

The future of natural gas in the global energy context

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Congrès du gaz (AFG)
Palais des Congrès de Paris,
11-13 septembre 2007

The future of natural gas in the global energy context

- *Natural gas market will grow*
- Gas is faced to constraints on demand and supply
- Technology will contribute to solve those challenges

Gas-to-power convergence...

OIL & GAS

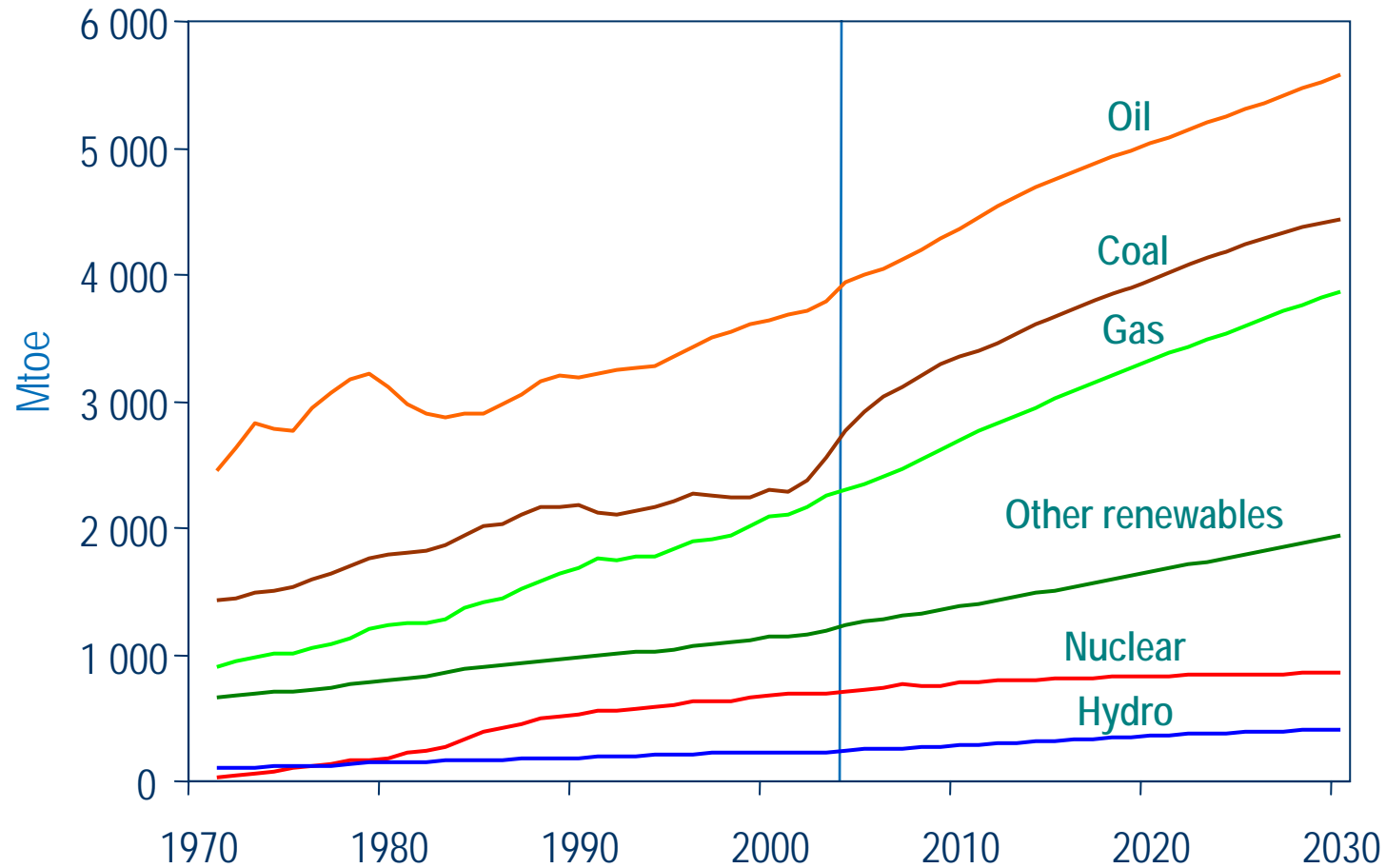


GAS



GAS & ELECTRICITY

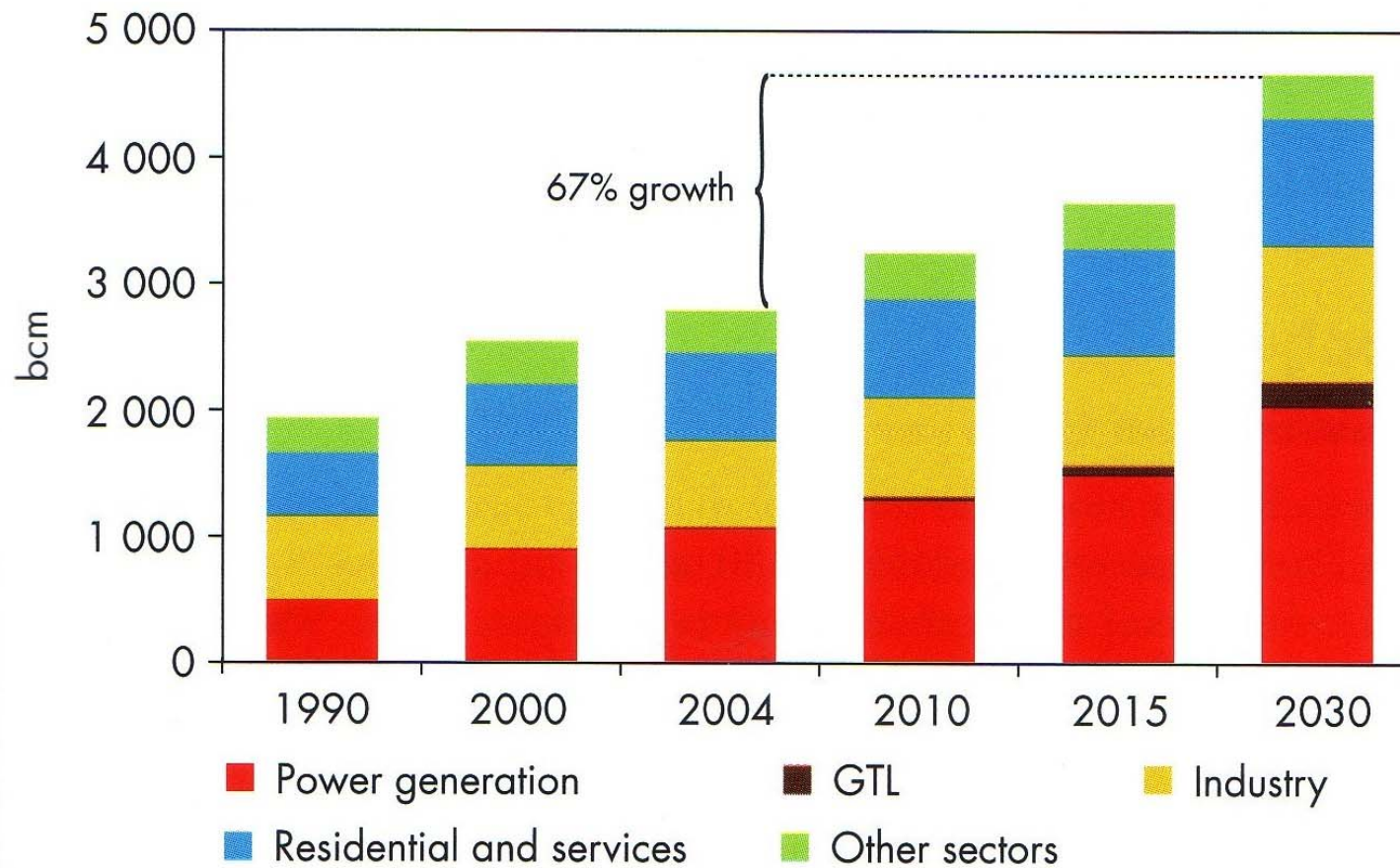
Prospects for world primary energy demand



