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Securing China's Energy
in a Cleaner World



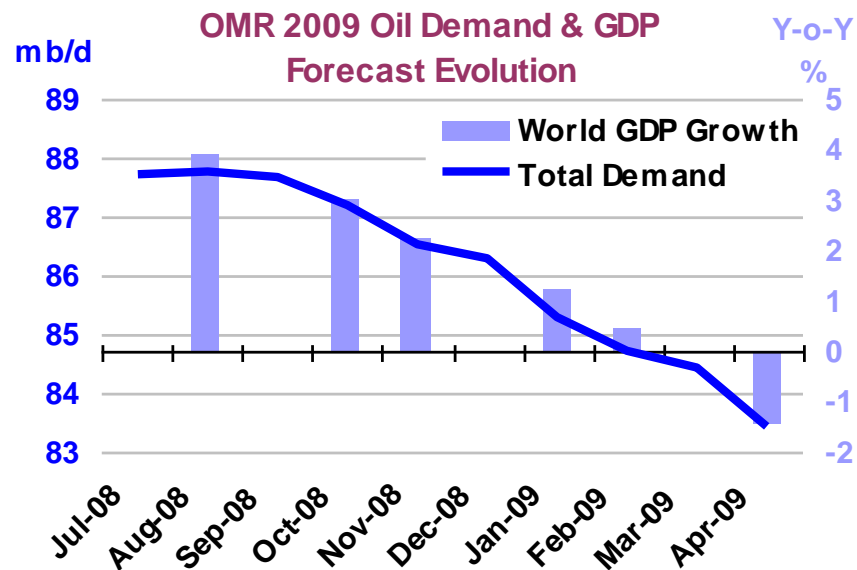
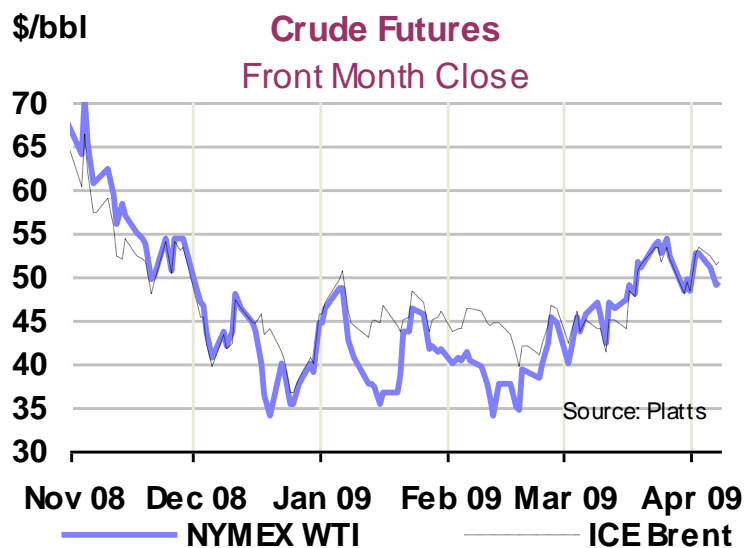
Today's energy context

■ Two key challenges:

- **Energy security** – can be achieved through energy diversification and investment in low carbon technologies
- **Climate change** – CO₂ emissions can be reduced by enhancing energy security

