Coal Market Overview

IEA High Efficiency, Low Emissions (HELE) Technology Roadmap

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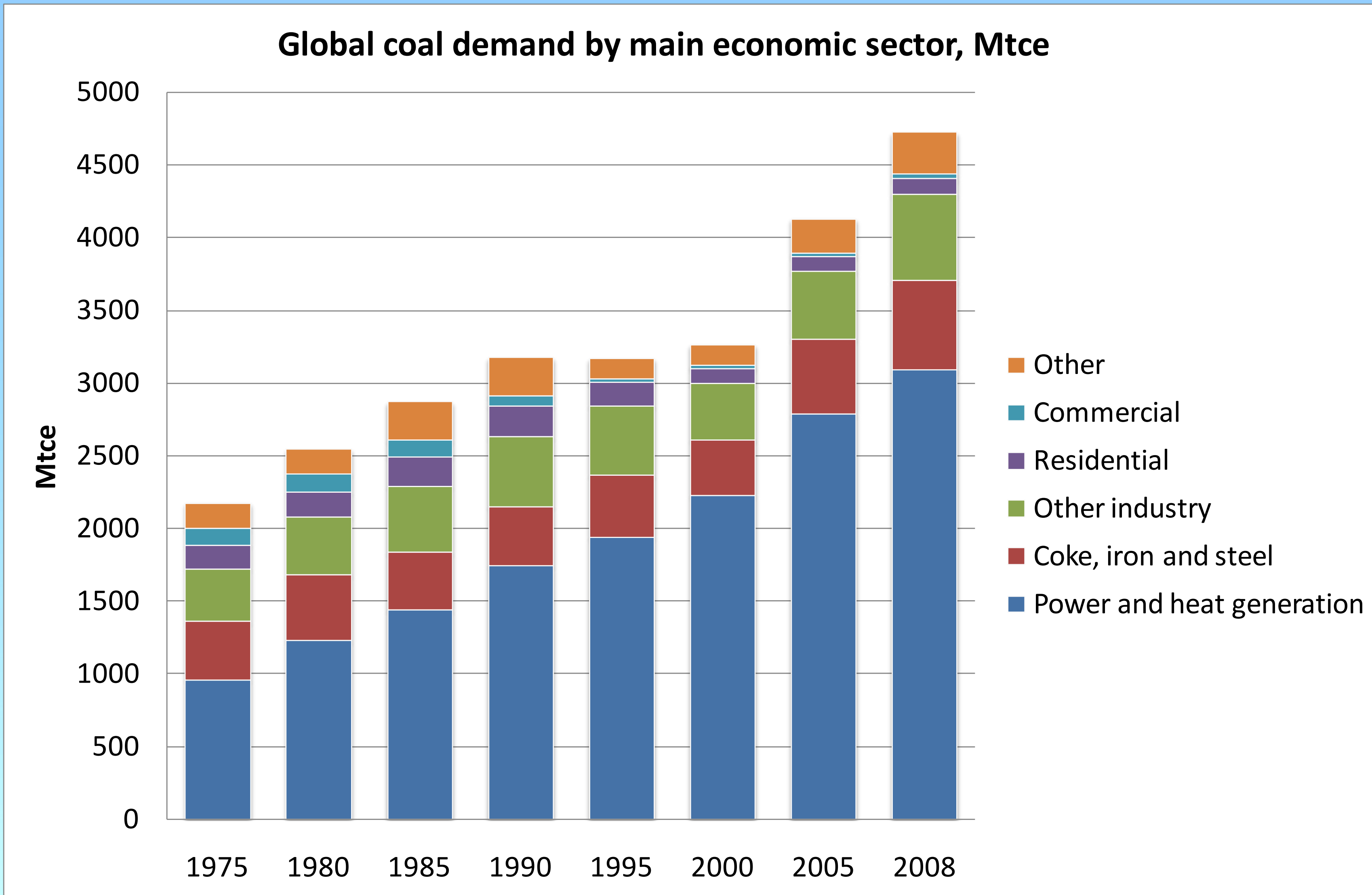
Introduction