Source: IEA, WEO 2006

**Reference scenario:
+53% over the 2004-2030 period**

Potential gas growth remains driven by the power sector



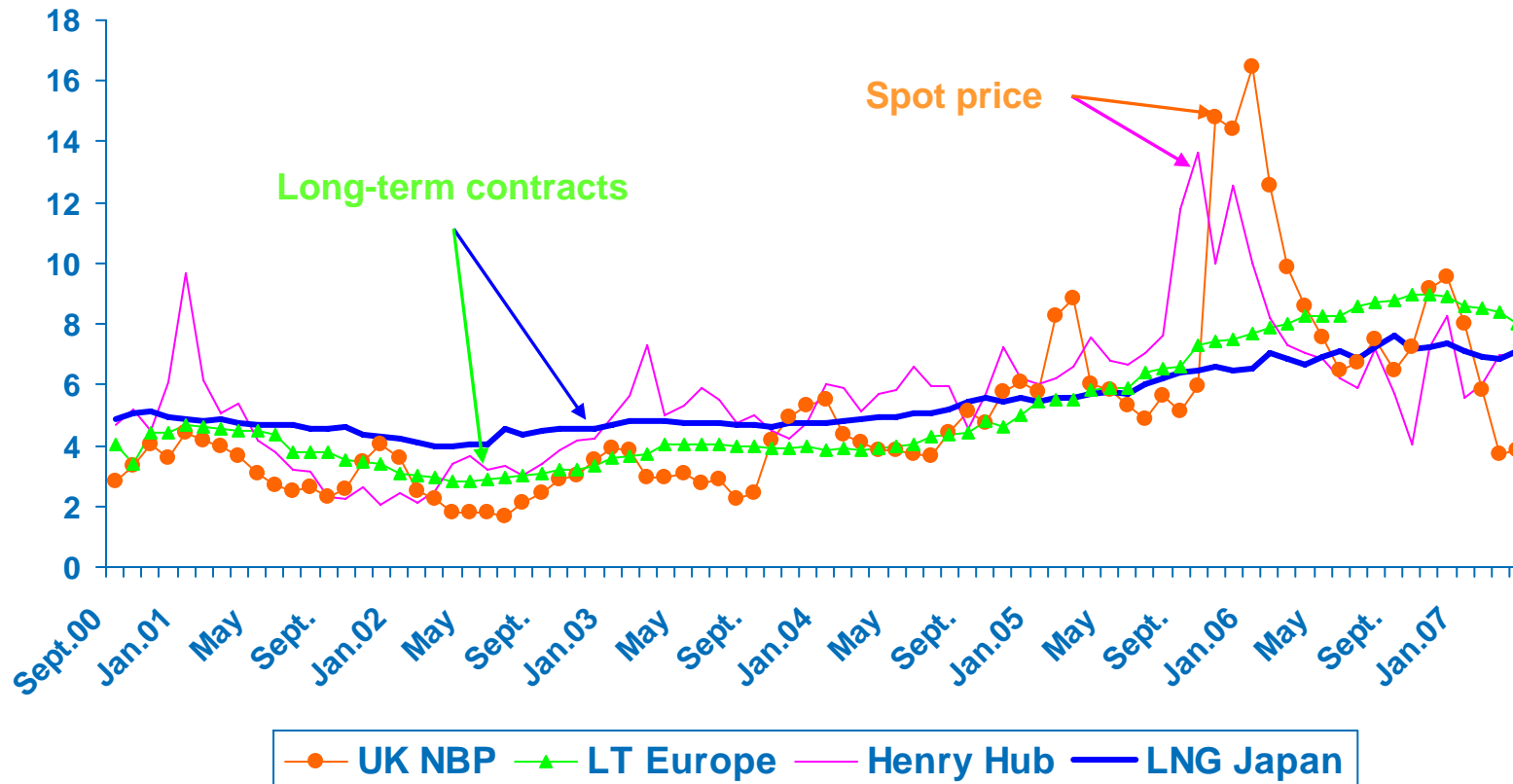
Source: IEA, WEO 2006, Reference scenario

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Rising prices and volatility concerns inter-fuels competition