**Investment is needed – *despite the financial crisis* –
to address both of these challenges.**

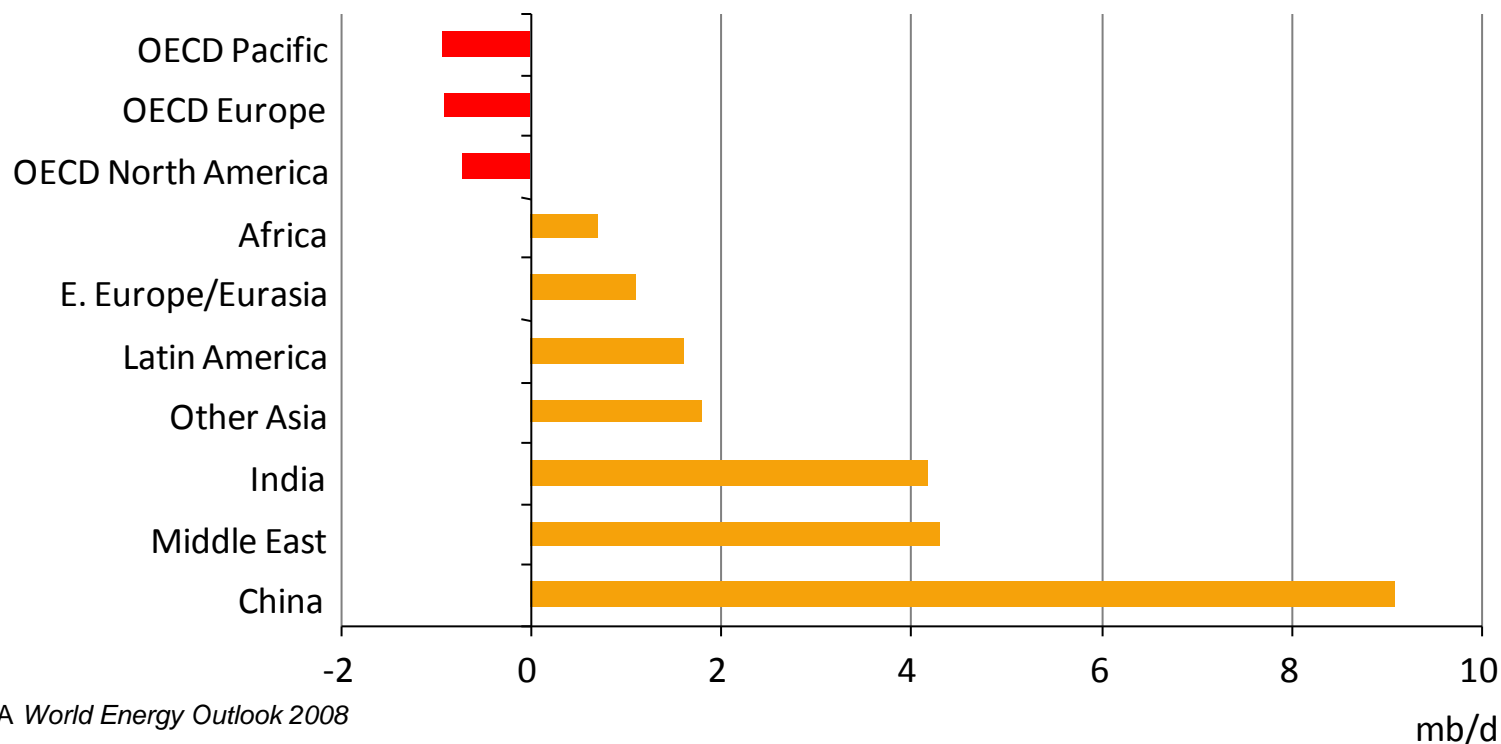
Today's oil market



- *Worsening economy drives demand revisions*
- *Two year demand contraction in 08/09 first since early-1980s*
- *OECD hit hard, but clear signs that non-OECD is slowing now too*
- *Latest GDP estimates suggest -1.4% for 2009*