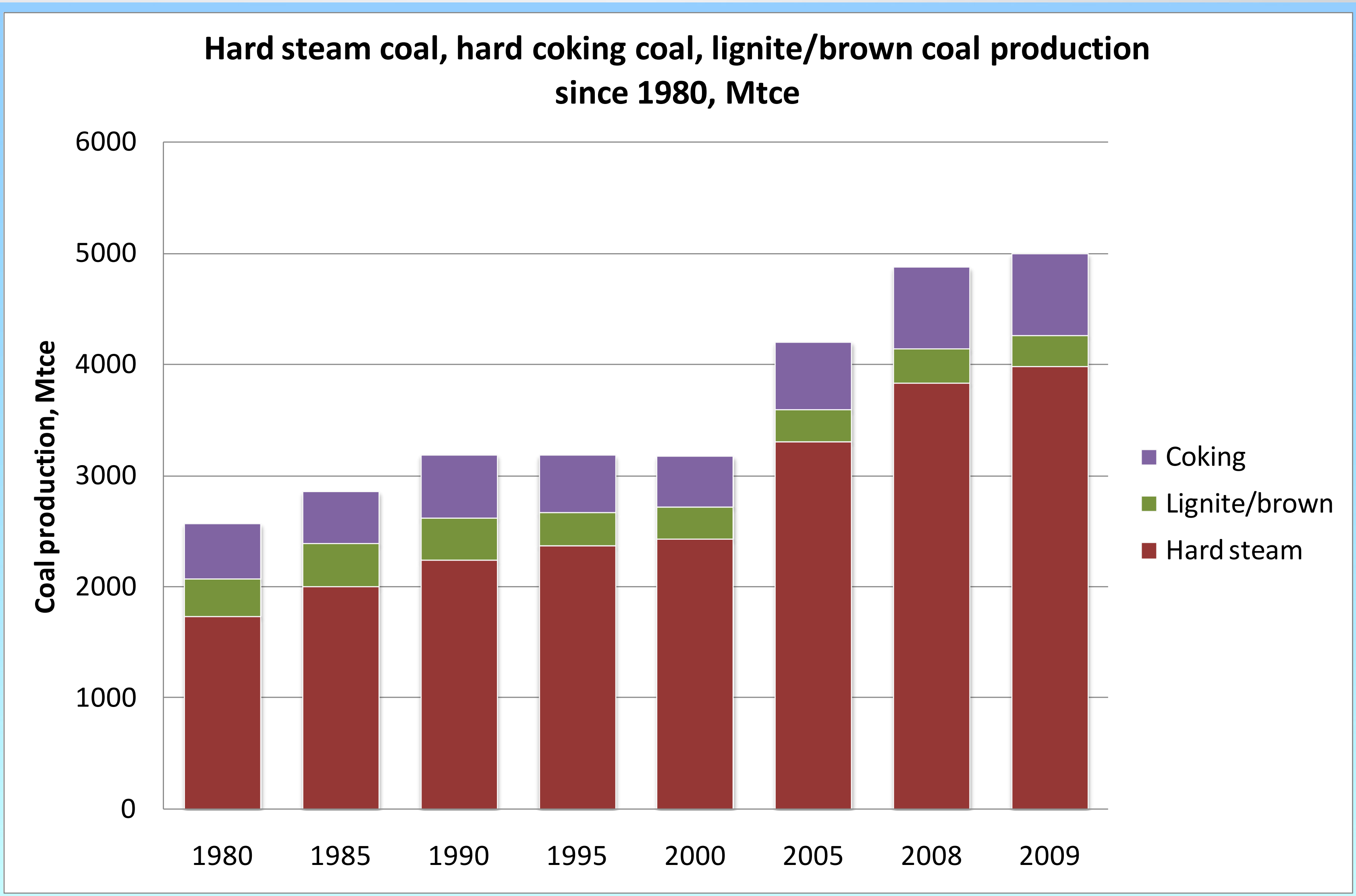
- **Present the status of global coal use, coal trade and regional influences**
- **Understand current trends in coal markets**
- **Consider issues that might shape the next 10-20 years**

