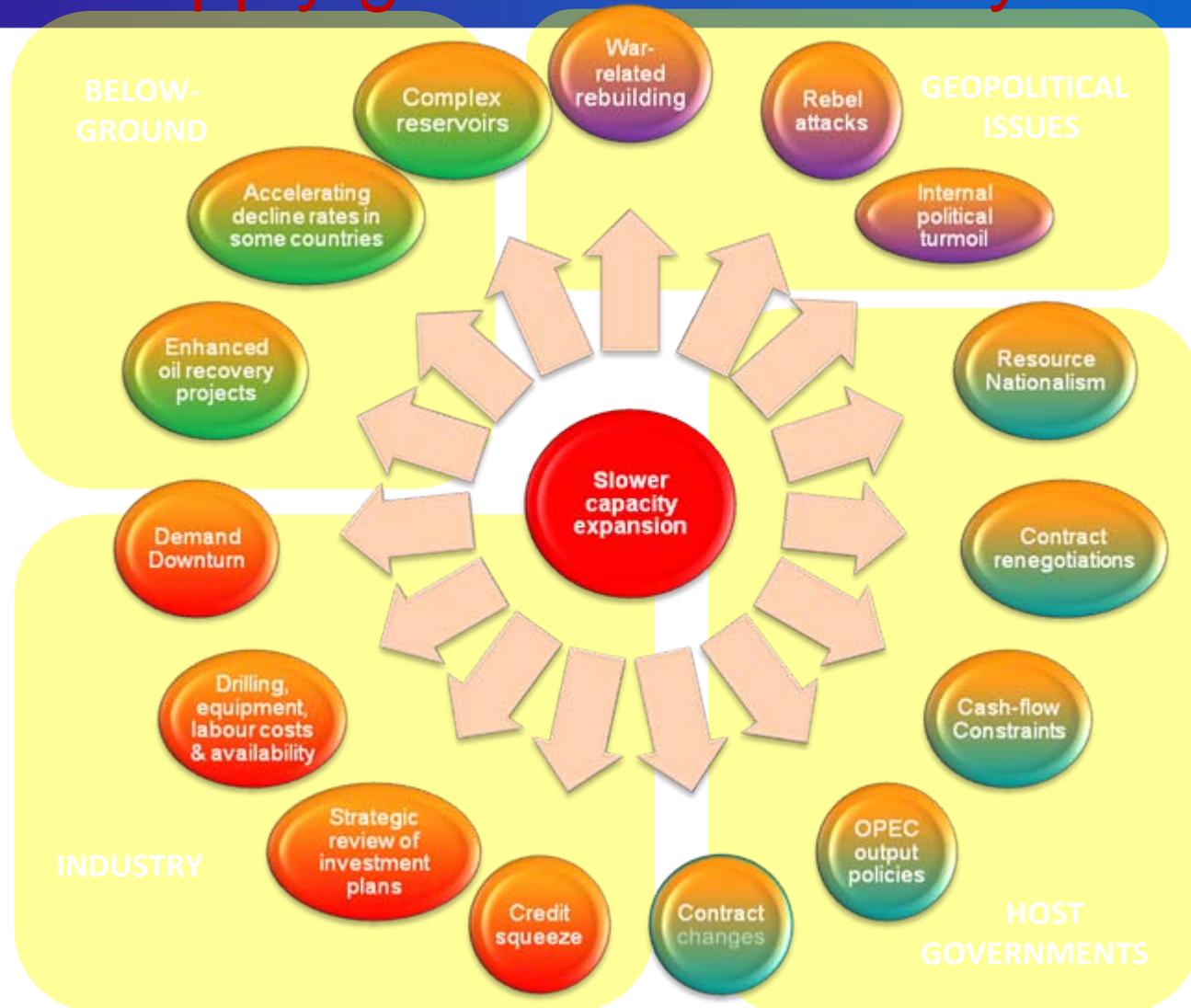
World energy demand expands by 45% between now and 2030 – an average rate of increase of 1.6% per year – with coal accounting for more than a third of the overall rise.

World oil production by source in the Reference Scenario



We need more oil to offset declining production from existing fields than to meet rising demand.