Change in oil demand by region in IEA *World Energy Outlook 2008*

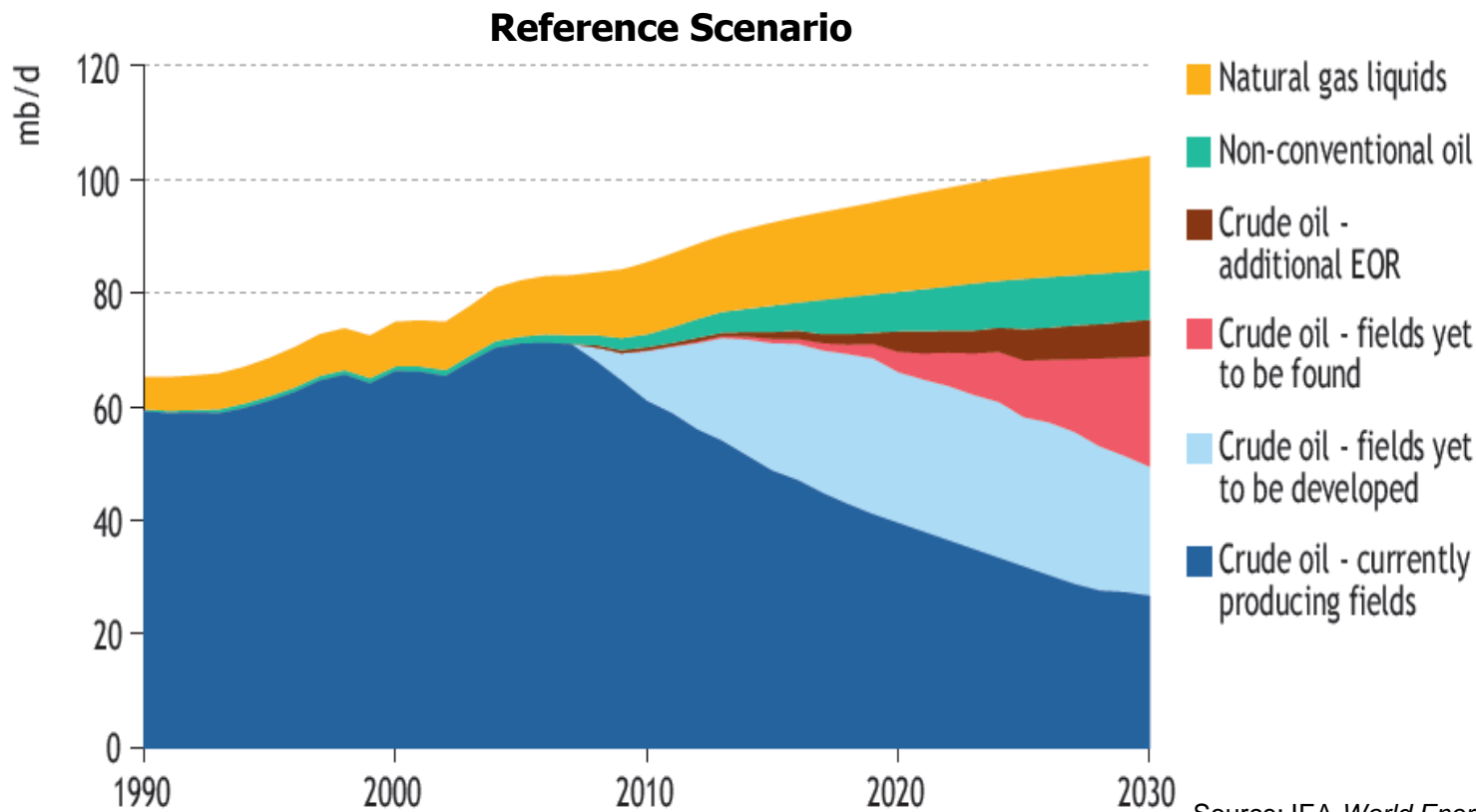
Reference Scenario 2007-2030



Source: IEA *World Energy Outlook 2008*

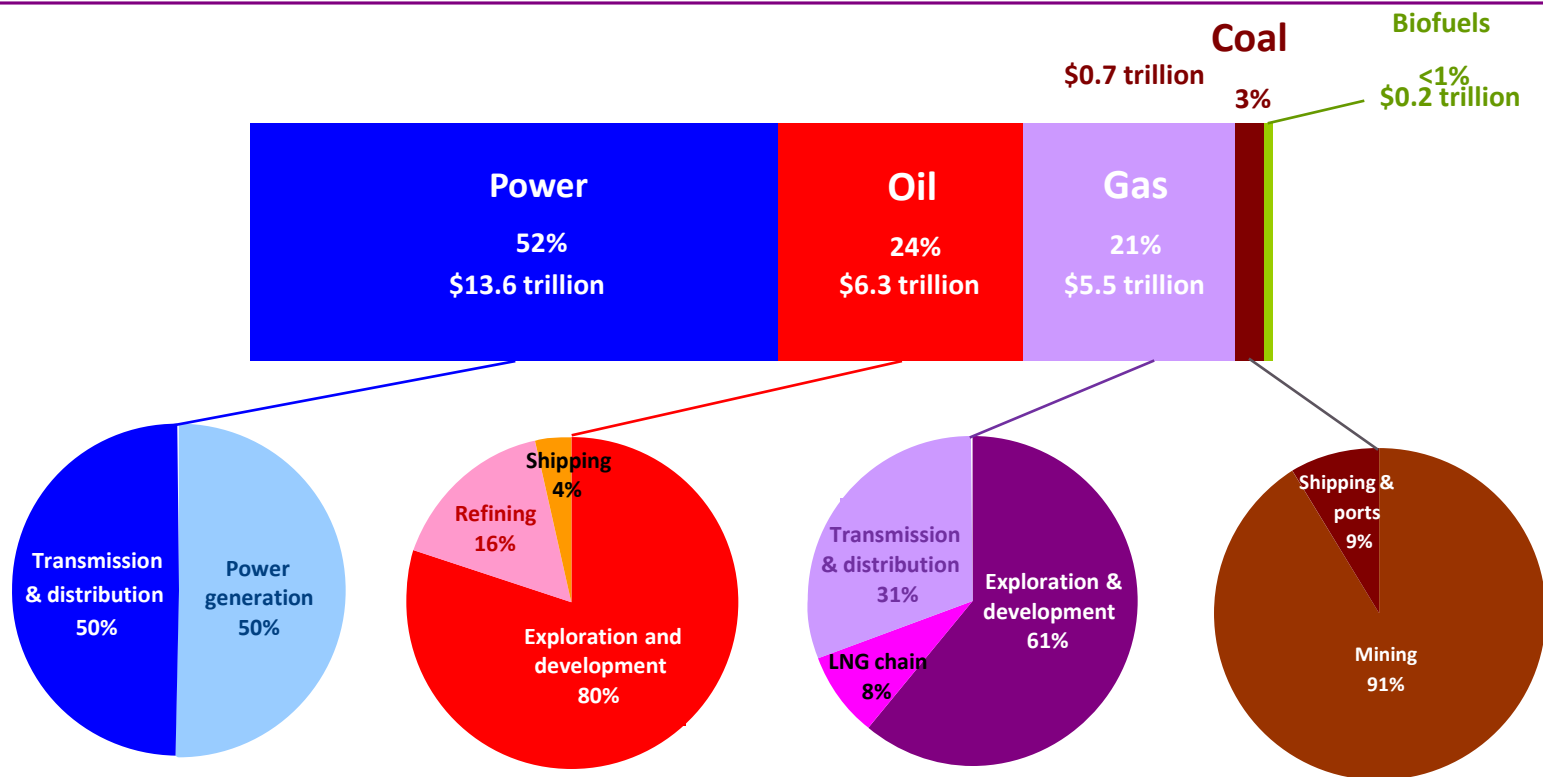
All of the growth in oil demand comes from non-OECD, with China contributing 43%, the Middle East and India each about 20% and other emerging Asian economies most of the rest.

Oil production decline is twice as important an oil growth demand



64 mb/d of gross capacity needs to be installed between 2007 and 2030 – six times the current capacity of Saudi Arabia – to meet demand growth & offset decline.