IEA CLEAN COAL CENTRE

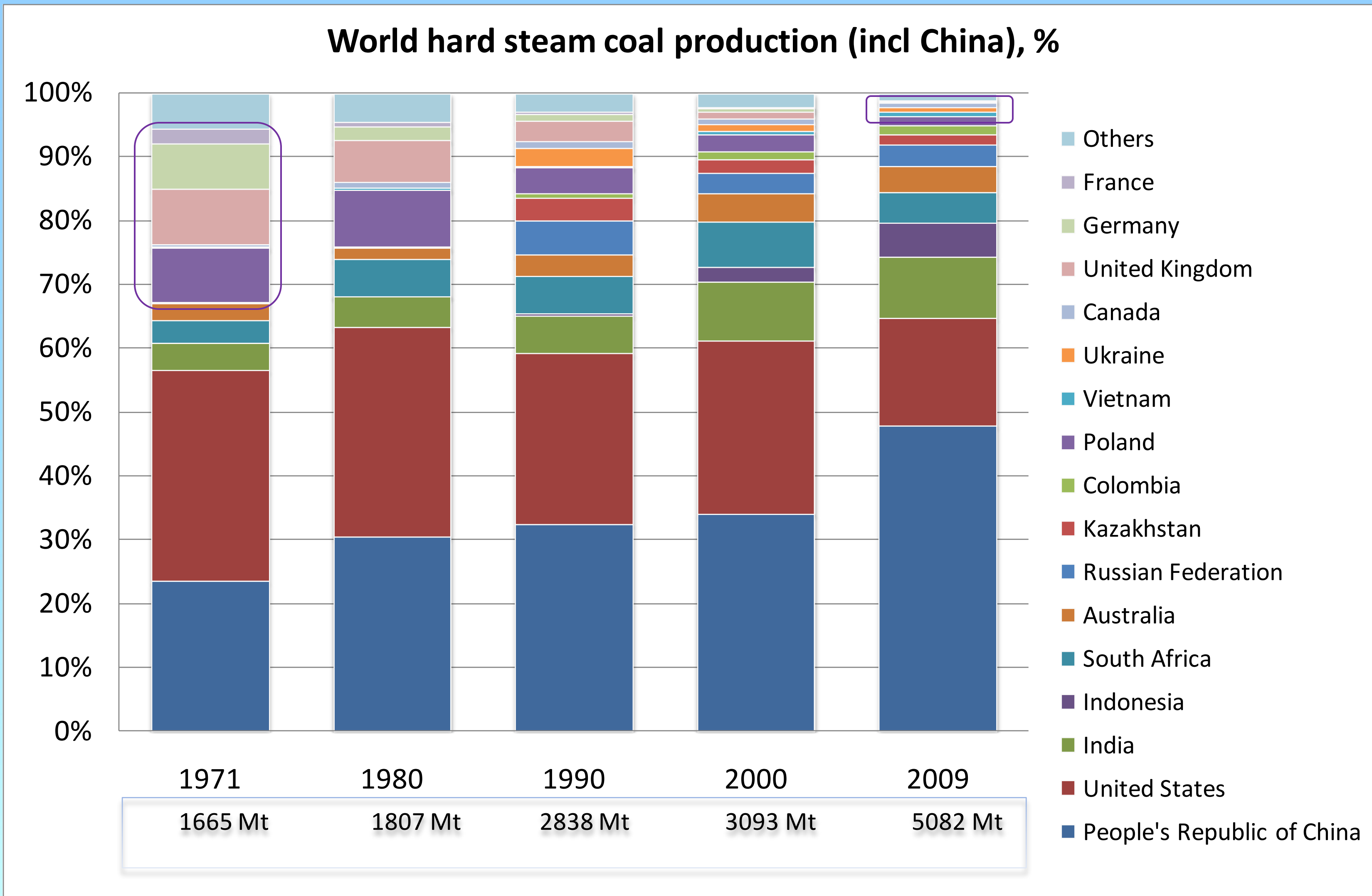
30% rise in 20y preceding 2000; 46% rise in 8 years after 2000



Hard steam coal dominates by volume, 5000 Mtce in 2009



Trends reflected by OECD retreat from coal; and advance by non-OECD



Coal-fired fleet still consists of many subcritical stations

IEA CoalPower Database (2010)

- **~220 *stations* under construction (or repowered)**
- **Totalling ~223 GWe of which 113 GWe is known to be SC or USC, mostly hard steam coal**

Of which:

- **58 GWe in China (35 GWe is known SC or USC)**
- **80 GWe in India (48 GWe is known SC or USC)**
- **8-15 GWe in each of the following countries: Indonesia, Vietnam, S Africa, Germany, and USA**