\$/MBtu



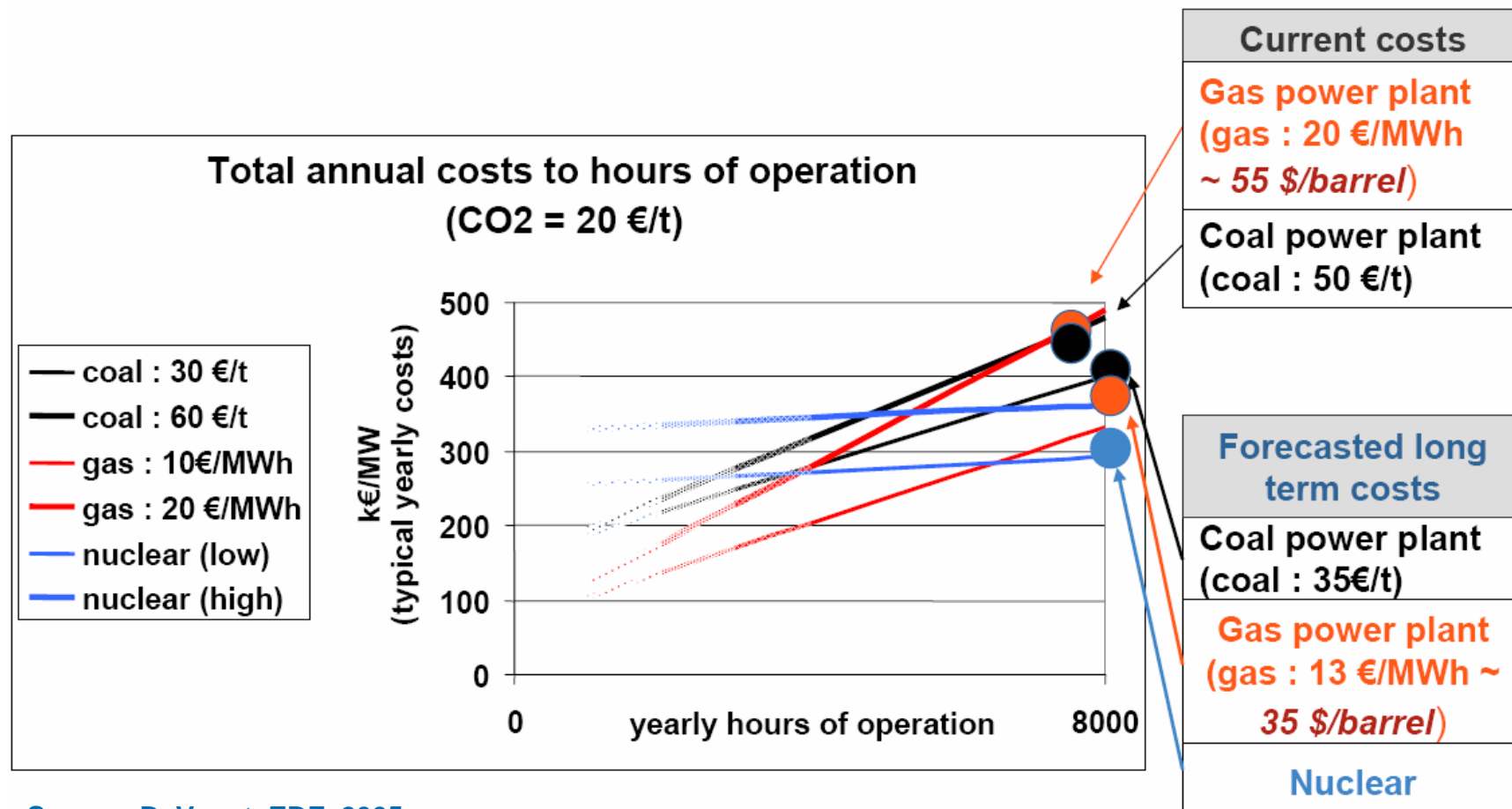
Sources: EGM, WGI, MITI

Impact of climate change on fossil fuels

- A growing concern on climate change
 - Gas has an advantage over fossil fuels as regards CO₂ emissions and local air pollution. However, carbon capture and sequestration will have to be applied to all fossil fuels and possibly more easily to coal.

- Post-Kyoto 2012?