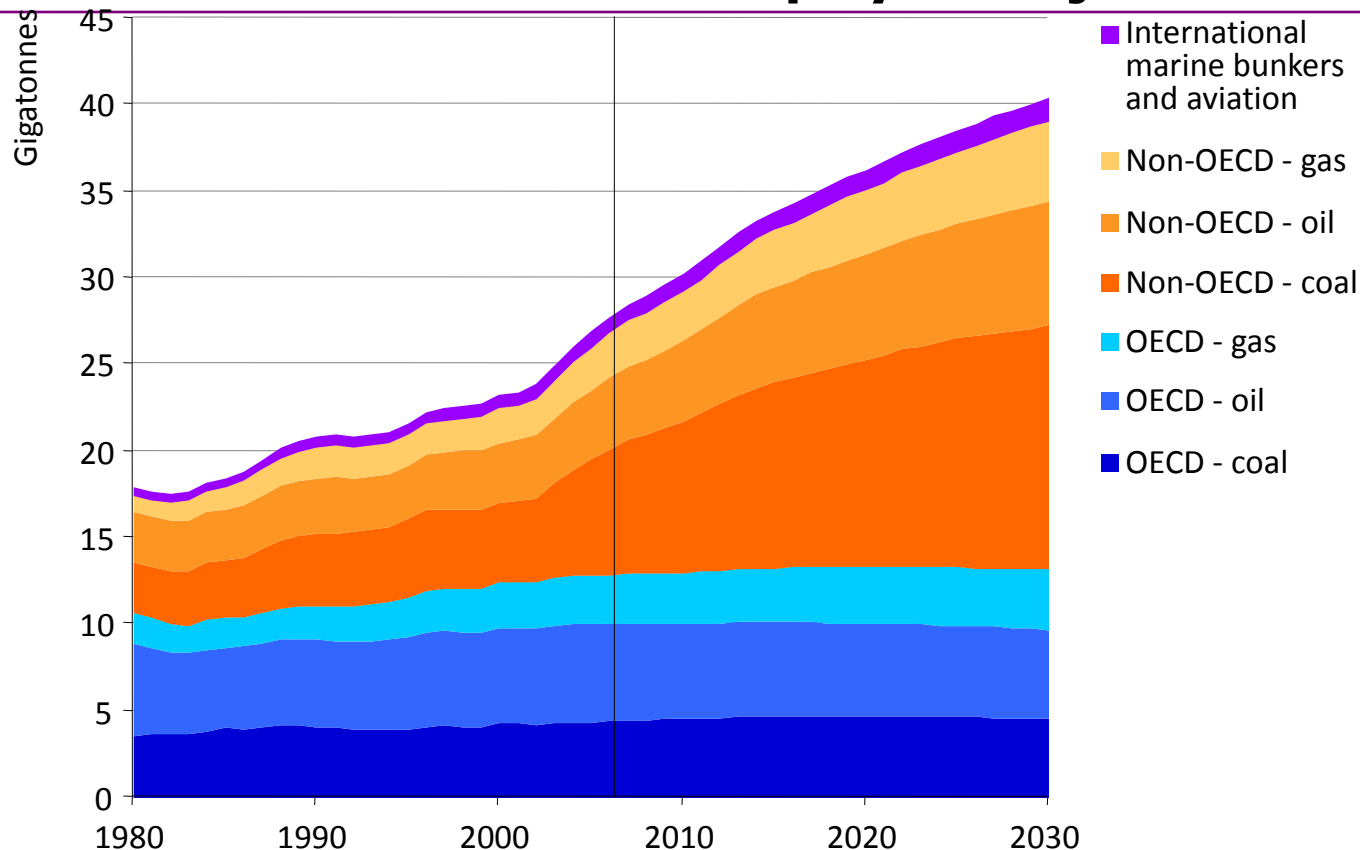
Cumulative energy supply side investment is a global issue