Coal-fired power investment

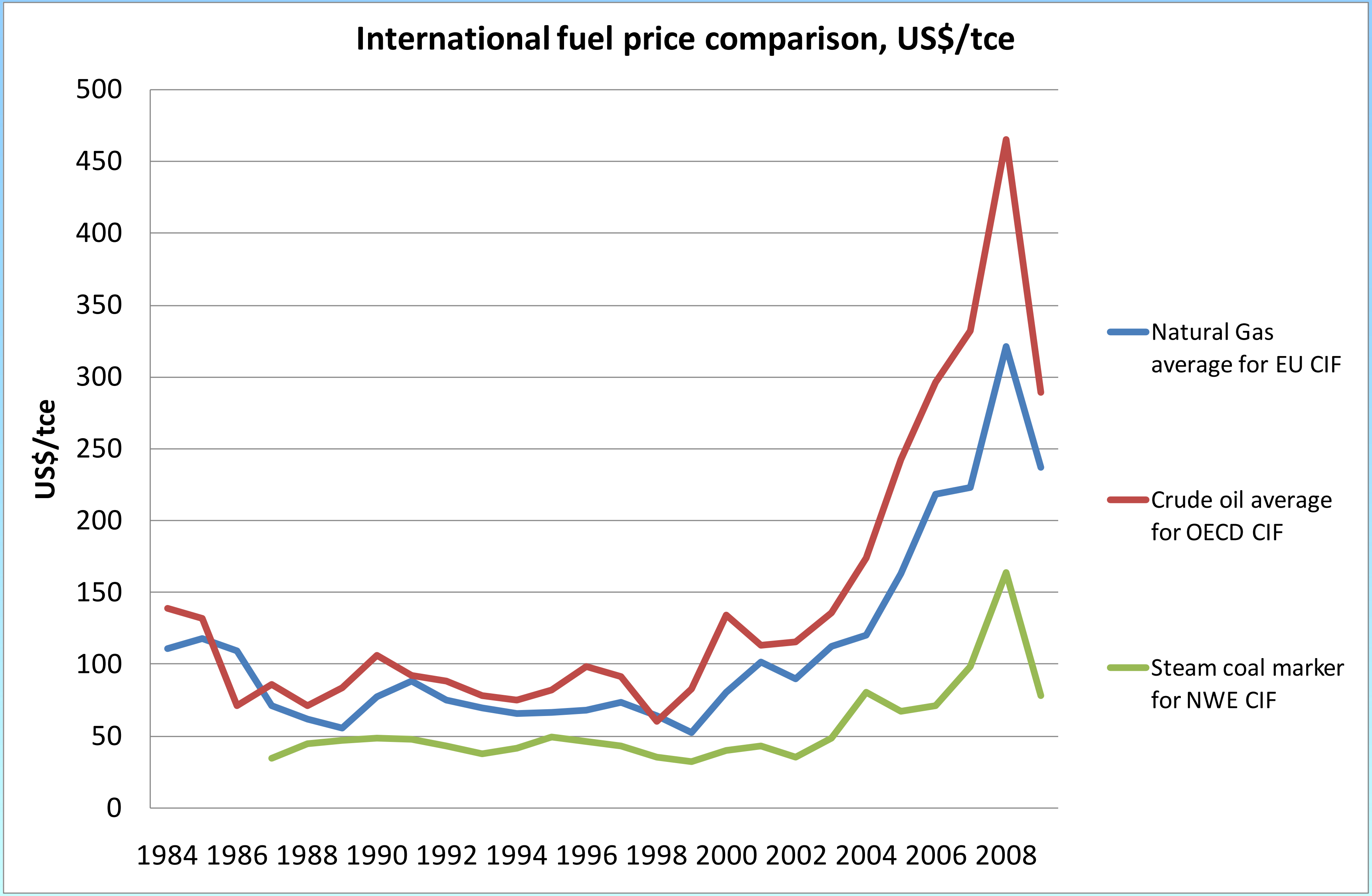
- **Coal-fired power investments carry a number of risks to financial institutions and investors:**
  - **higher \$/kWe capital cost compared with gas**
  - **higher carbon lock-in (in the absence of CCS or appropriate ‘offset’)**
  - **continuing stringency of emission regulation (SOx, NOx, and PM)**

Coal price ‘stability’

BUT

- **Coal remains a relatively stable commodity and lowest price fossil fuel compared with oil and gas (even when standardised to $/tce)**

CIF price of major fossil fuels ($/tce)



