



Natural Gas and Energy Security

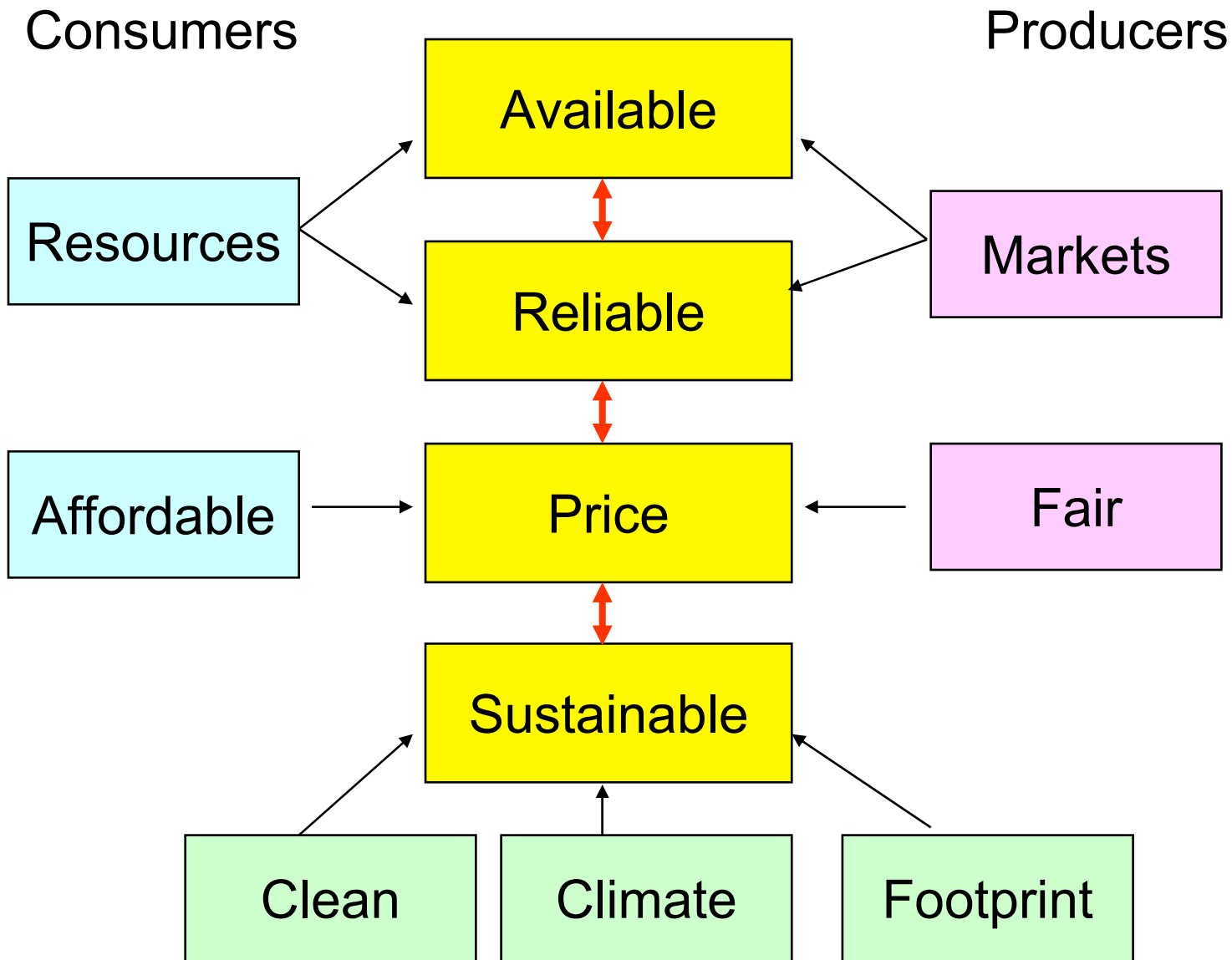
Christof Rühl, London, September 27, 2007

Outline



- **Energy Security – concept and trade-offs**
- Natural Gas and other fossil fuels: security issues
- Segmented markets – segmented security
- Medium term perspectives