Source: IEA World Energy Outlook 2008

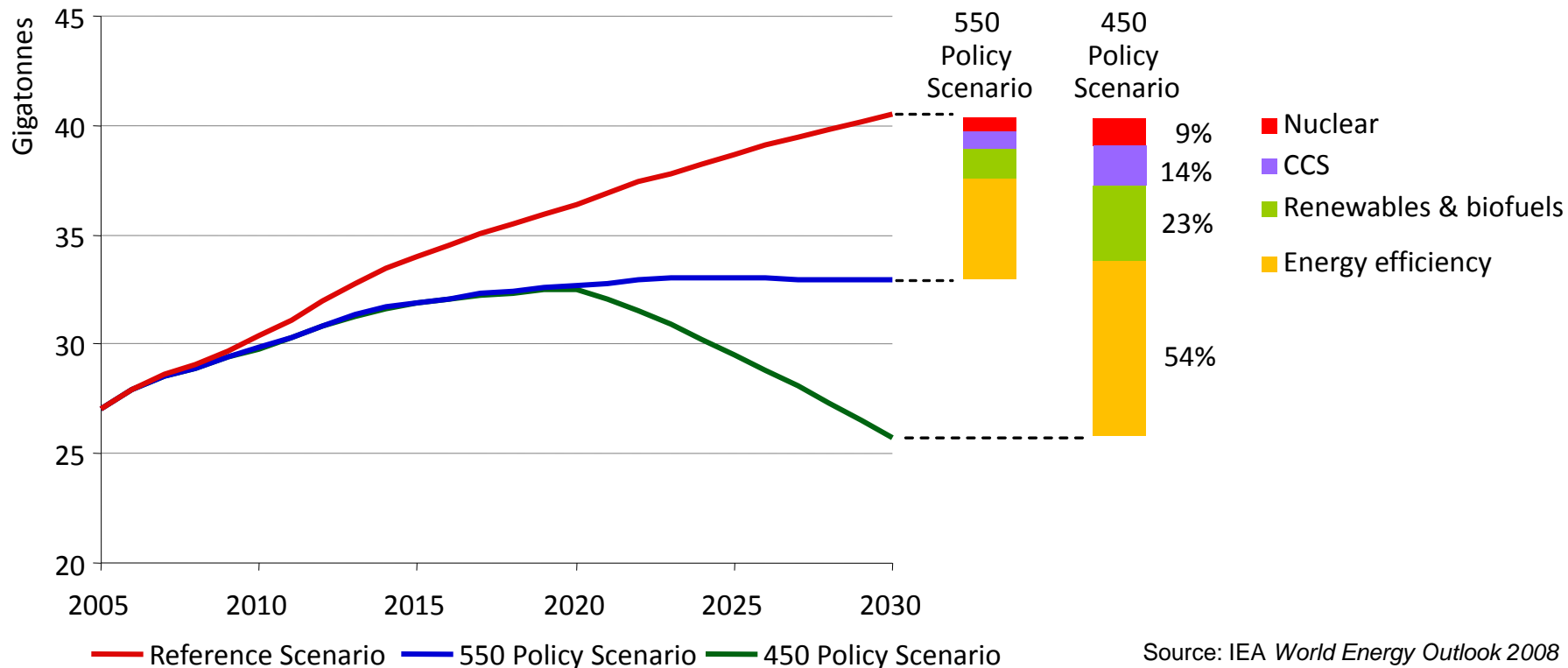
**Investment of \$26 trillion, or over \$1 trillion/year, is needed
- 63% from non-OECD countries, 16% from China alone**