Inter-fuels competition in power generation

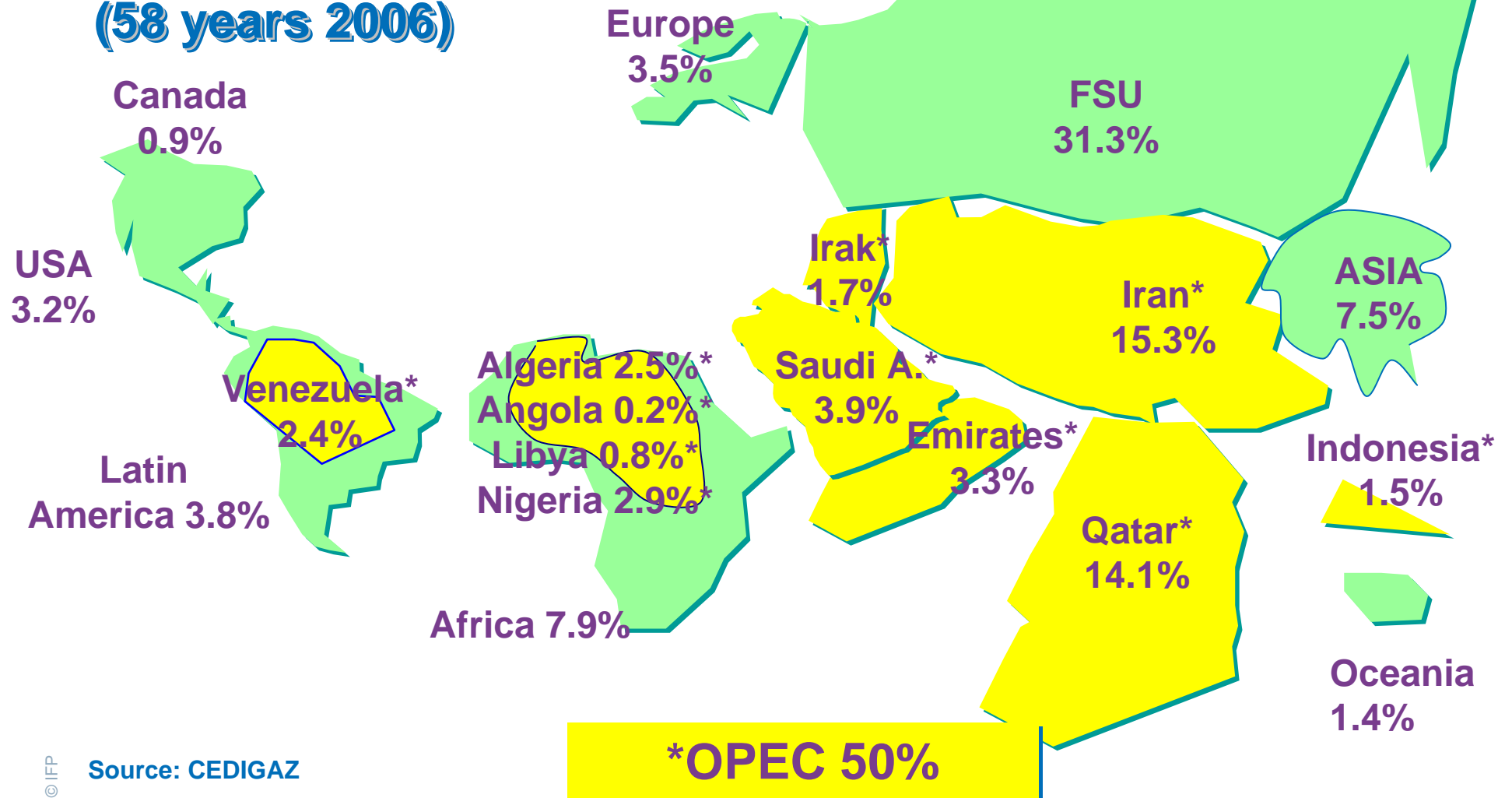


Source: D. Venet, EDF, 2005

Gas reserves are concentrated

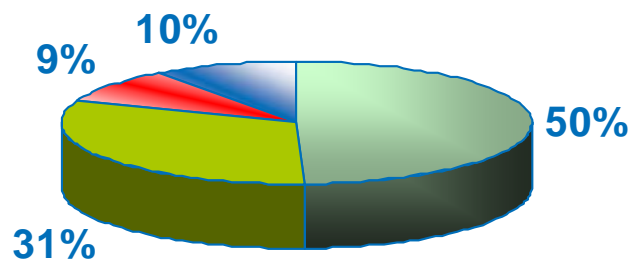
TOTAL 182.9 Tm³
(58 years 2006)