Energy Security



Outline

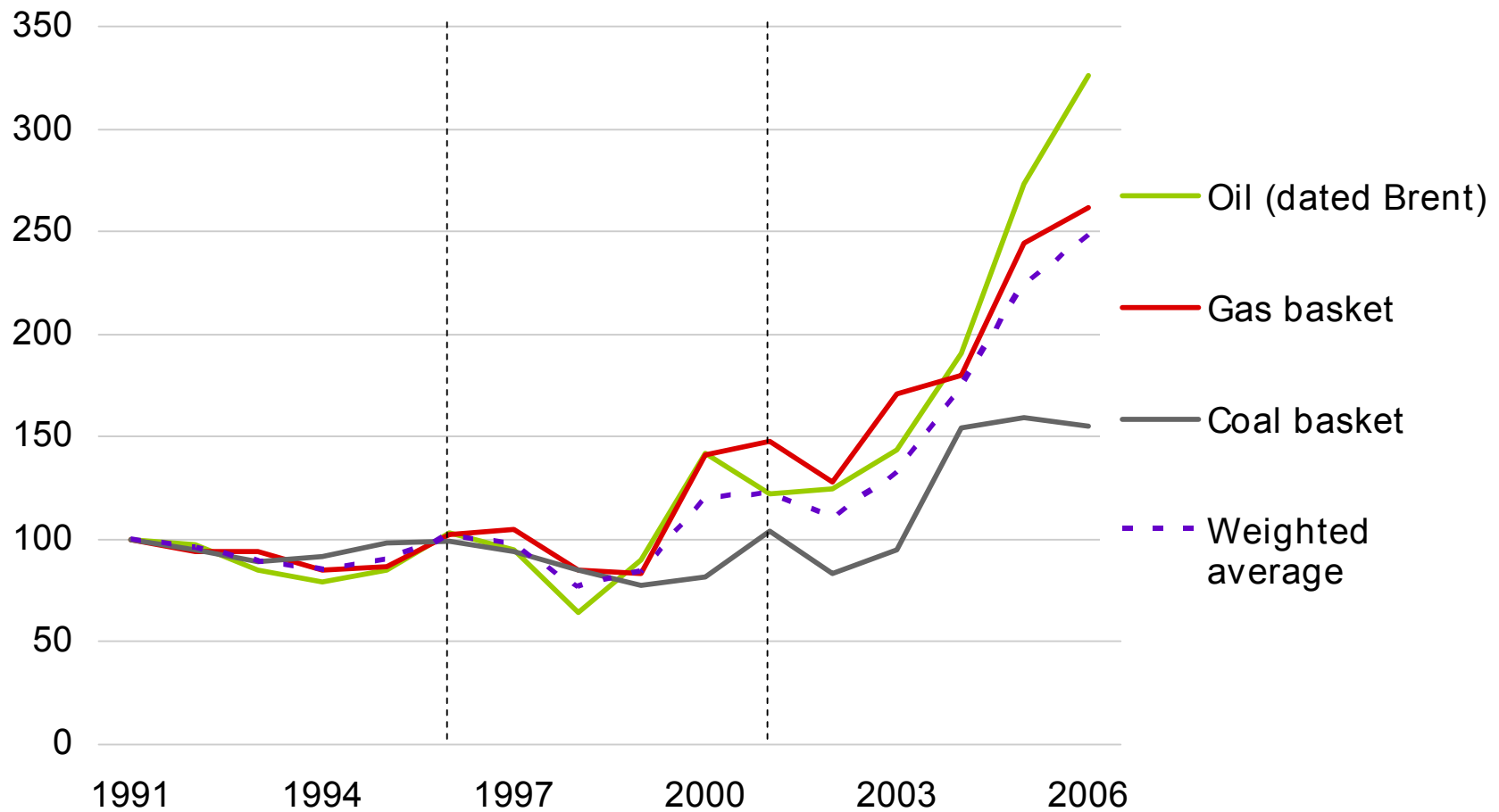


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Energy Prices



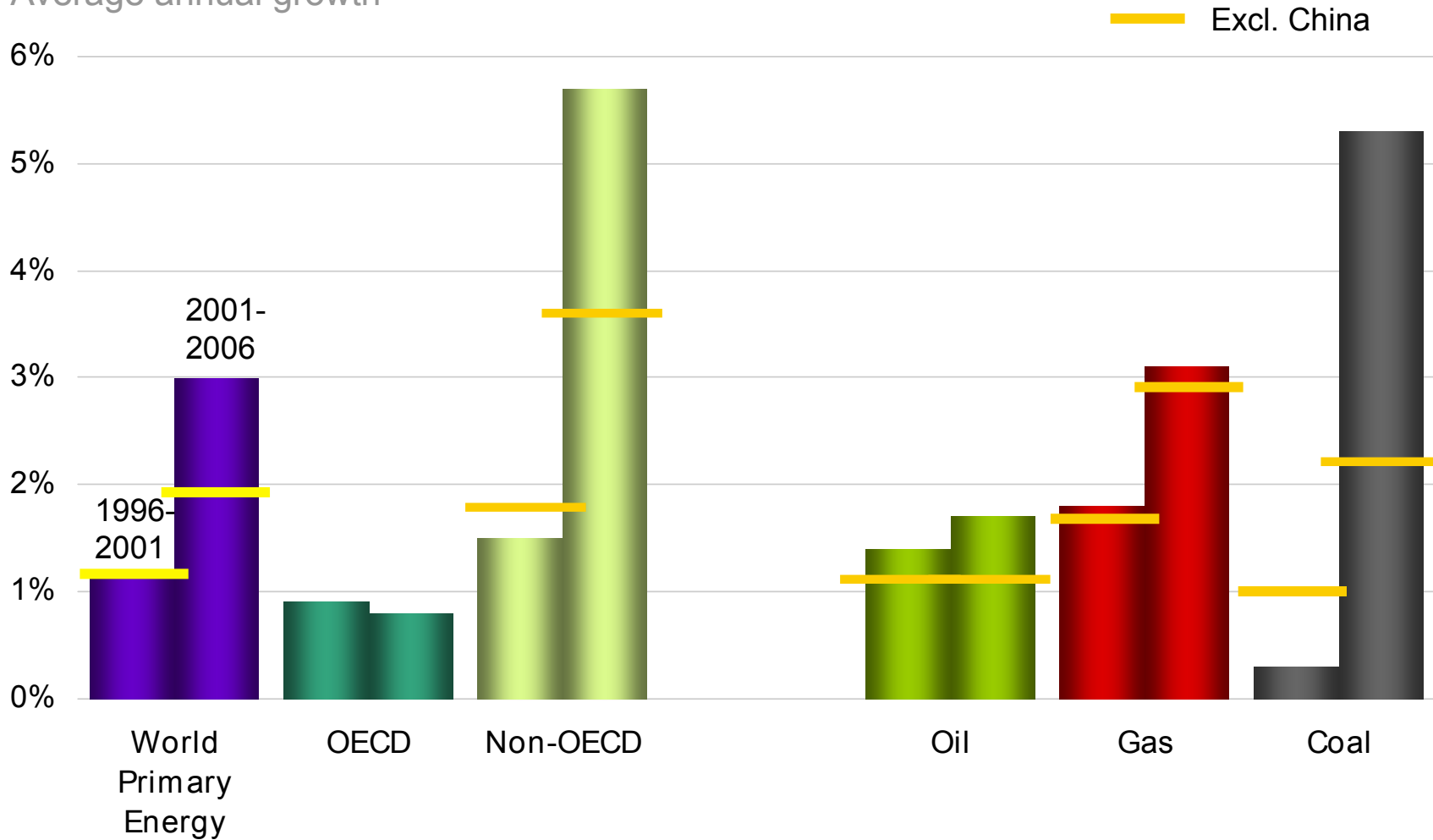
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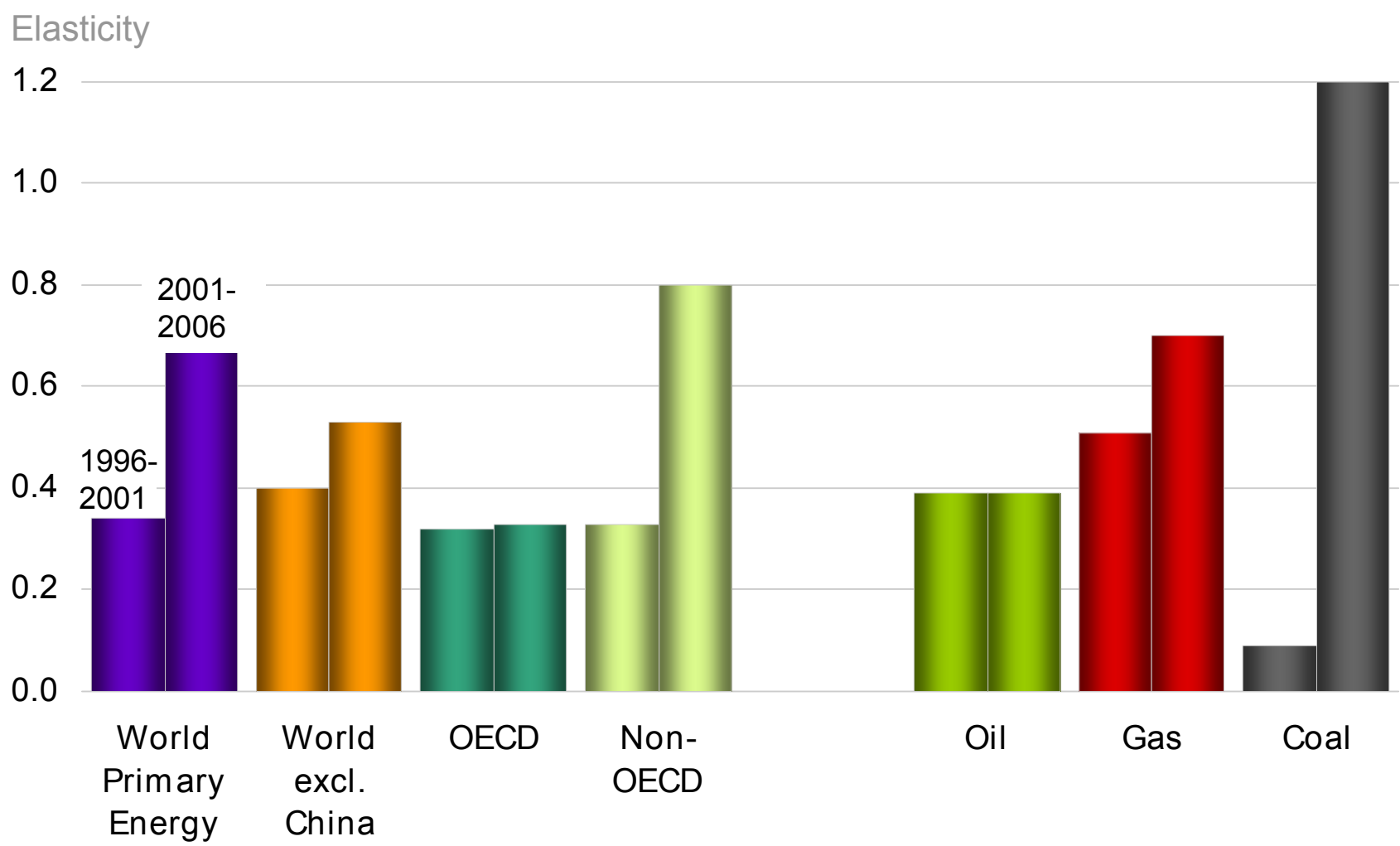
World Energy Consumption Growth



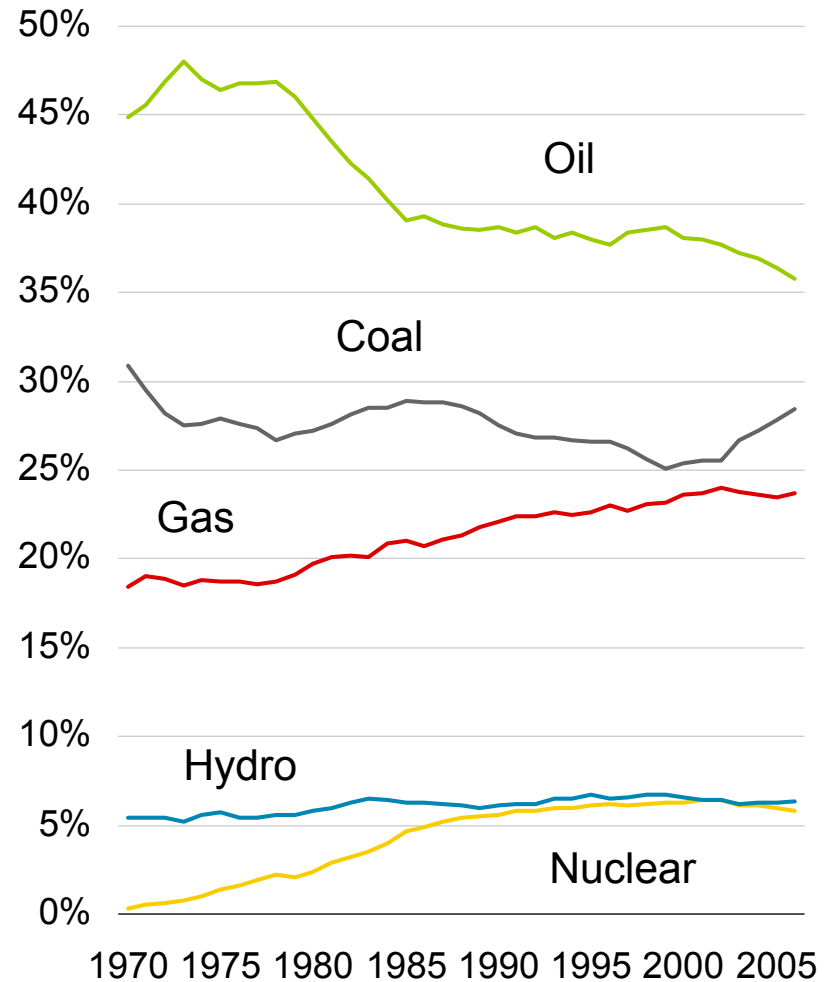
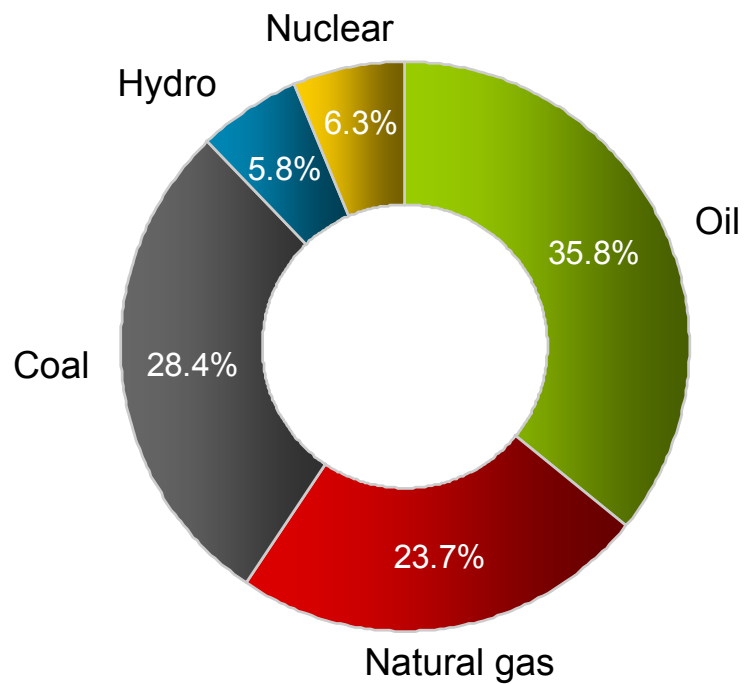
Average annual growth