Energy related CO2 emissions – coal plays a major role



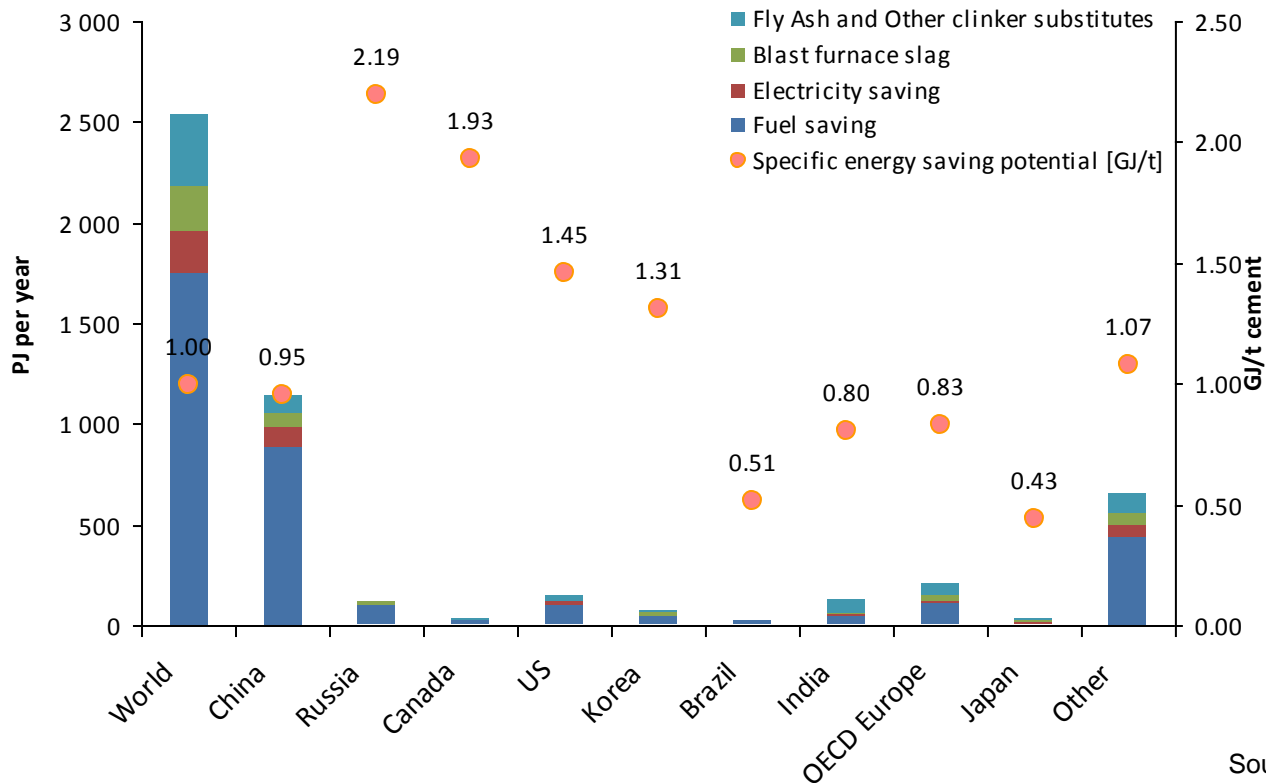
97% of the projected increase in emissions between now & 2030 comes from non-OECD countries – three-quarters from China, India & the Middle East alone

Energy efficiency, renewables and CCS play a key role in reducing CO2 emissions



Technological progress is needed to achieve some emissions reductions but efficiency gains and deployment of existing low-carbon energy accounts for most of the savings.

Energy savings in cement production



Source: IEA data, 2006.

China already has many good practices in place

China is in the same league as OECD Europe with respect to energy efficiency in cement production. China accounts for 47% of world cement production, so potential savings are larger than elsewhere