Steam coal markets are still subject to volatility

- **NW Europe steam coal prices peak at 210 $/t in September (Brent crude hits 100 $/bbl)**
- **2008 – triple supply shock and freight shortage**
  - **Coal demand in China soars; exports stop; winter weather causes demand spike**
  - **Record flooding in Queensland**
  - **South African power cuts**
  - **Freight averages 30 $/t (max. 60 $/t)**

Although before 2008 ends

- **Financial meltdown halts price momentum and prices slump to 60-80 $/t**

Dec 2010 - supply and demand shocks hit world markets again

- **NW Europe steam coal prices return to 120 $/t**
  - **China imports continue to rise (119 Mt steam, 47 Mt coking)**
  - **Record floods return to Queensland**
  - **Japanese earthquake/tsunami closes 8 GWe nuclear plants and 8 GWe of coal-fired plants; demand in remaining thermal plants rise to compensate, including coal**
  - **Germany closes pre-1980 nuclear stations for safety approval**

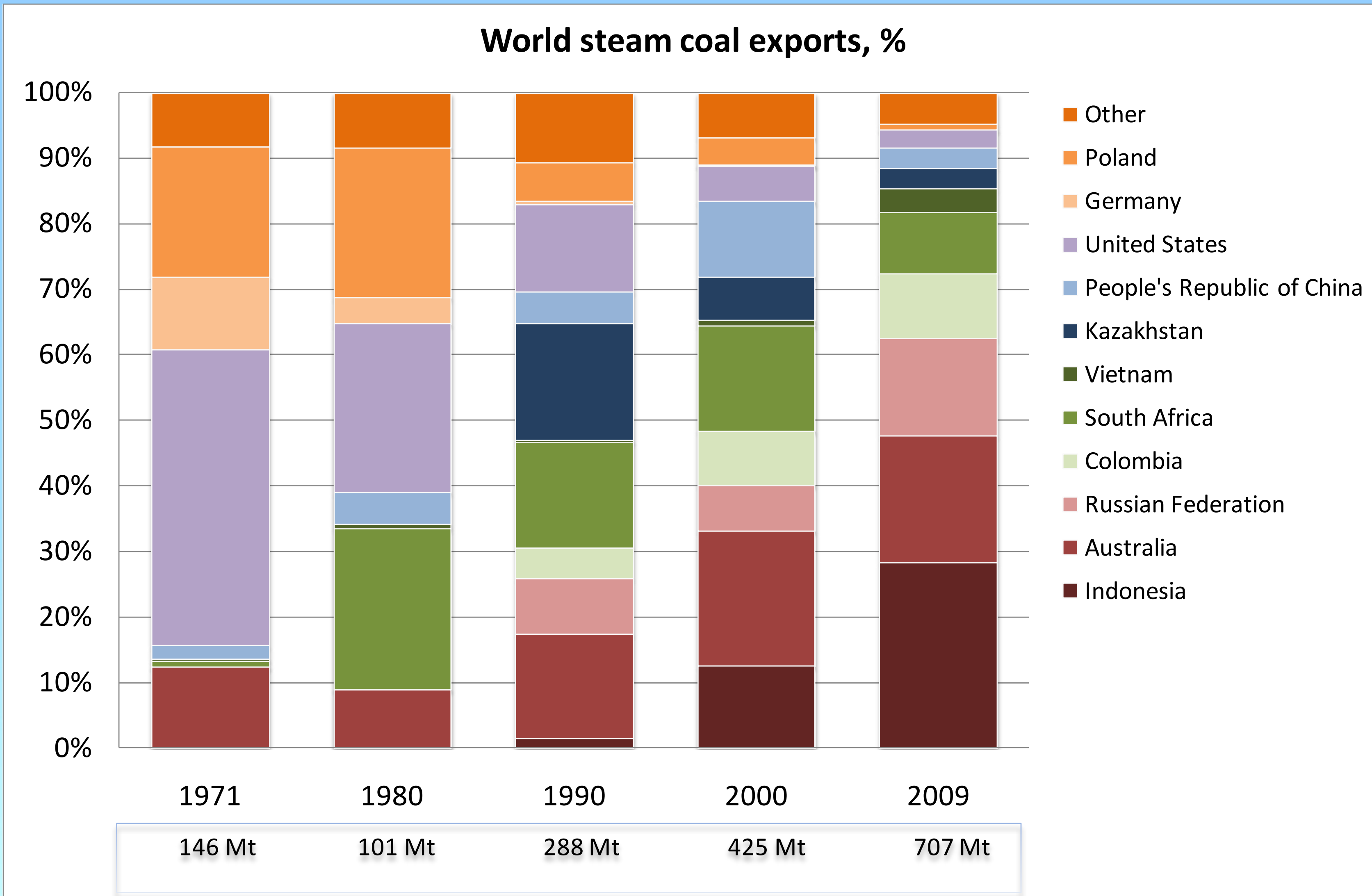
Over the Roadmap period, the market could look different