Income Elasticities of Energy Demand



Share of Global Primary Energy Consumption



Security Issues

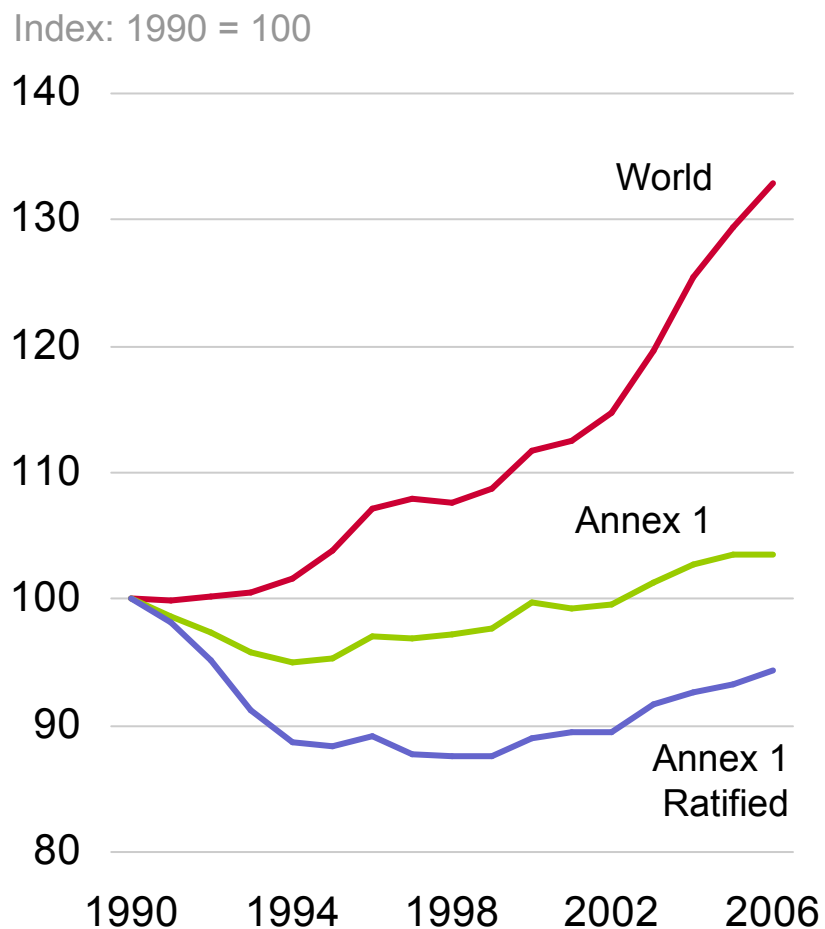


- Sustainability
- Availability
- Reliability
- Price

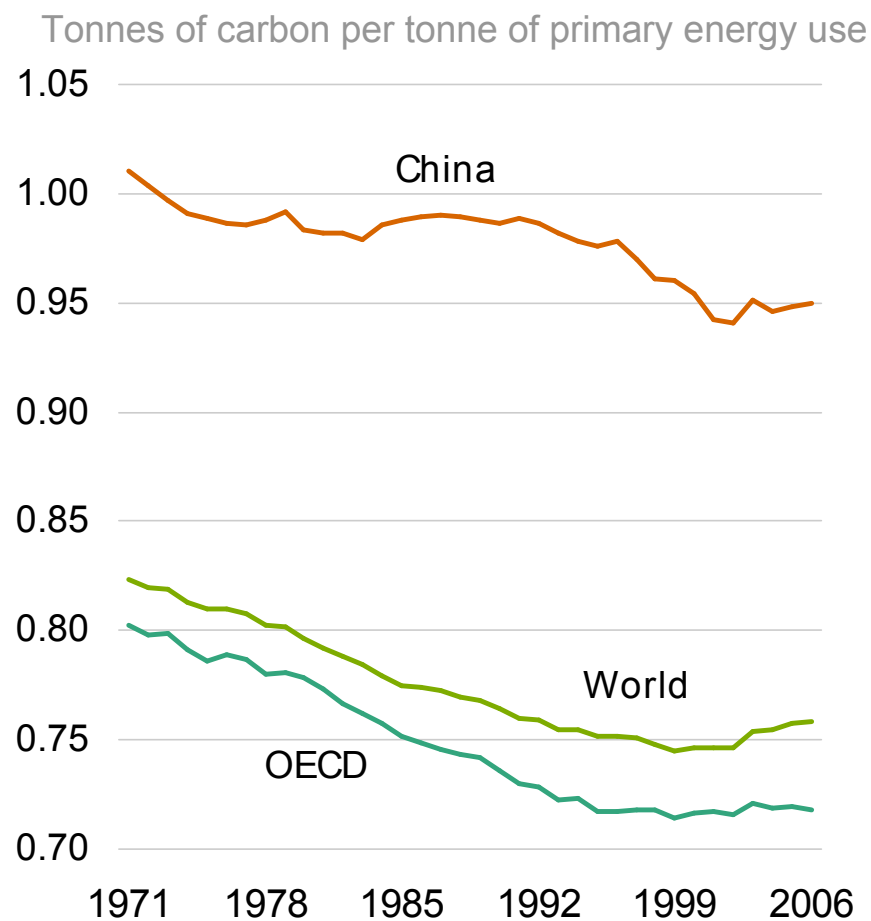
Carbon Emissions



World Carbon Emissions



Carbon Intensity

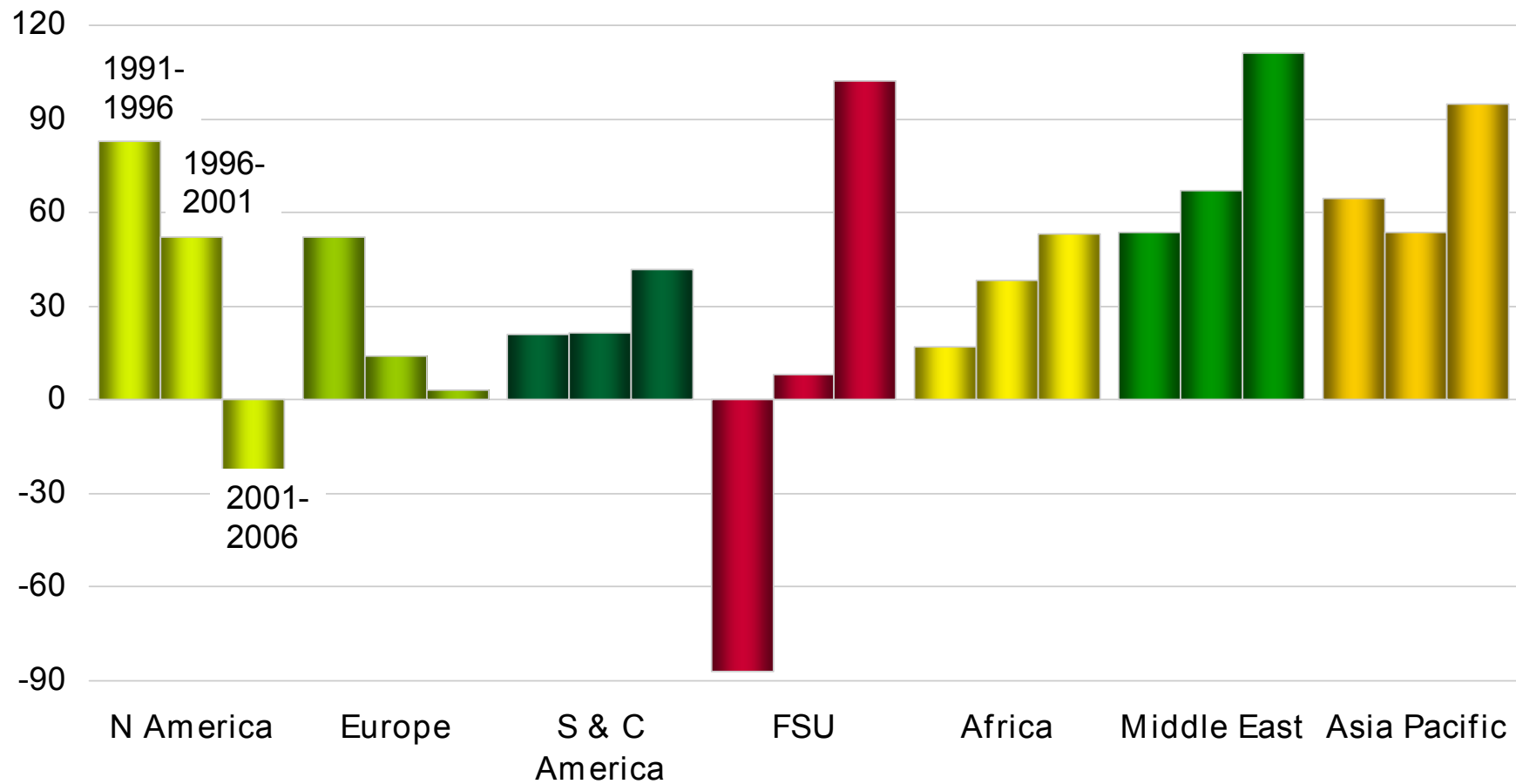


Regional Growth of Gas Production