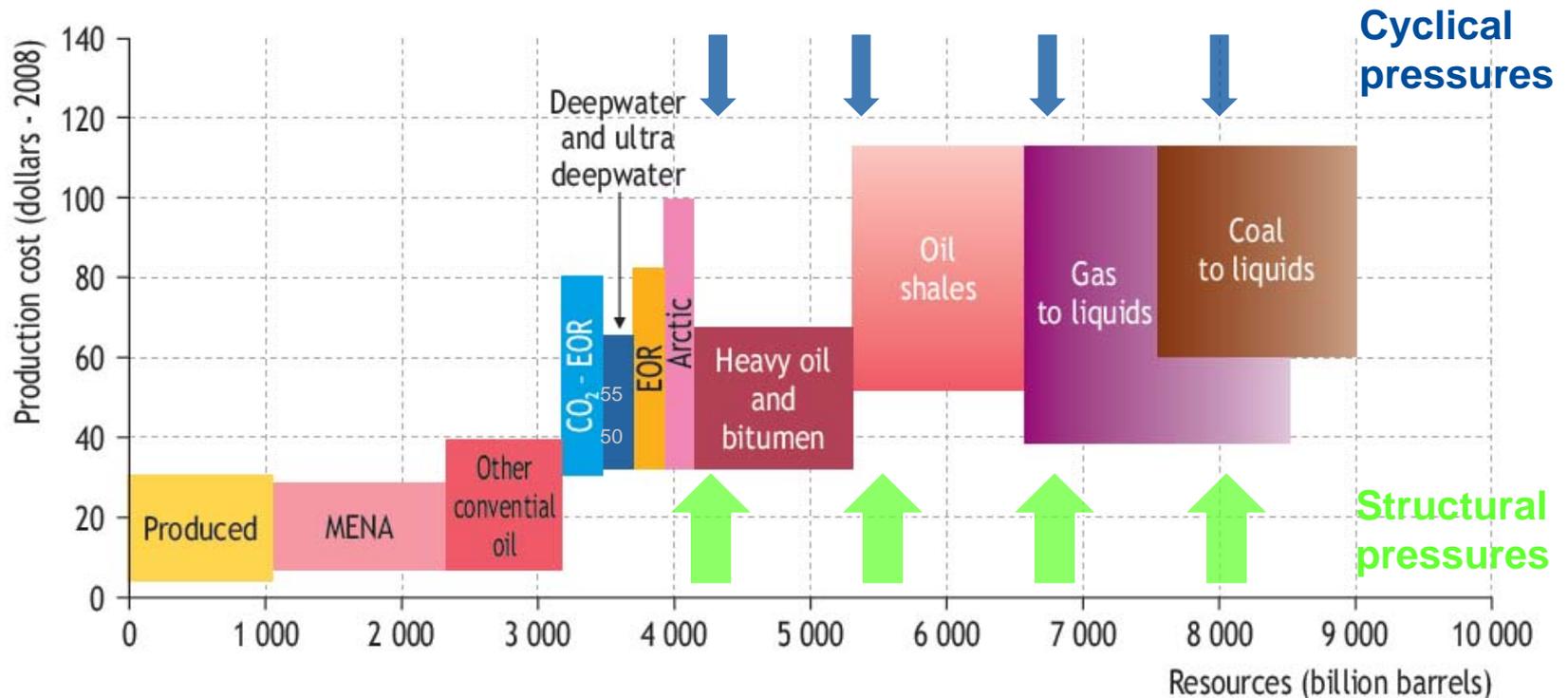
Peak oil or multiple peak oil? Either way, slower supply growth here to stay



Structural shift to more difficult oil (access constraints) ...but cyclical element to costs too