Clean energy technologies - we need all technology options to be open

■ Supply side

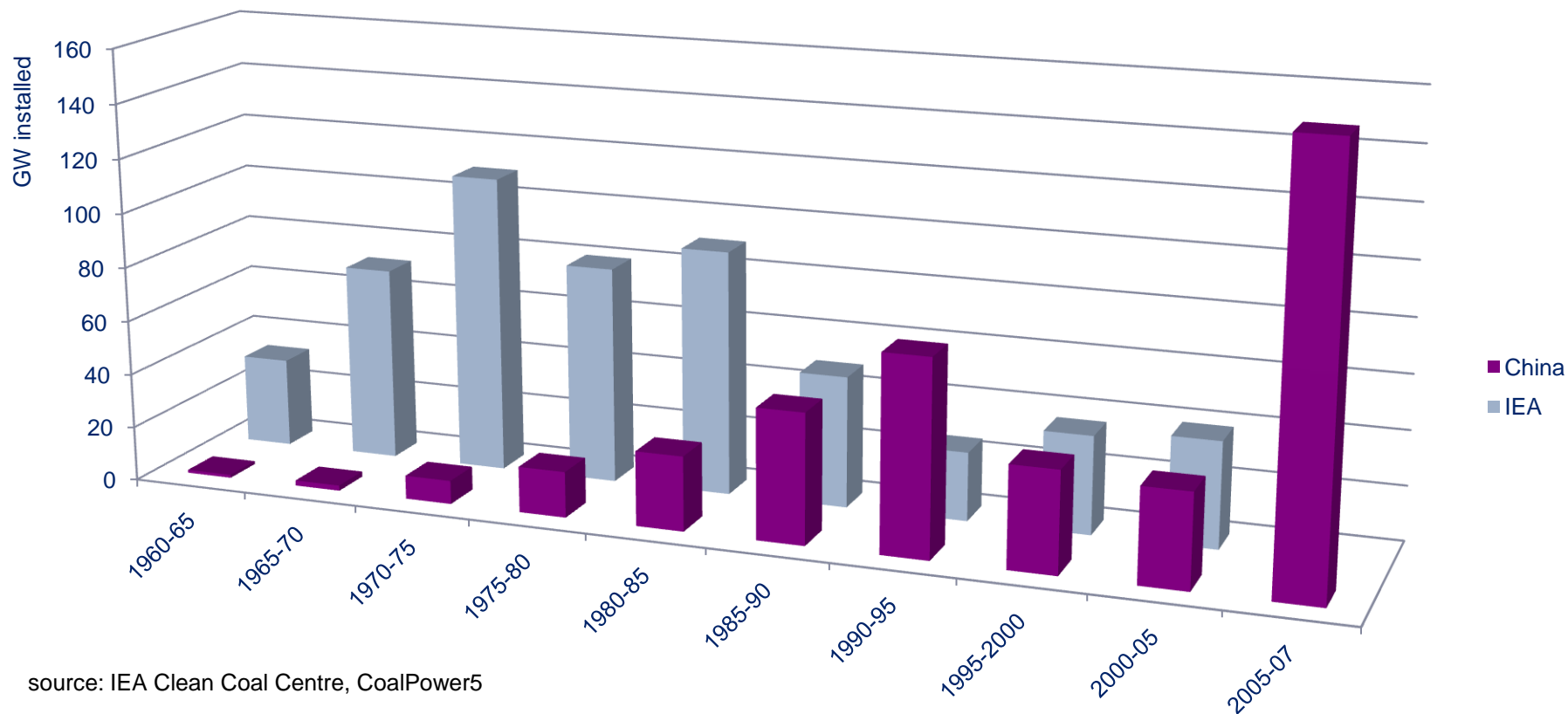
- CO₂ capture & storage in power generation
- Nuclear III + IV
- Wind
- Biomass – IGCC & co-combustion
- Solar – photovoltaics (PV)
- Solar – concentrating solar power (CSP)
- Coal – integrated gasification combined cycle
- Coal – ultra supercritical (USC) steam
- 2nd generation biofuels

■ Demand side

- Energy efficiency in buildings
- Heat pumps
- Solar space and water heating
- Energy efficiency in transport
- Electric and plug-in vehicles
- Fuel cell vehicles
- CO₂ capture & storage in industry
- Industrial motor systems

IEA Energy Technology Perspective 2008 provides roadmaps of 17 key technologies which can provide 87% of CO₂ savings to halve energy-related CO₂ emissions by 2050.

Age profile of coal power plants in China & IEA member countries



source: IEA Clean Coal Centre, CoalPower5

Many older power plants in 12 IEA coal-using member countries (Australia, Canada, France, Germany, Italy, Japan, Korea, Poland, Spain, Turkey, UK and USA) will need replacing or upgrading.

Summary

- **To enhance energy security in China**, there is a need for:
 - energy diversification ; and
 - investment in energy efficiency and low-carbon technologies (CCS, renewables, nuclear power, hybrid and electric vehicles).
- **Measures to mitigate climate change enhance energy security**
- **The global economic crisis is an opportunity to place a Clean Energy New Deal**
at the heart of economic stimulus packages everywhere.
- **China could provide a new growth model.** There are enormous opportunities for China.