5 year cumulative changes in natural gas production by region

Billion cubic metres

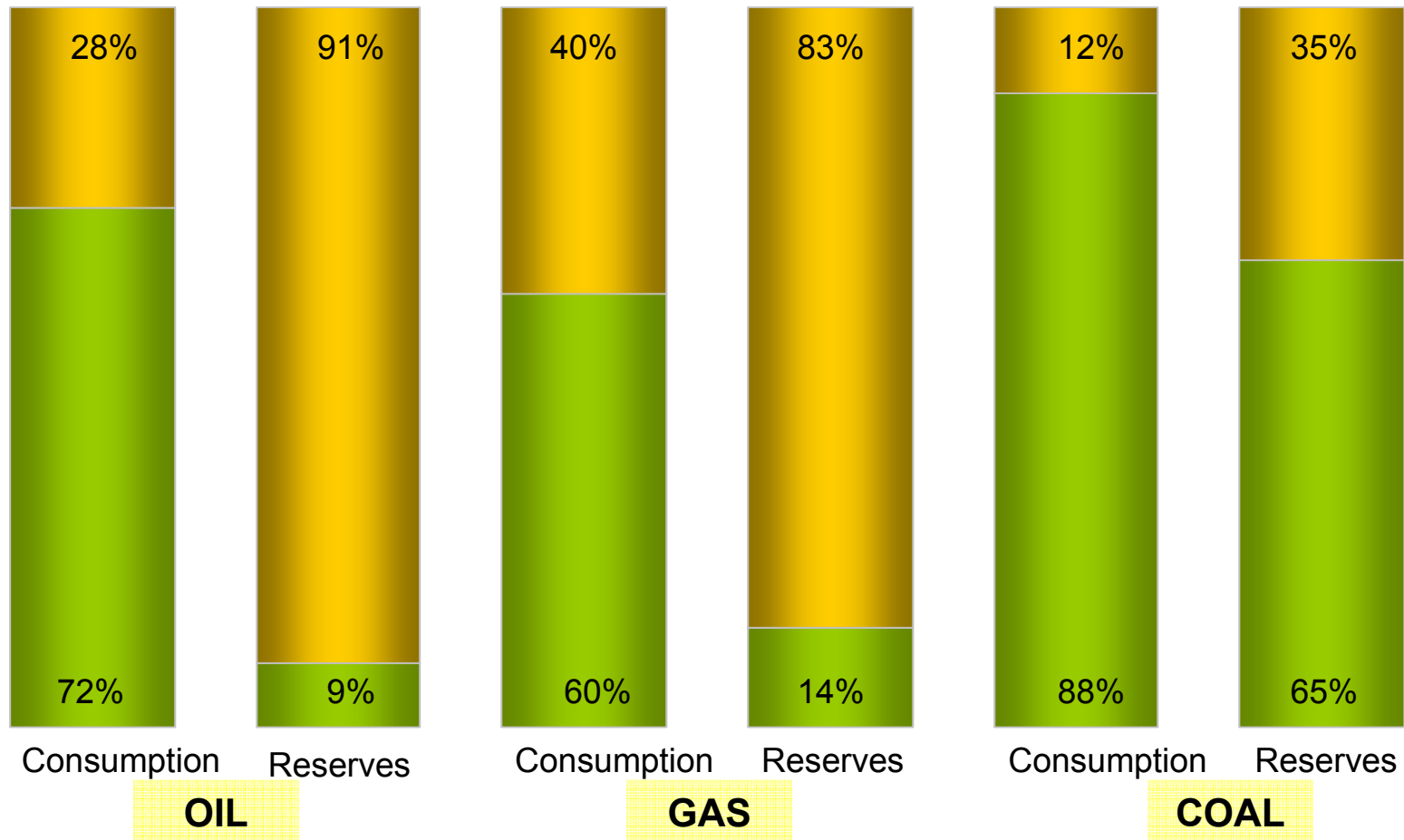


Dislocation of Supply & Demand

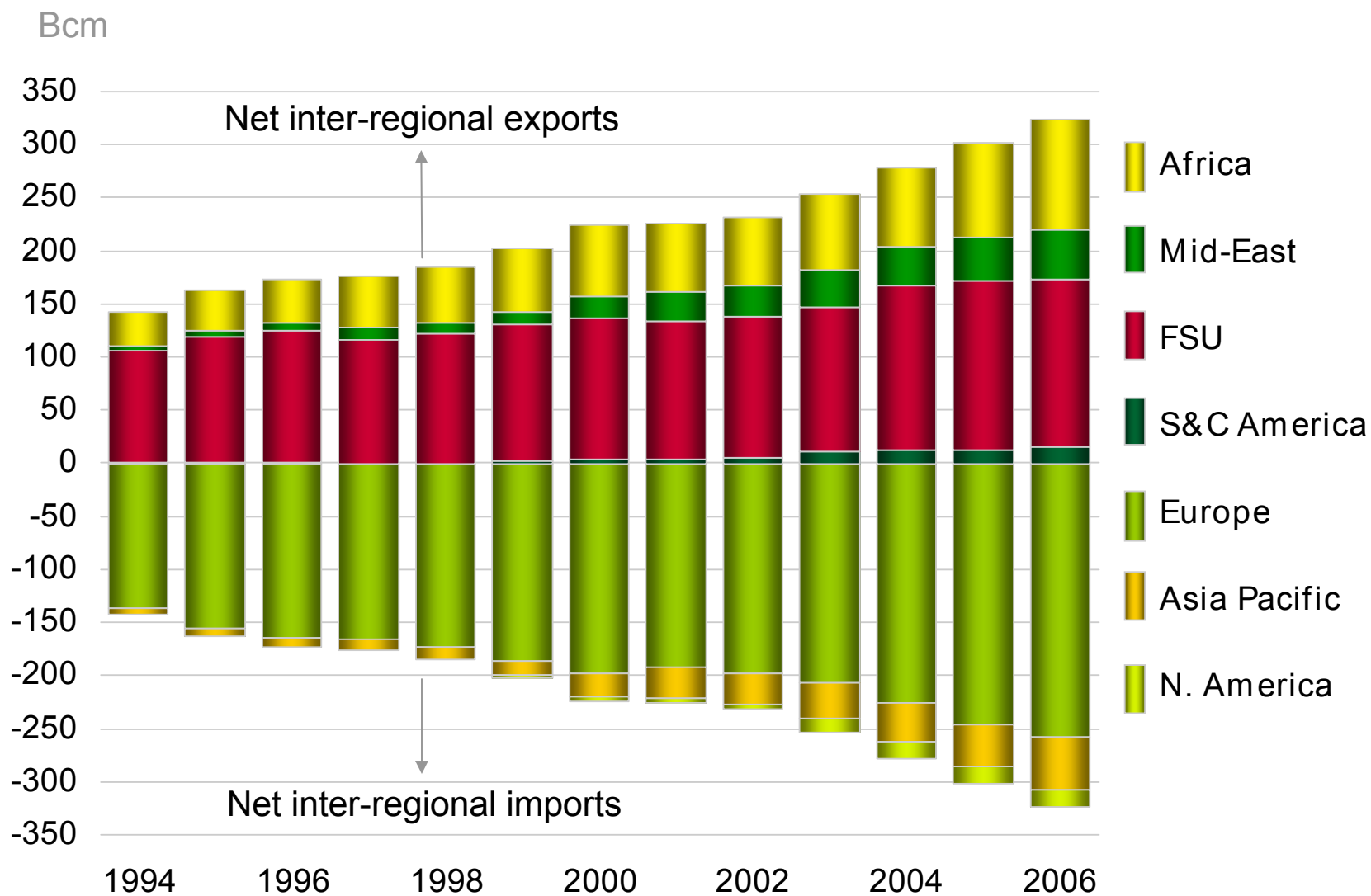


■ 3 Largest Energy Markets (N. America + Europe + Asia Pacific)

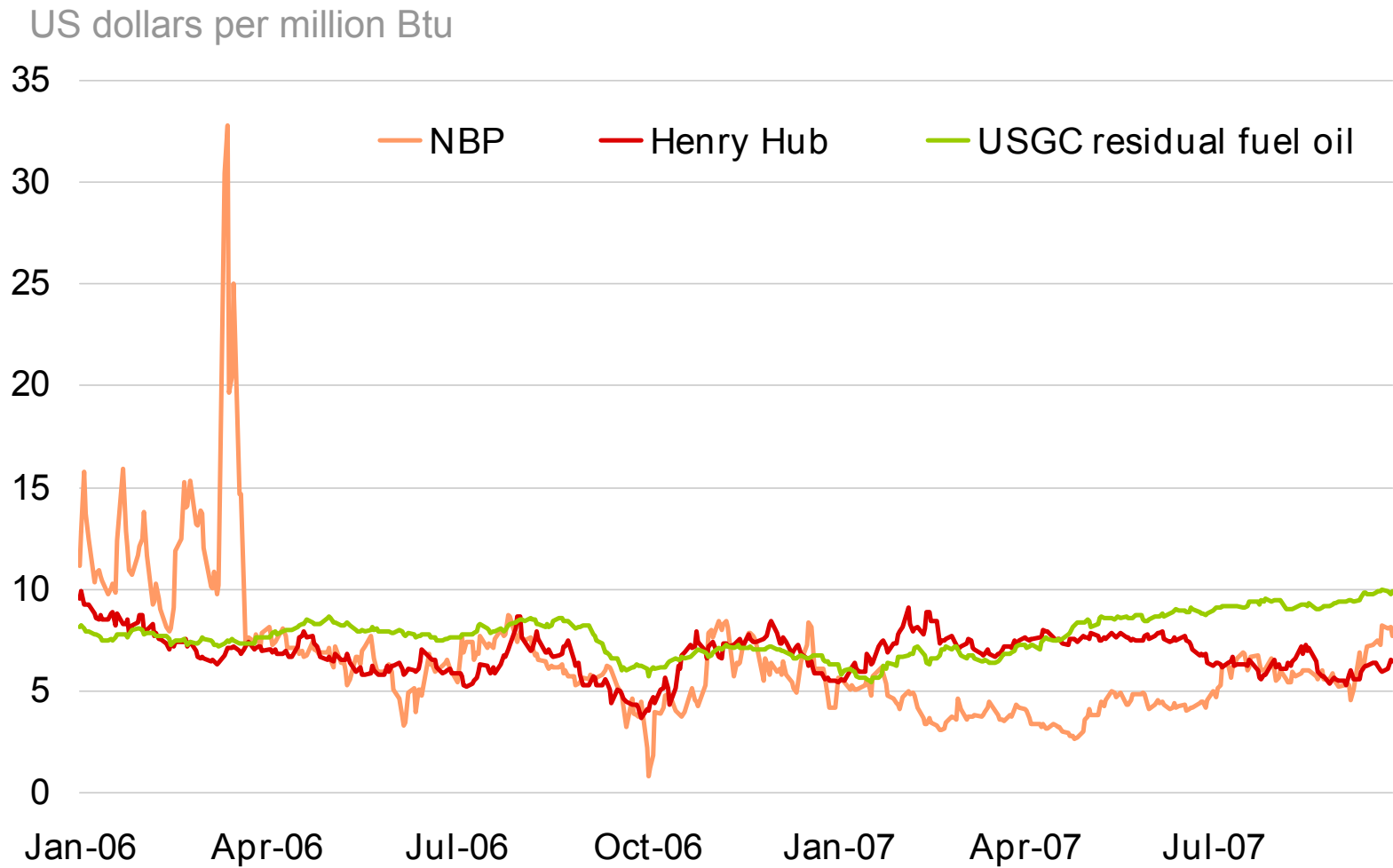
■ ROW



Gas Trade



Natural Gas Prices

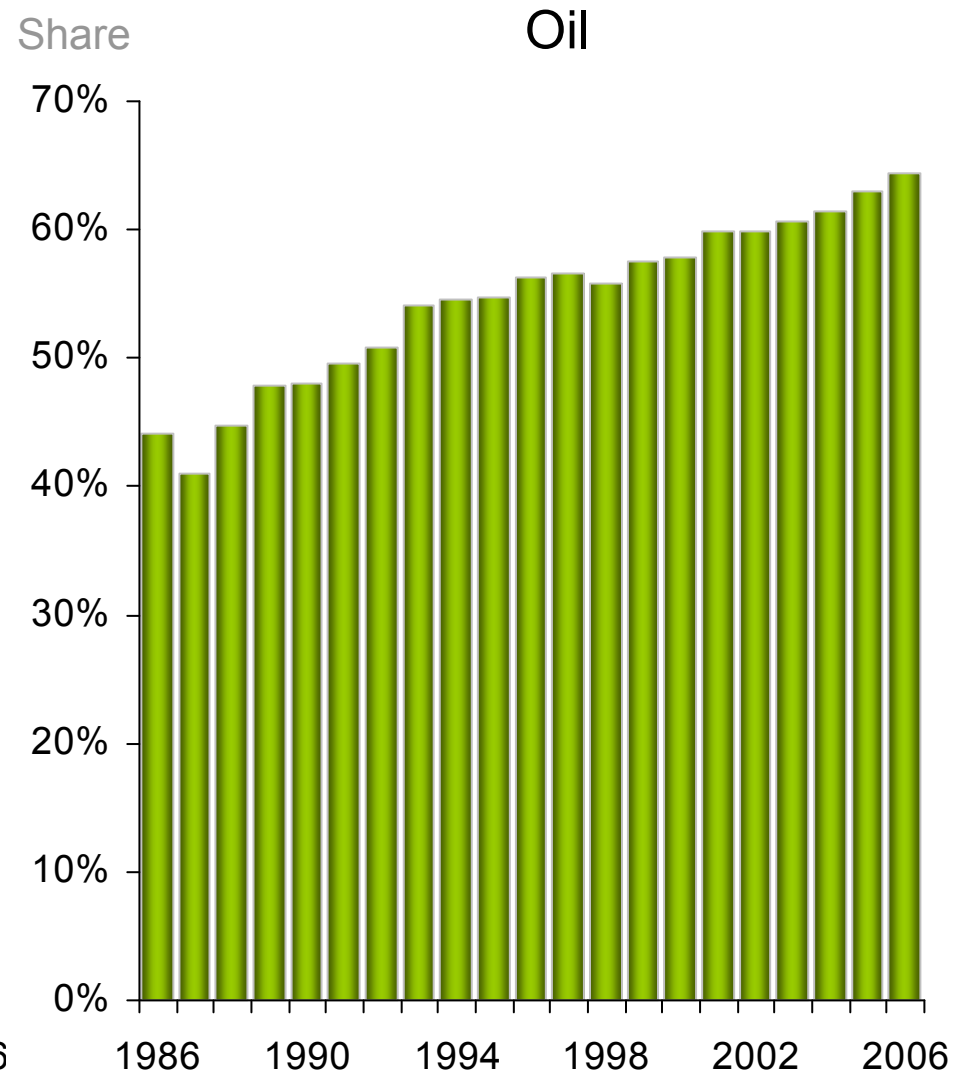
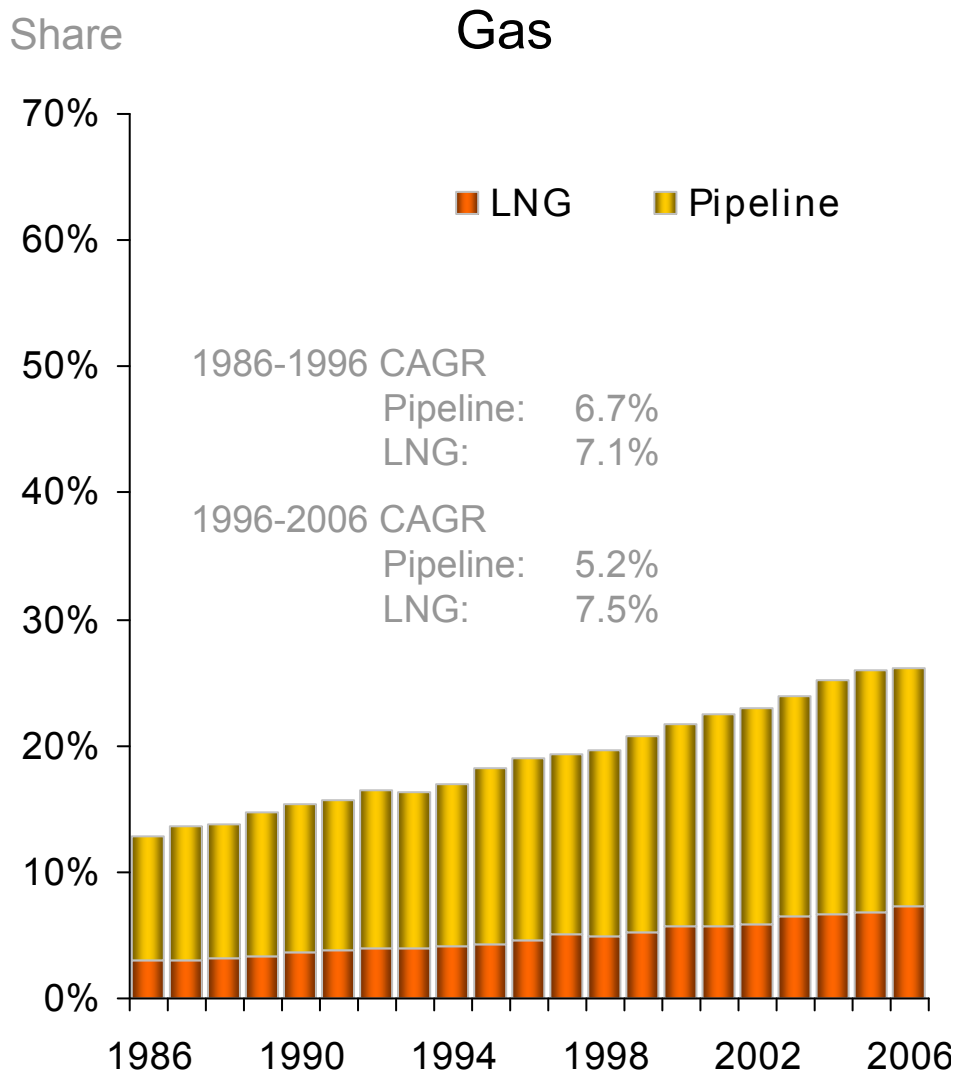