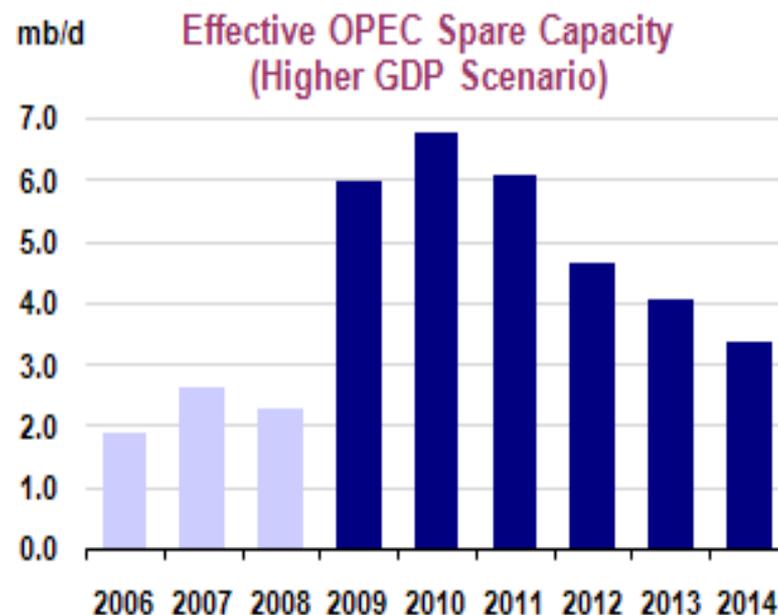
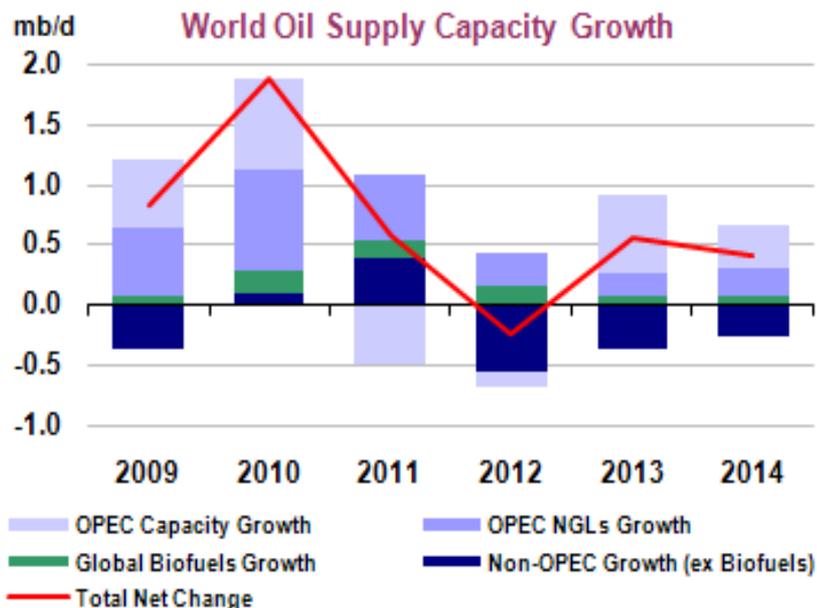