- These short term phenomena are important to monitor, while longer term trends are also difficult to foresee
- There's no guarantee that prices will remain high over the entire Roadmap period

Roadmap needs longer term perspective

- **Will prices change, if so, who or what will be the key drivers**
- **Imports account for just 14% of hard steam coal supplies (26% for coking coal, negligible for lignite)**
- **Yet, world prices are having a larger impact on domestic prices**
- **So who are the biggest influences on world prices**

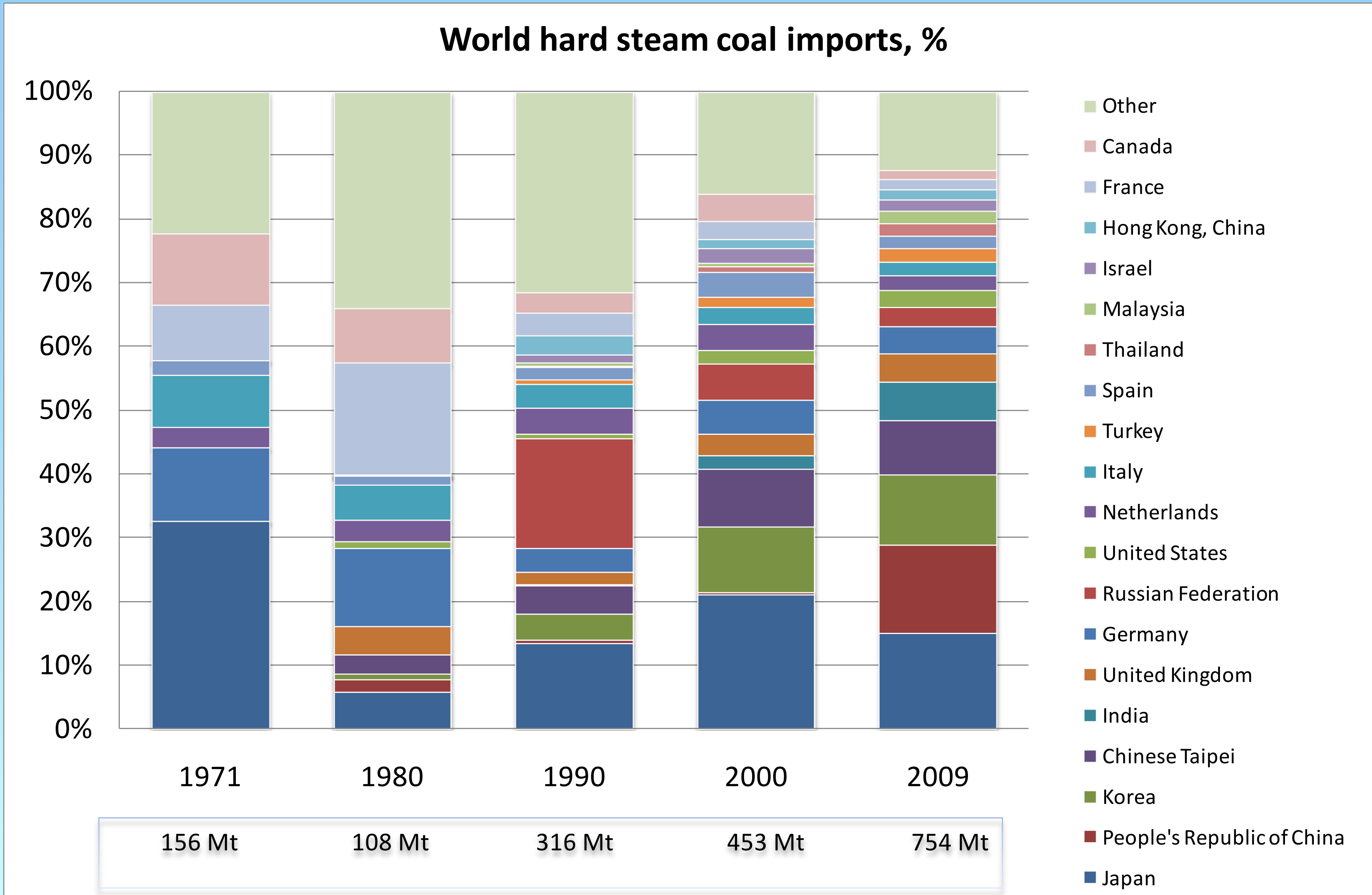
Global steam coal exports by % market share