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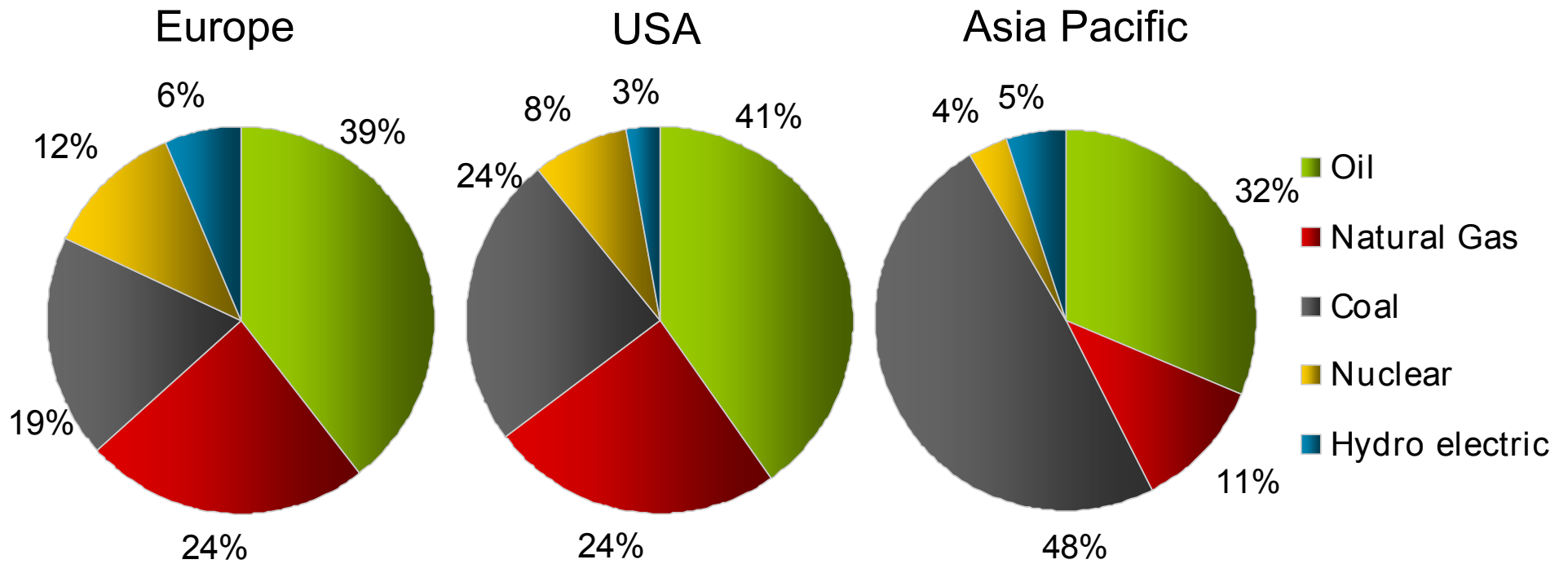


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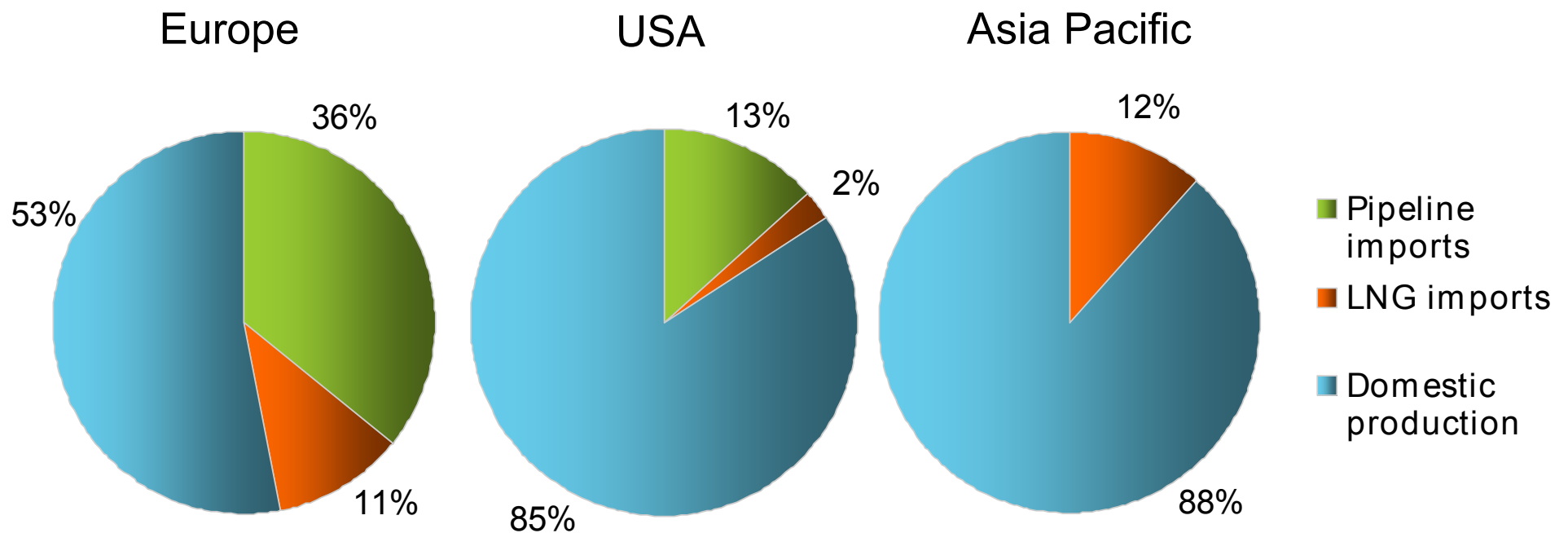
Oil and Gas Exports as Share of Production



Regional Fuel Shares, 2006

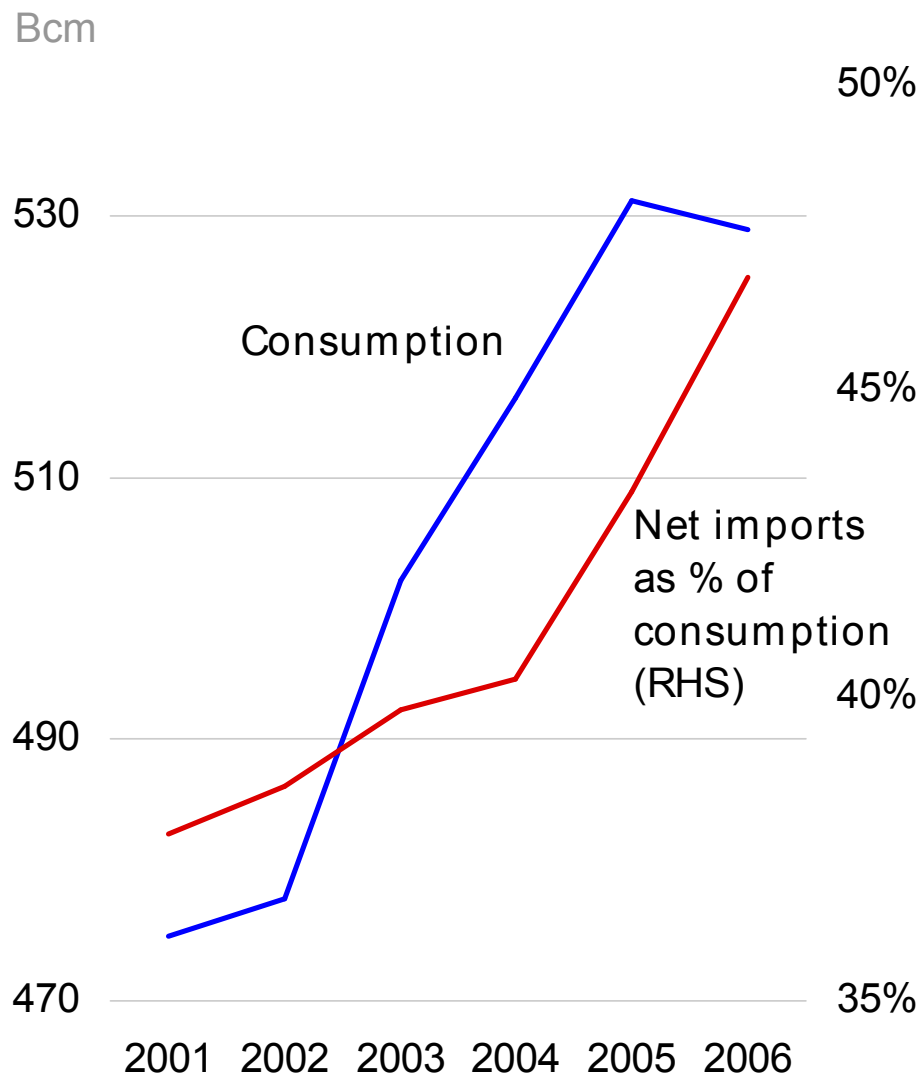


Gas: Share of Net Imports in Total Supply, 2006

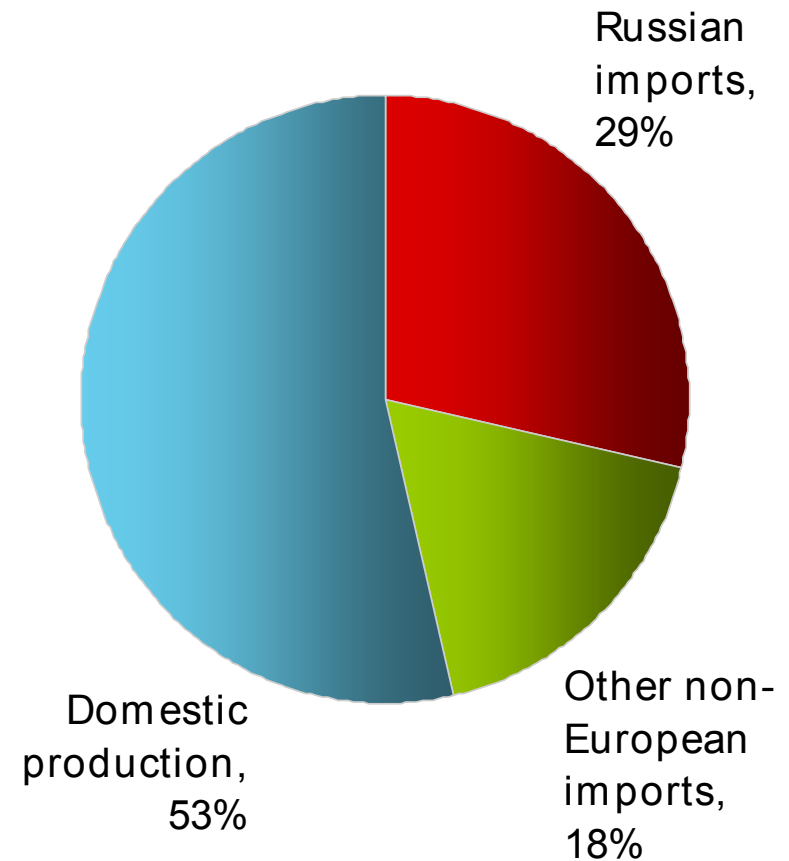


But note: Japan and South Korea are 97% and 100%, respectively, dependent on LNG imports