Figure 9.10 • Long-term oil-supply cost curve

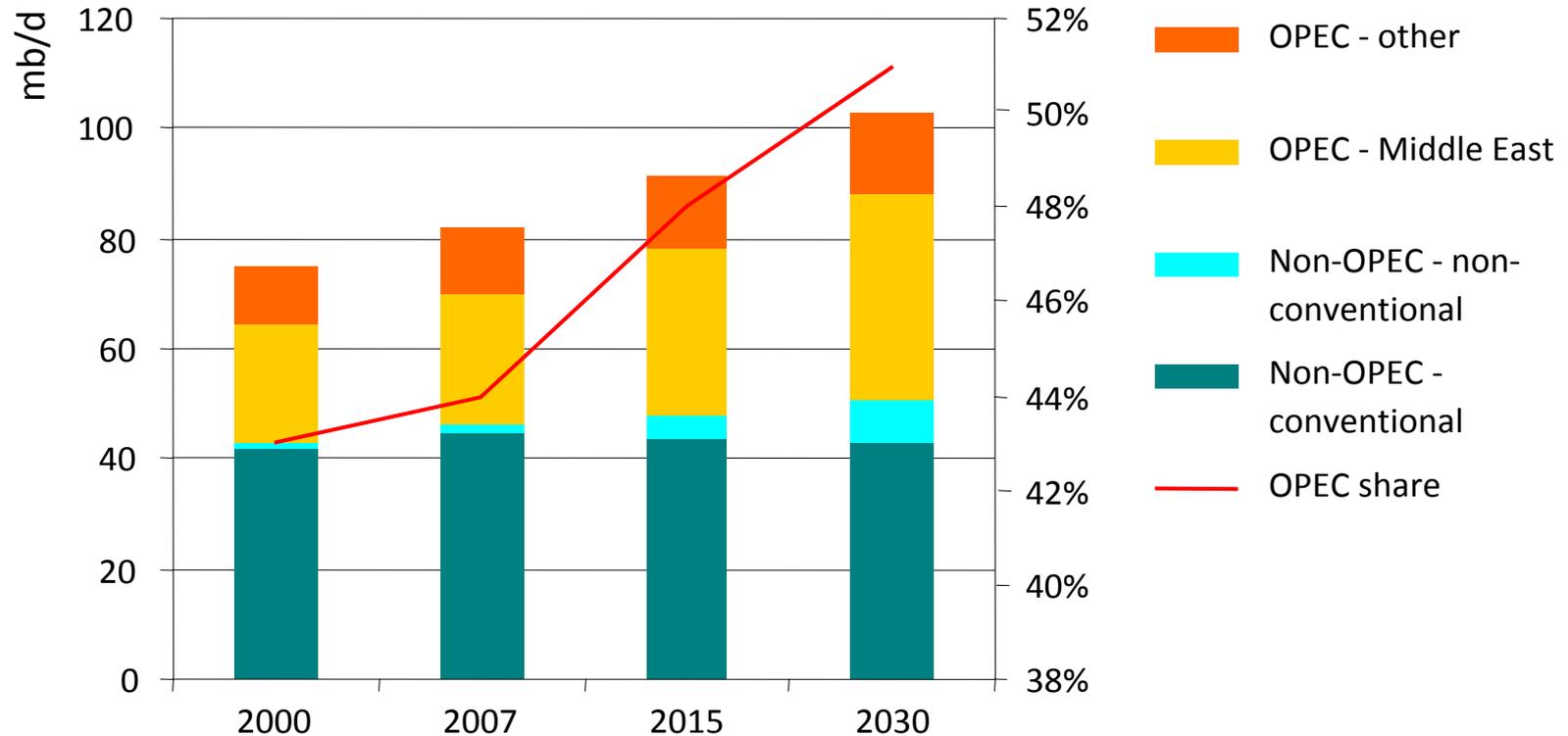


- *Cost curves have moved higher, \$60-80/bbl for some oil sands projects*
- *Deep water not far behind*
- *But some cyclical easing of earlier cost inflation also now evident*
- *So picking an arbitrary 'ideal' price makes little sense*

Two market paths to mid-decade: supply crunch or comfortable capacity margin

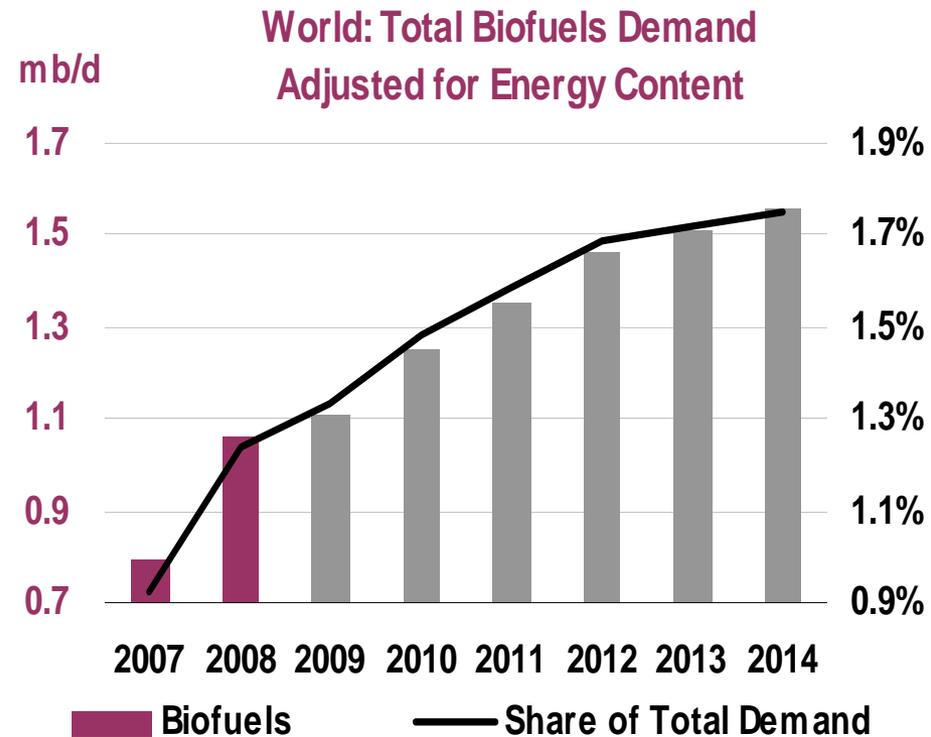
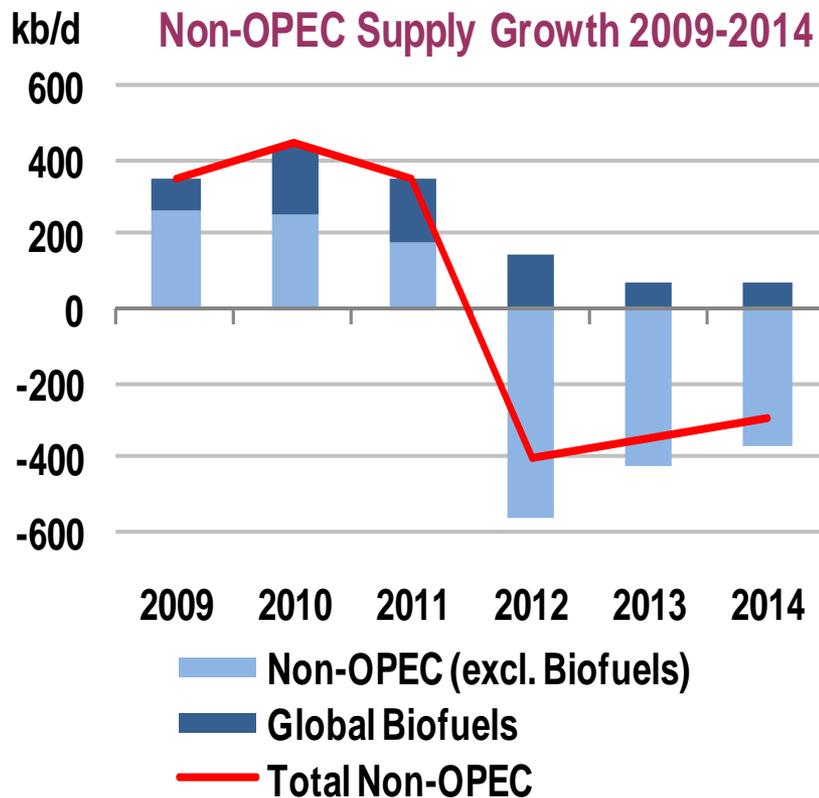