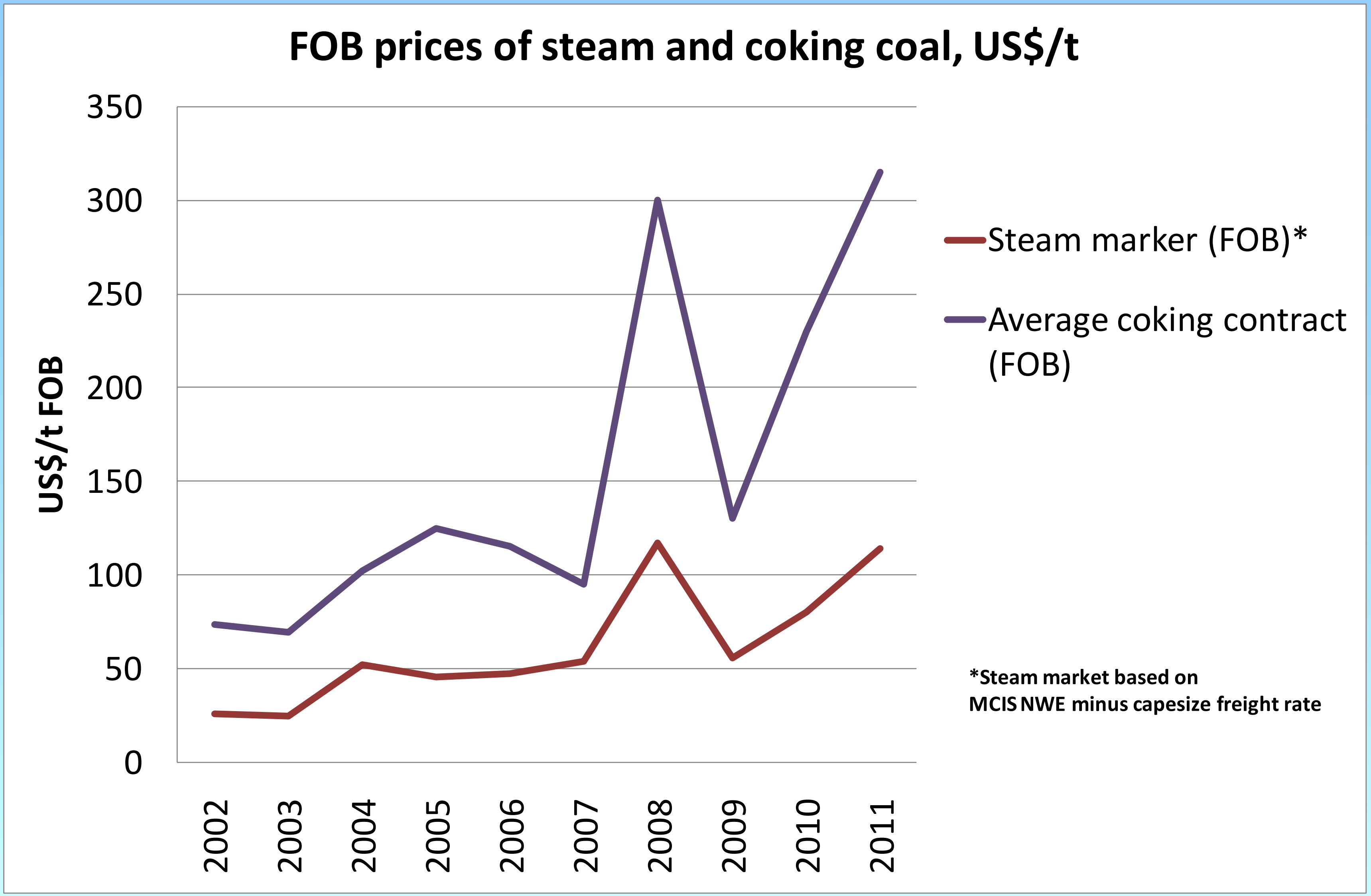
Rising exports suppliers

- **Mongolia (30-50 Mt/y?) – Tavan Tolgio**
- **Southern Africa – Botswana, Mozambique, and Zimbabwe (>70 Gt of reserves, but needs rail)**
- **US West Coast – Powder River Basin coal exports**