European Gas Consumption

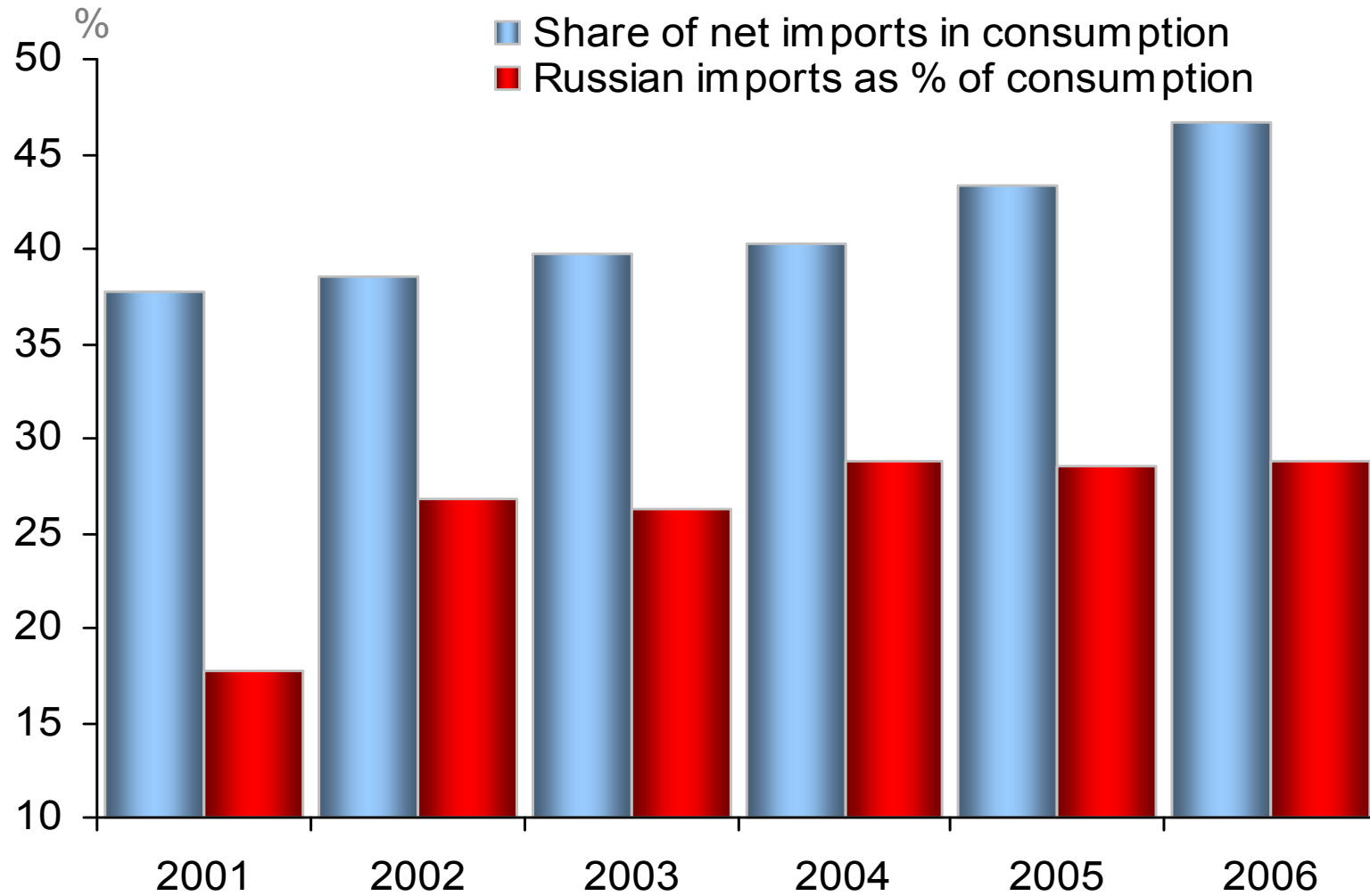


Share of Supply in 2006

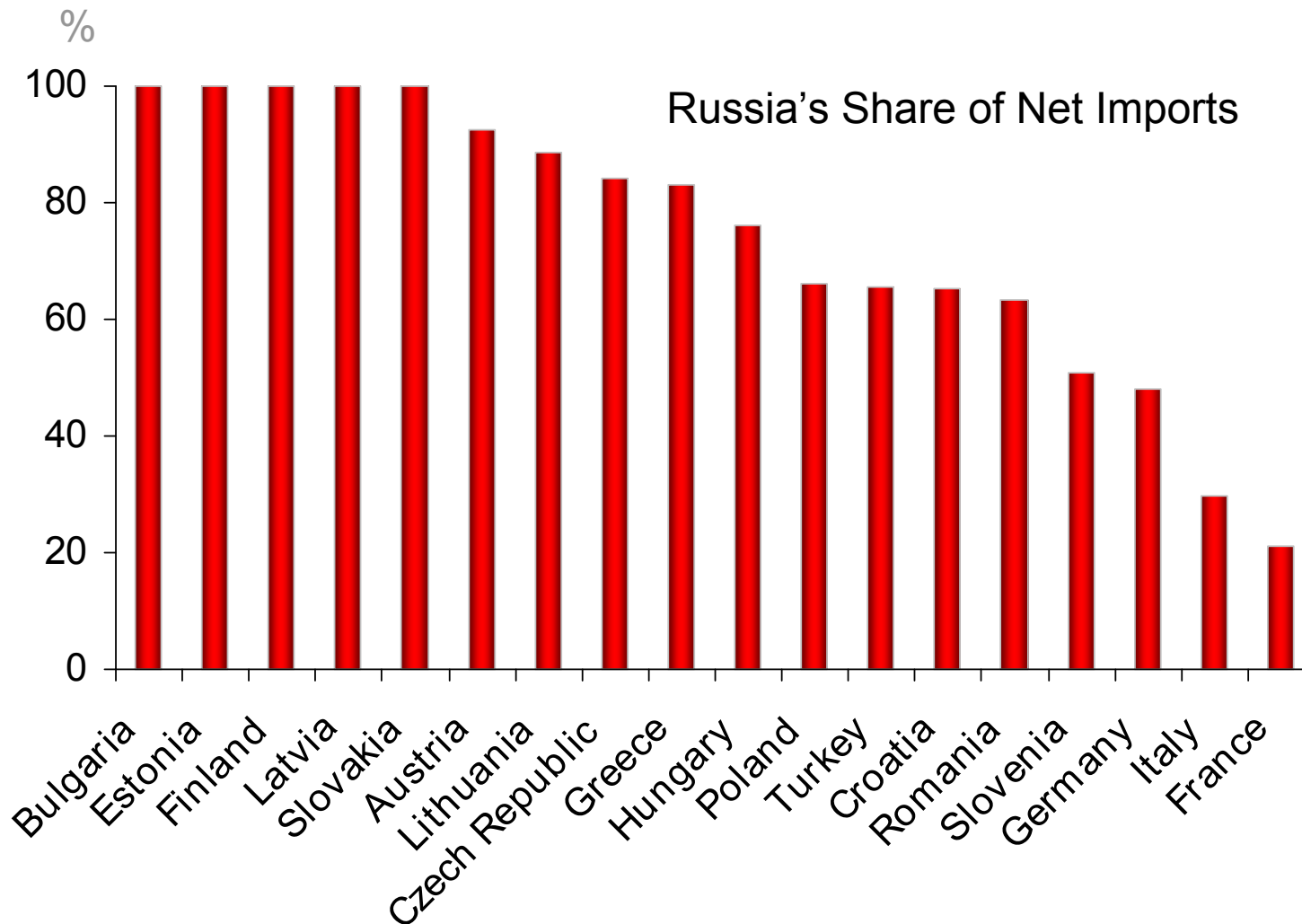


Source: BP Statistical Review, Eurostat

European Gas Imports



European Countries Most Dependent on Russian Imports, 2006



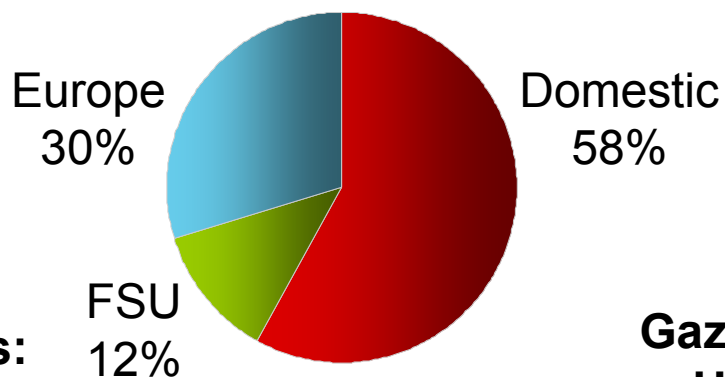
Source: BP Statistical Review, Eurostat

Russia's Dependence on Gas Exports to Europe

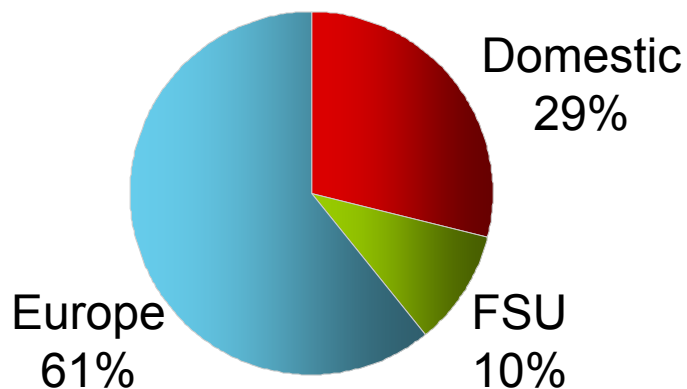


Average Share 2003-06

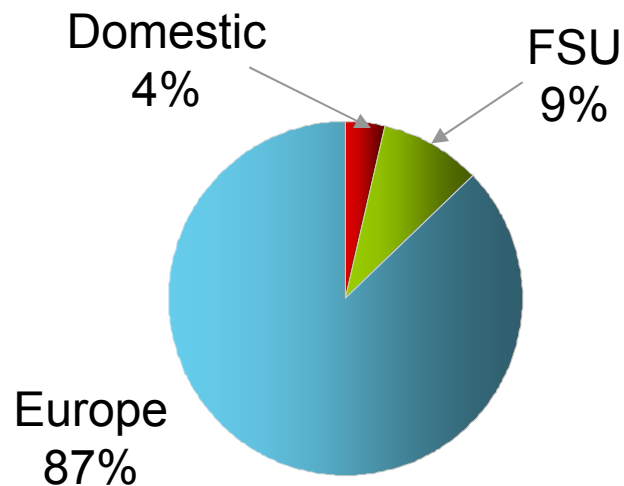
Gazprom Deliveries: 539.9 St Bcm in 2006