World oil production by OPEC/non-OPEC in the Reference Scenario



Production rises to 104 mb/d in 2030, with Middle East OPEC taking the lion's share of oil market growth as conventional non-OPEC production declines

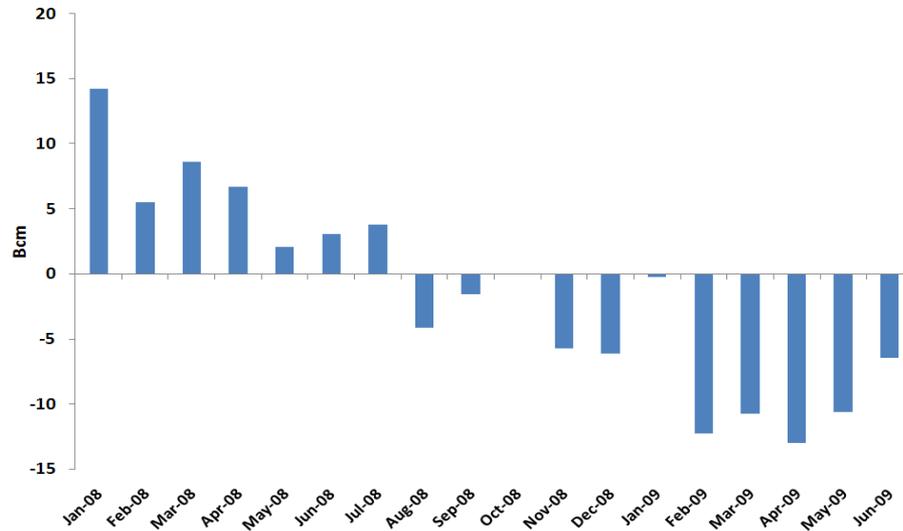
Though volumes are small, biofuels growth provides a safety valve for oil markets