Global steam coal imports by country, % share



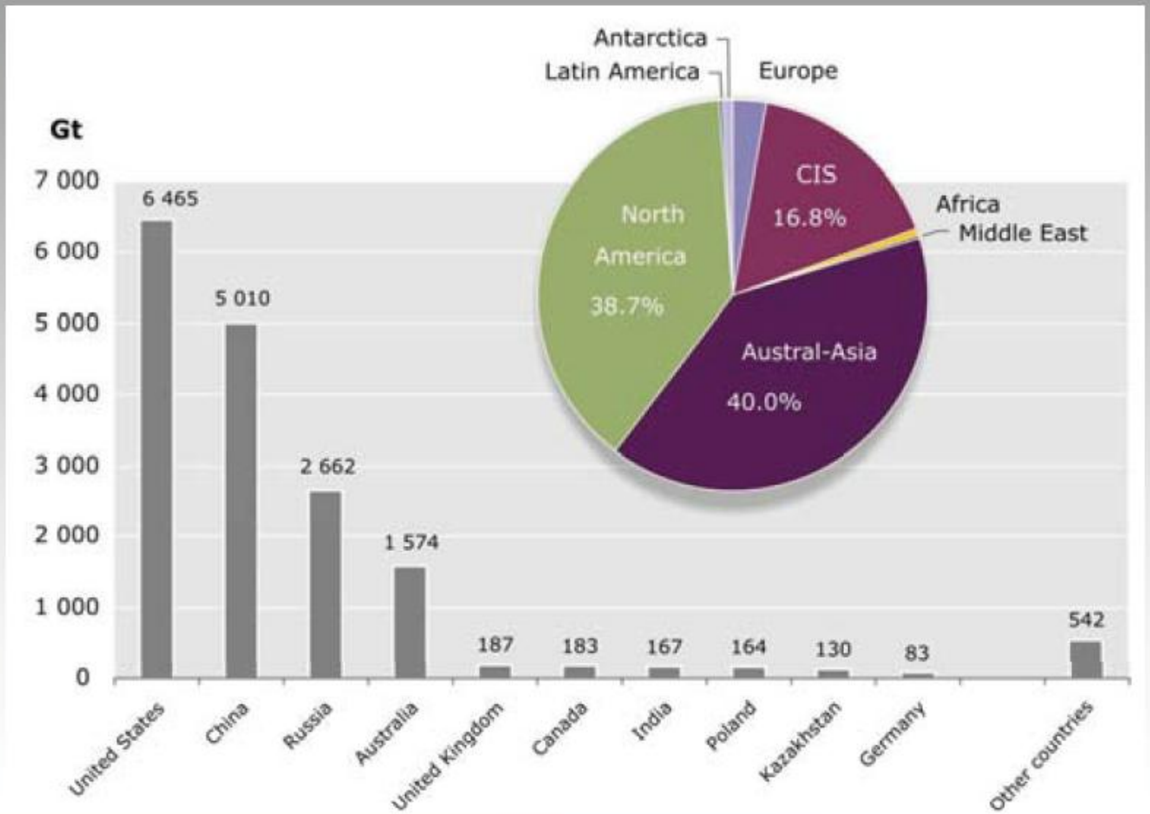
Average international coal prices



END

- **Hard coal has an estimated life of 120 years (~730 Gt, 6 Gt/y production**
- **(but where it matters, China's R/P was 38 years based on 2008 production)**
- **Lignite has a life of 270 years, assuming an estimated reserve of ~270 Gt and 1 Gt/y production**

Resources of hard coal (total 17,167 Gt) in 2009 of the top ten countries as well as their distribution by region



Source:
BGR 2010

BGR Bundesanstalt für Geowissenschaften und Rohstoffe

GEOZENTRUM HANNOVER

Top 10 most abundant energy reserves (BGR, 2009)