Gazprom Net Sales: US\$ 51.9 billion in 2006

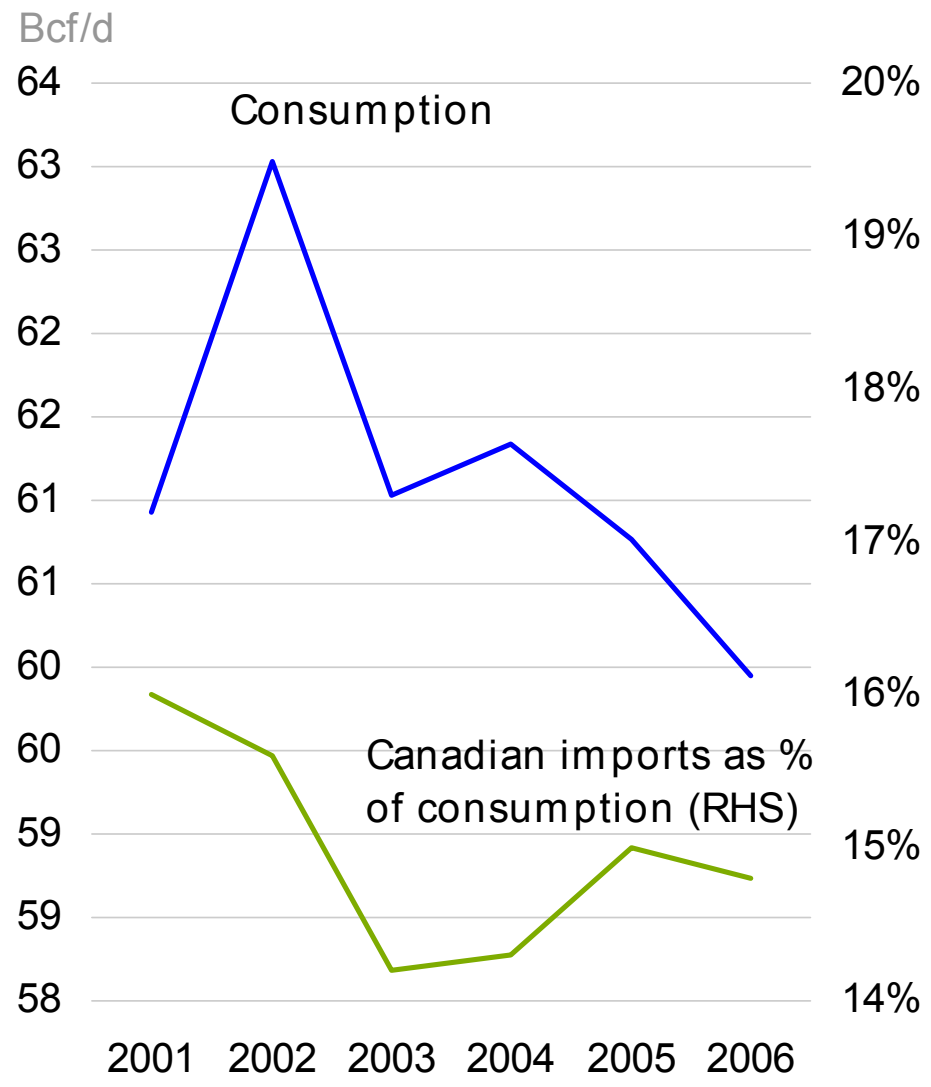


Gazprom Direct Taxes Paid: US\$ 12.4 billion in 2006

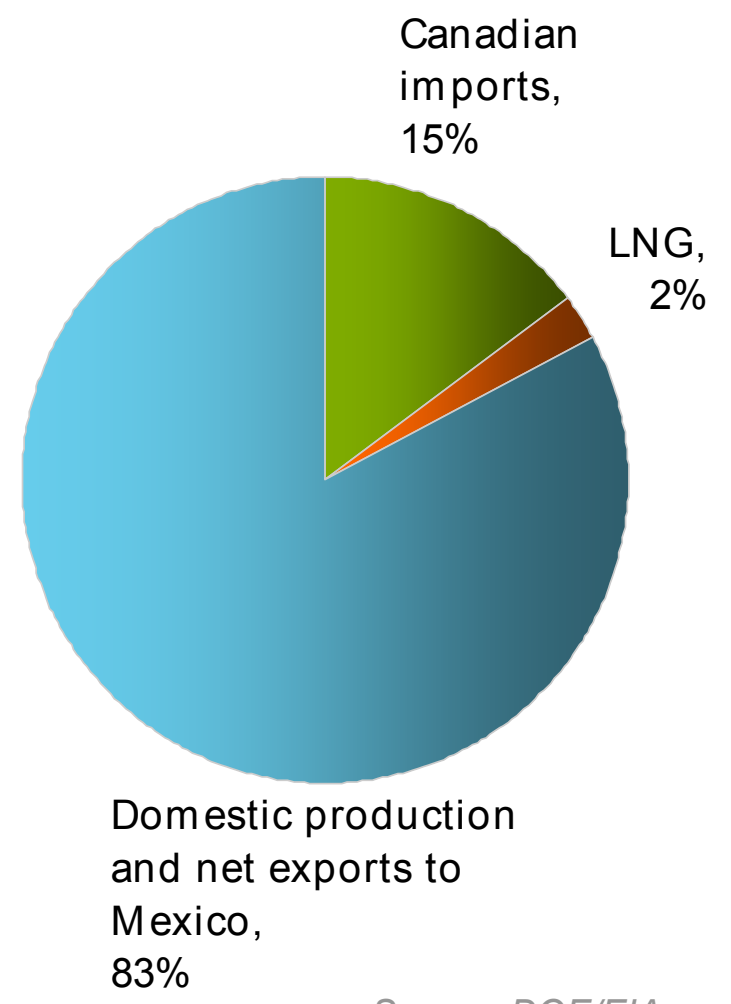


Source: Gazprom

US Natural Gas Consumption and Imports

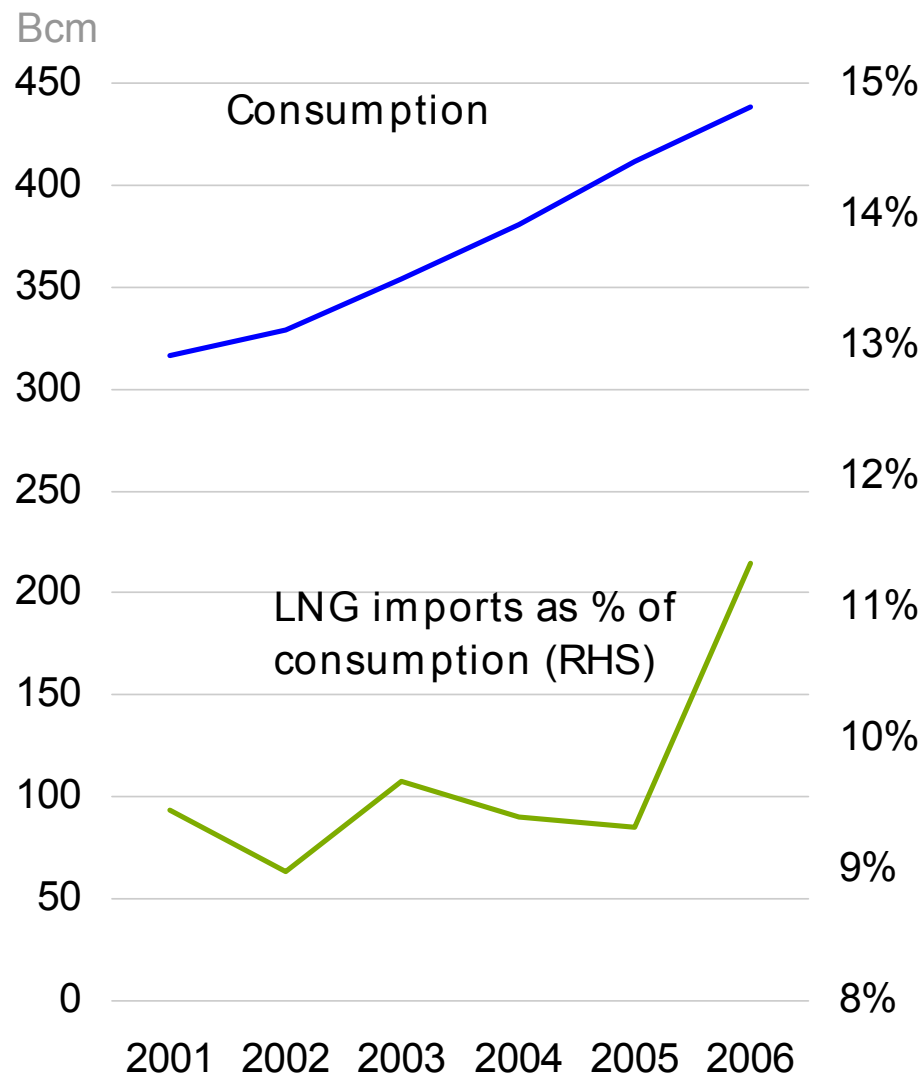


Share of Supply in 2006

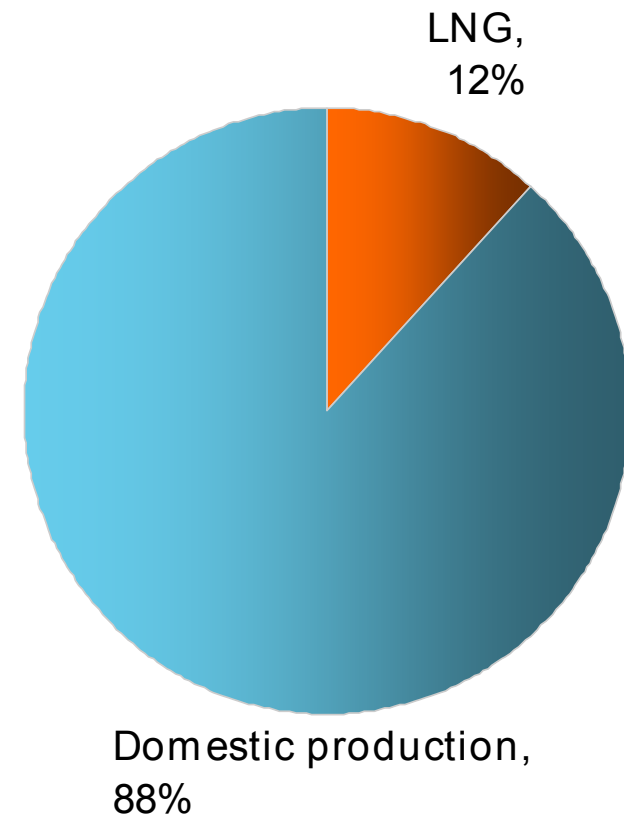


Source: DOE/EIA

Asia Pacific Natural Gas Consumption and Imports