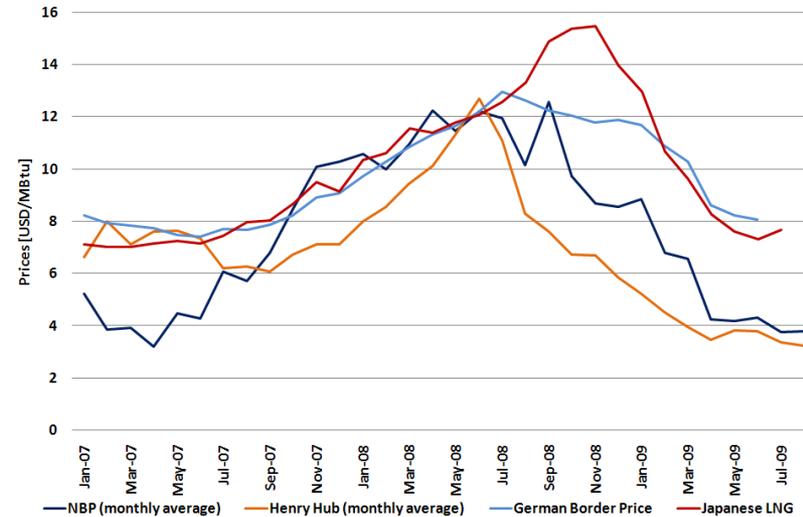
Recent Gas market developments



OECD Gas Demand, Changes yoy



International gas prices

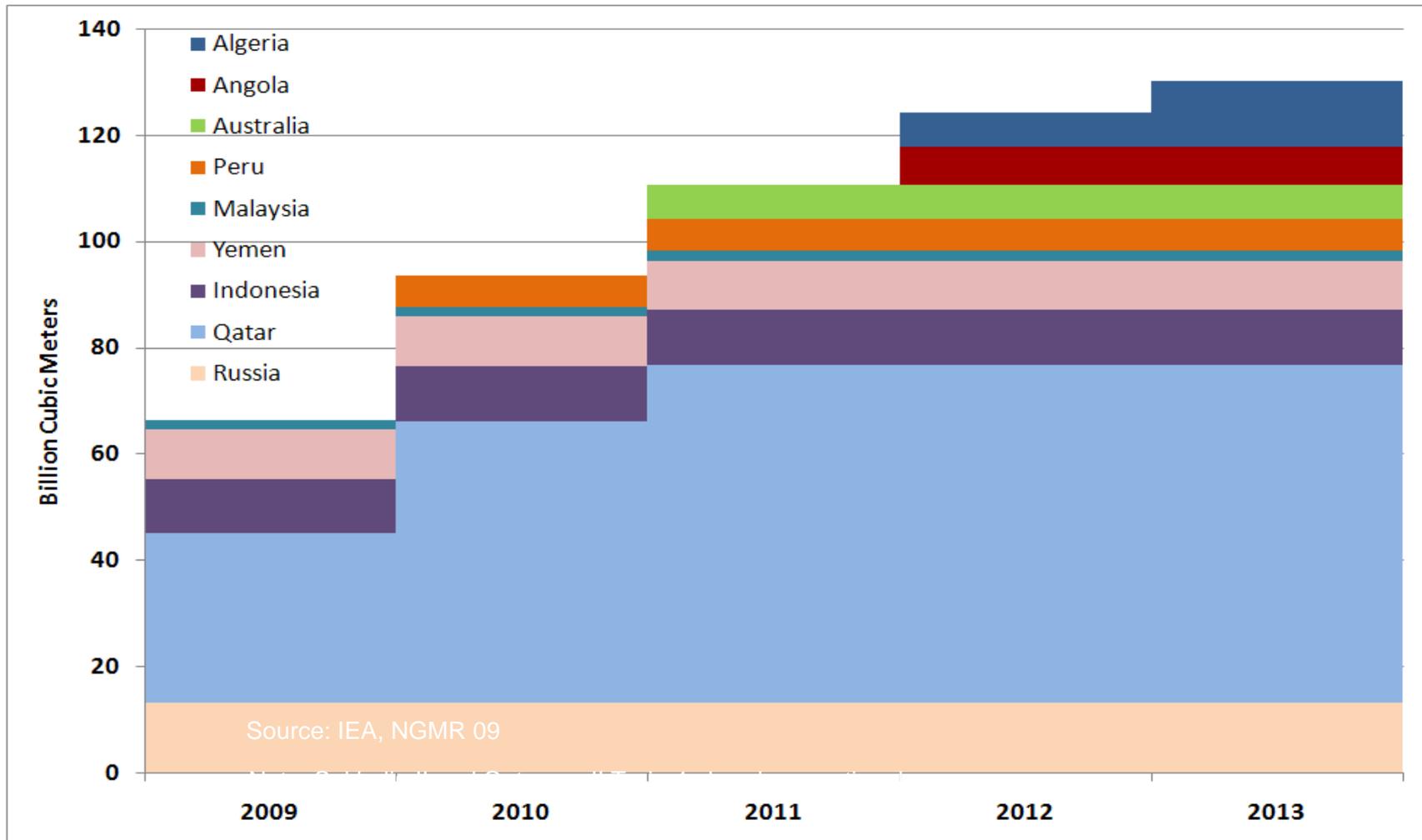


Recent market developments

- ◆ Gas demand is weakening in major economies
- ◆ Prices have peaked before collapsing to a fifth of last year's level
- ◆ Unconventional gas developments have had global impact on gas trade
- ◆ Gas exchanges are globalizing

Significant liquefaction capacity to start

Capacity does not mean production ...

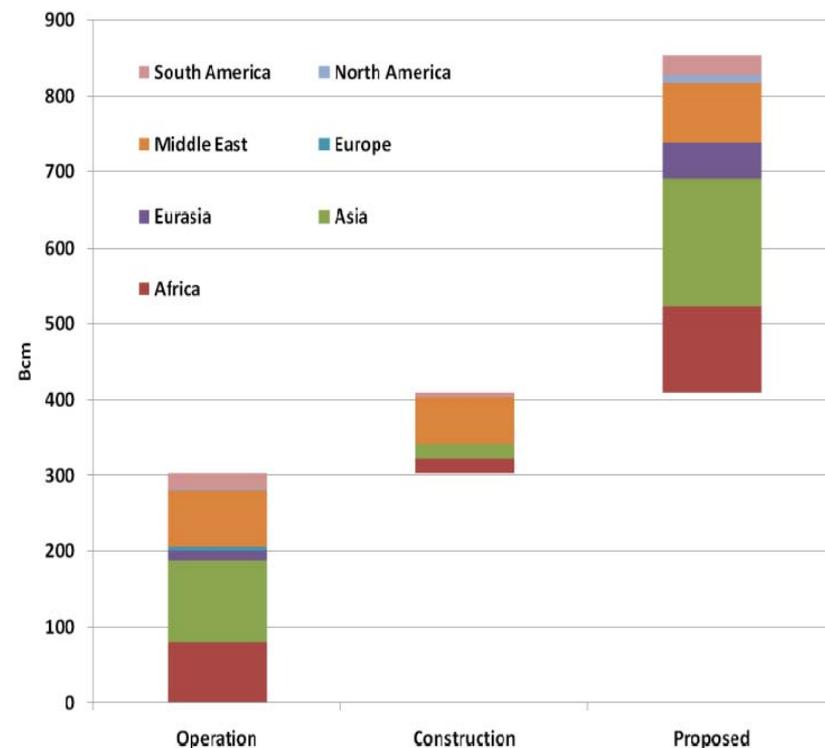
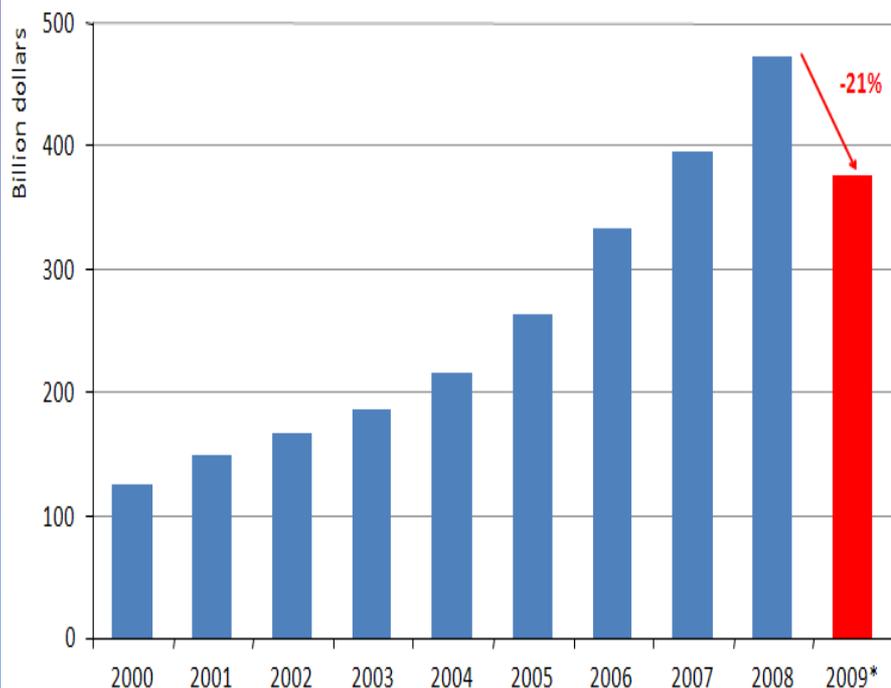