Share of Supply in 2006

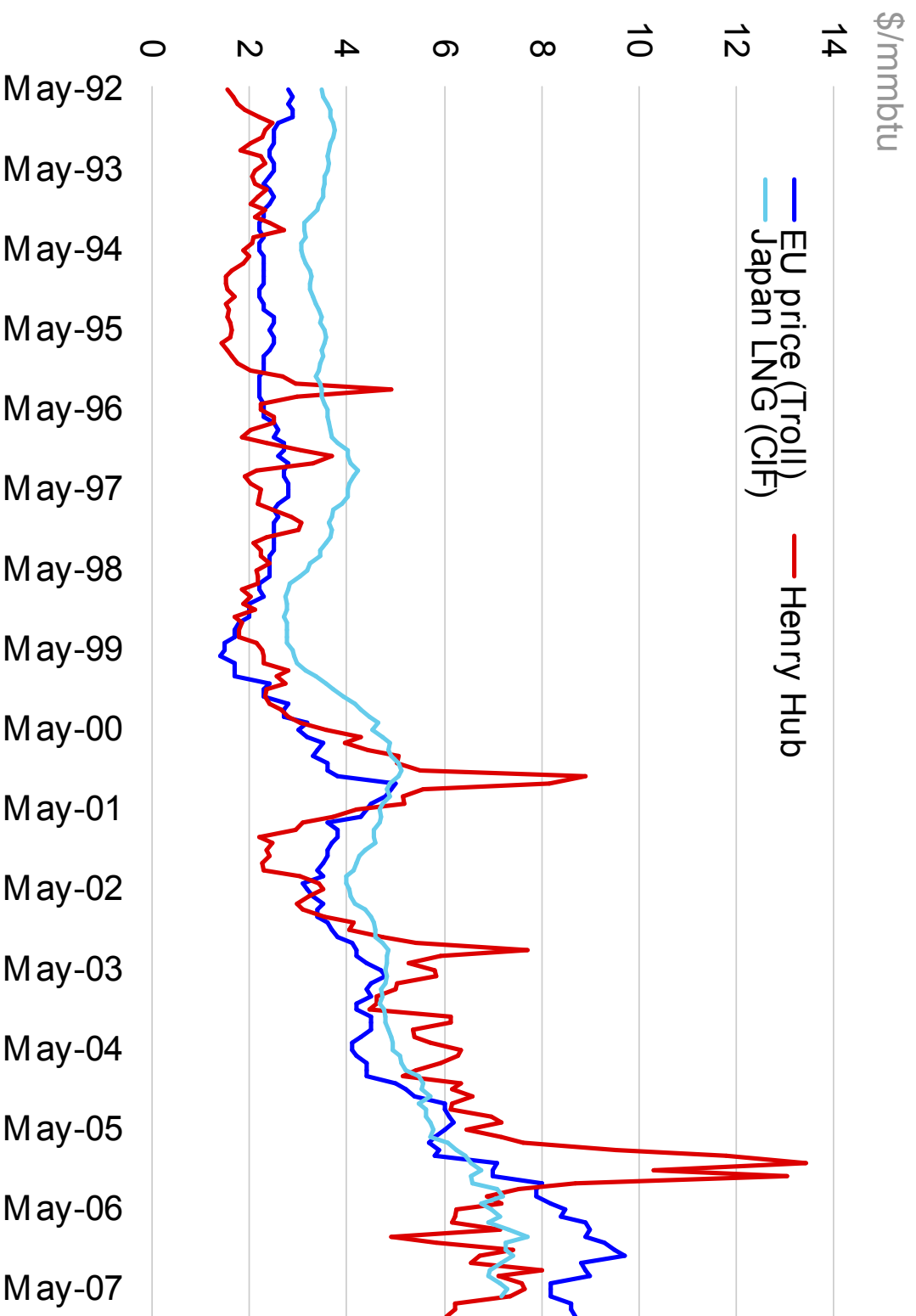


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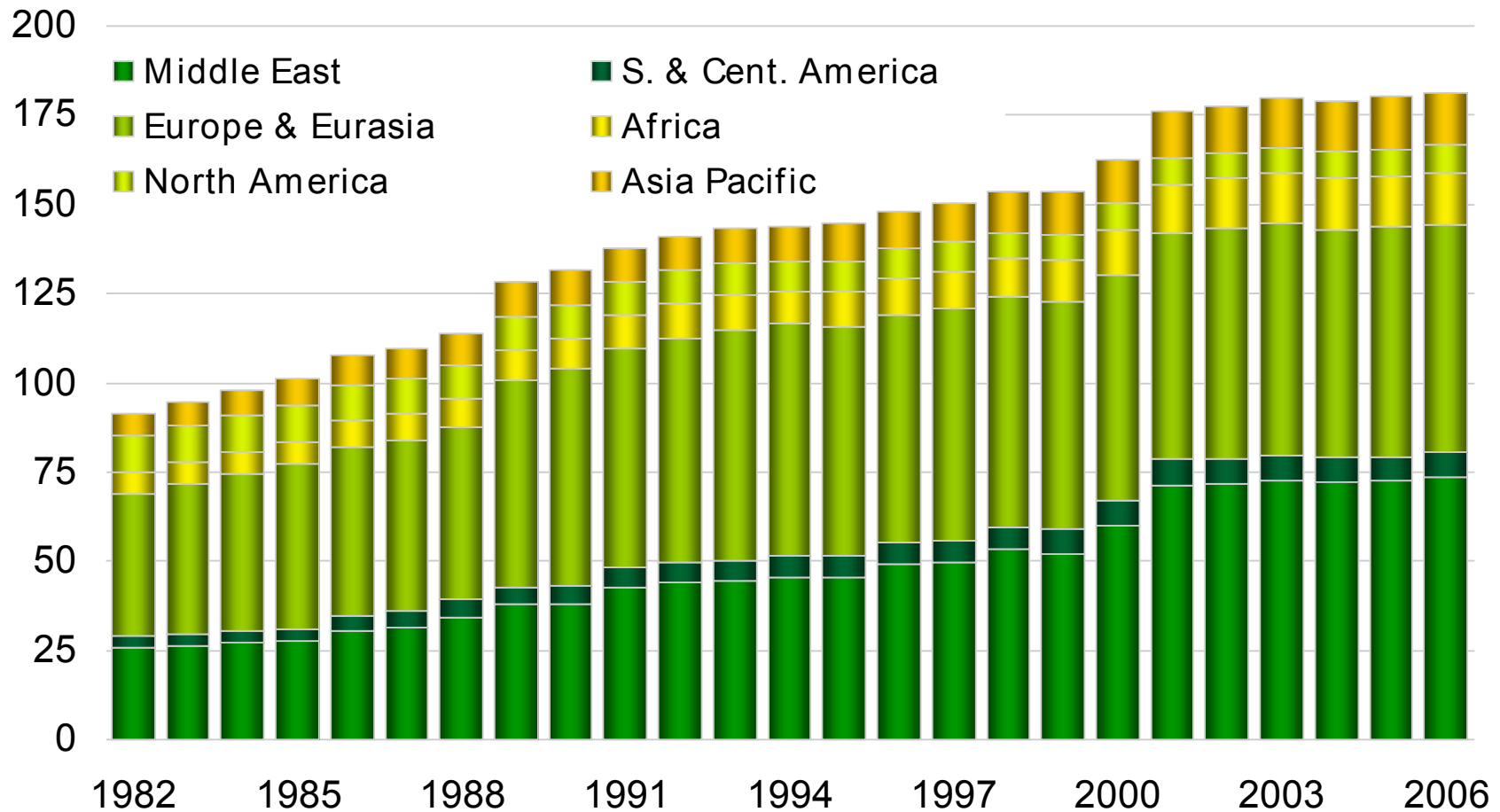
International Gas Prices



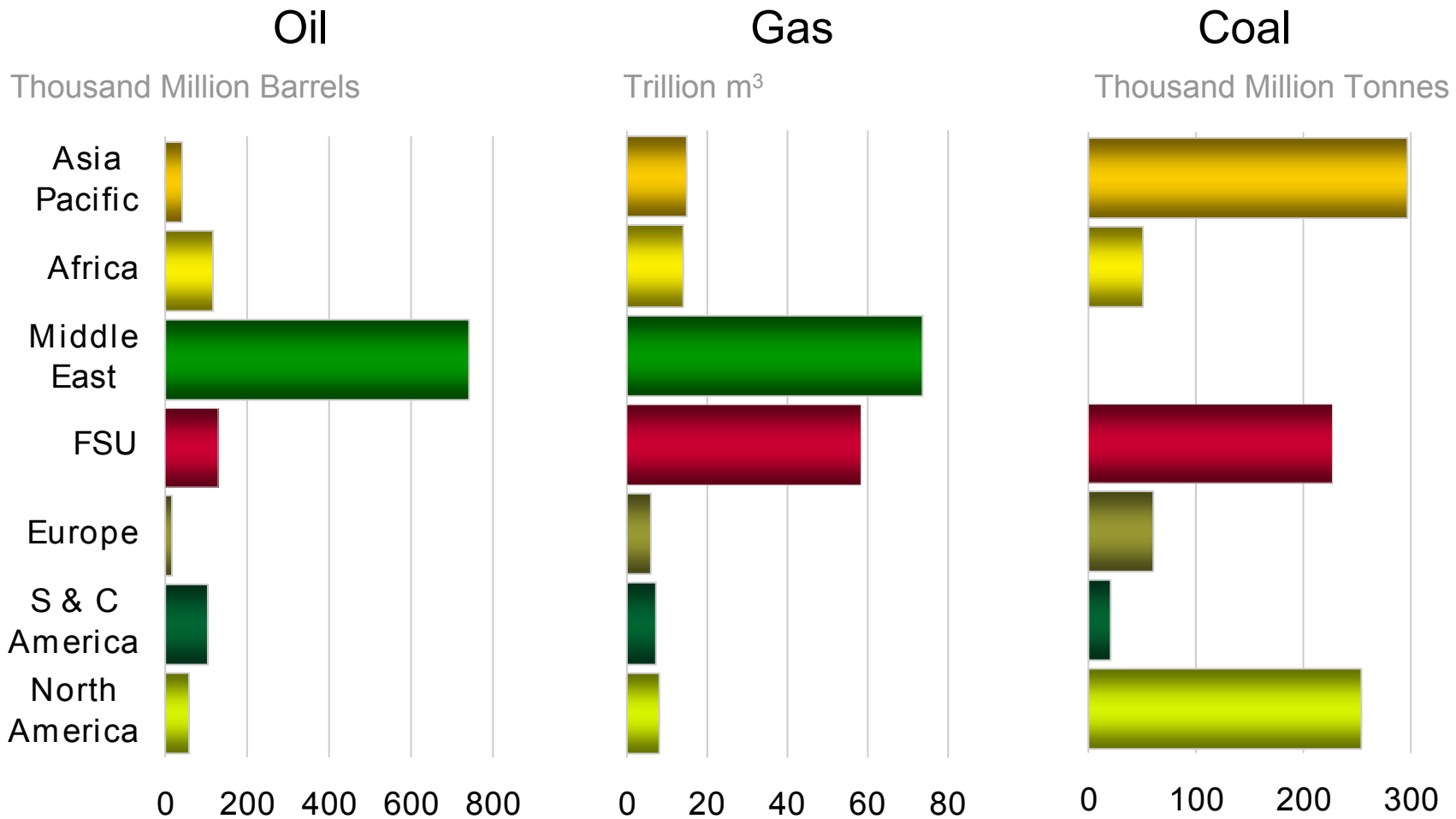
World Gas Reserves over Time



Trillion M³



Oil, Gas and Coal Reserves in 2006



Concentration ratios (3 largest reserve holding countries):

Oil:
43%

Gas:
56%

Coal:
57%