Energy investment



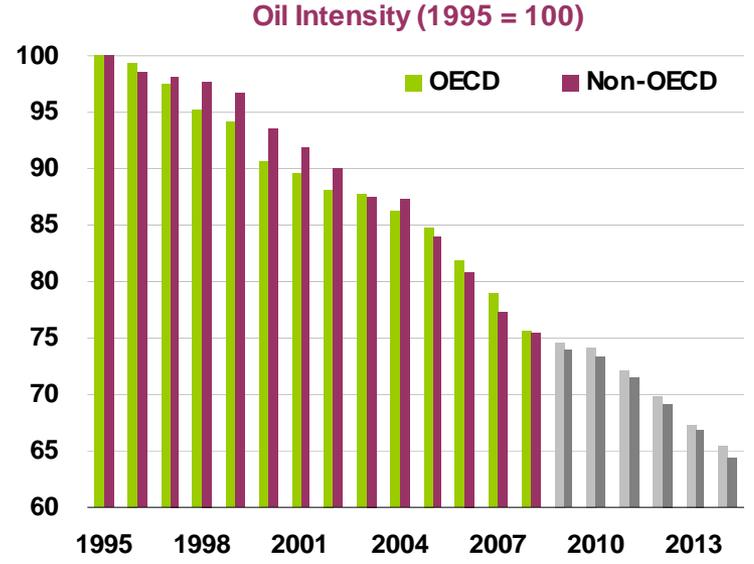
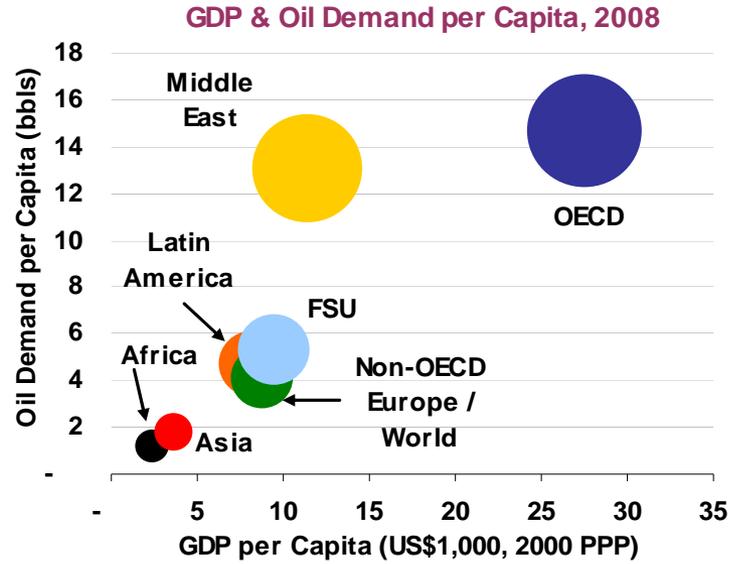
- The financial and economic crisis is affecting energy investment
- Declining gas demand and uncertainties about the future demand path and import requirements has reduced the urgency & appetite for suppliers to invest
- Lower oil and gas prices have impacted project sponsors revenues and make new investments less attractive
- Difficulties in obtaining credit & higher cost of capital
 - Increased aversion to risk
 - Paralysed credit markets
 - Plunging share values have increased debt-equity ratios

Worldwide oil & gas upstream capital expenditures



- There is clear evidence that investments this year will be falling
- This will have an impact on FIDs for projects currently planned, in particular the most capital intensive ones.

Efficiency gains can have an impact



Conclusions



- ❑ There is cause for concern with regard to the future of both the oil and gas markets.
- ❑ On the oil side, although spare capacity is comfortable now, the rapid growth in demand for transportation fuels, is putting us on a path where we need ever more production from ever fewer countries. Investment remains problematic.
- ❑ On the gas side, a combination of weak demand and surprising advances in non-conventional production have produced a glut that could undermine investment in supply and change the structure of the market. However, demand could bounce then back quickly and produce a tight market again in a few years.
- ❑ Although not the topic of today's talk, environmental sustainability is another serious concern. Even if there were no constraints on supply we would not want to use the amounts of oil and gas (not to mention coal) implied by IEA scenarios.
- ❑ In addition to investing in oil and gas, we must also invest in new technologies for a cleaner energy future. Such investments will lower energy bills and promote energy security as well as alleviate global climate change concerns.