Main Gas Countries

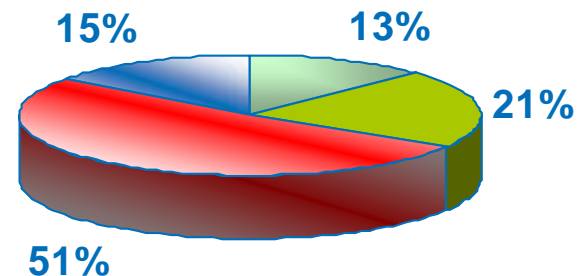


Natural gas reserves versus forecast demand

Proven gas reserves on 1.1.2007*:
182.9 Tcm



Gas consumption in 2006*:
2.88 Tm³



 **OPEC**

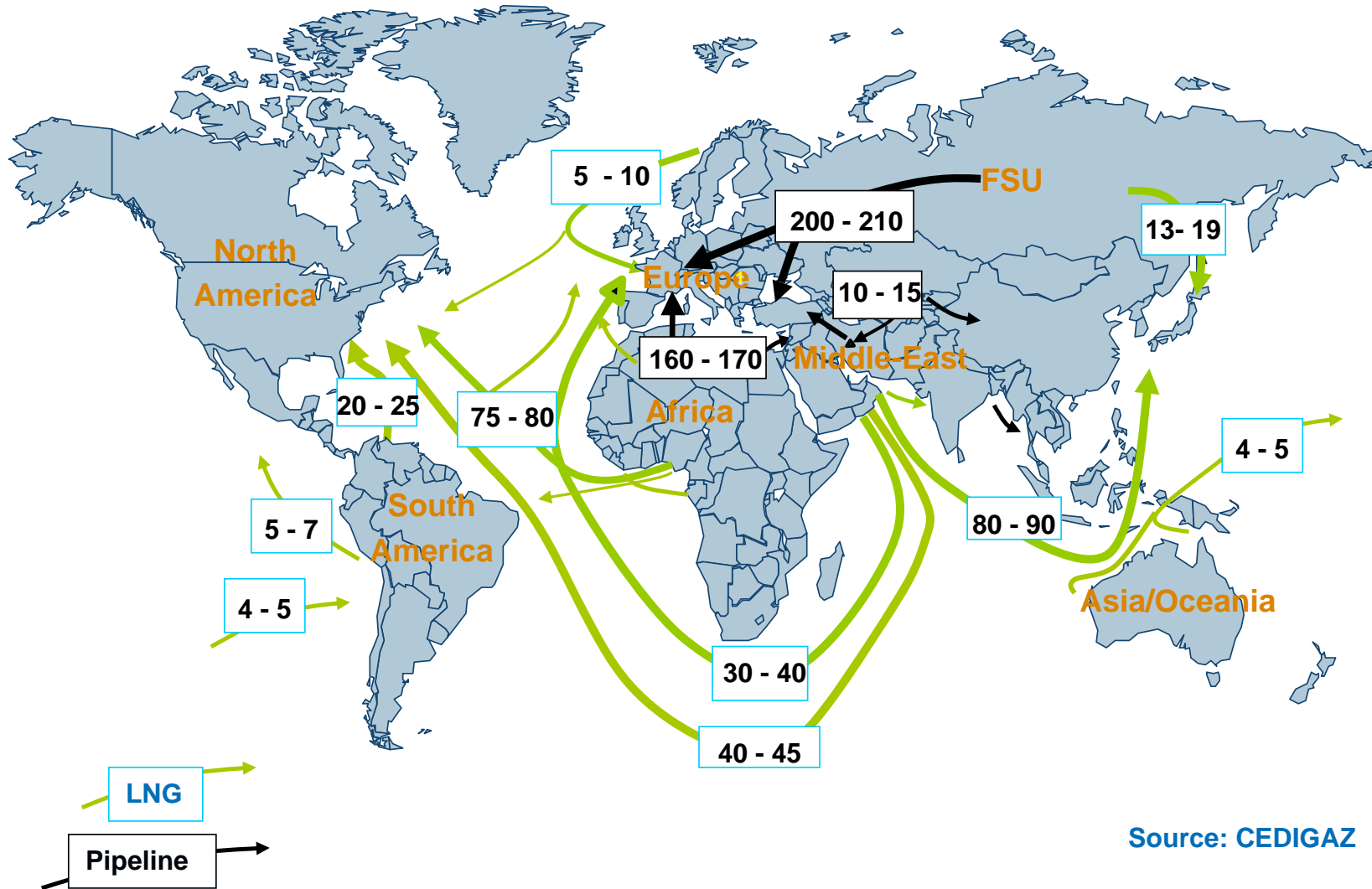
 **CIS**

 **OECD**

 **Other countries**

•Preliminary data
Source: CEDIGAZ

Inter-regional flows in 2020 660/720 Bcm

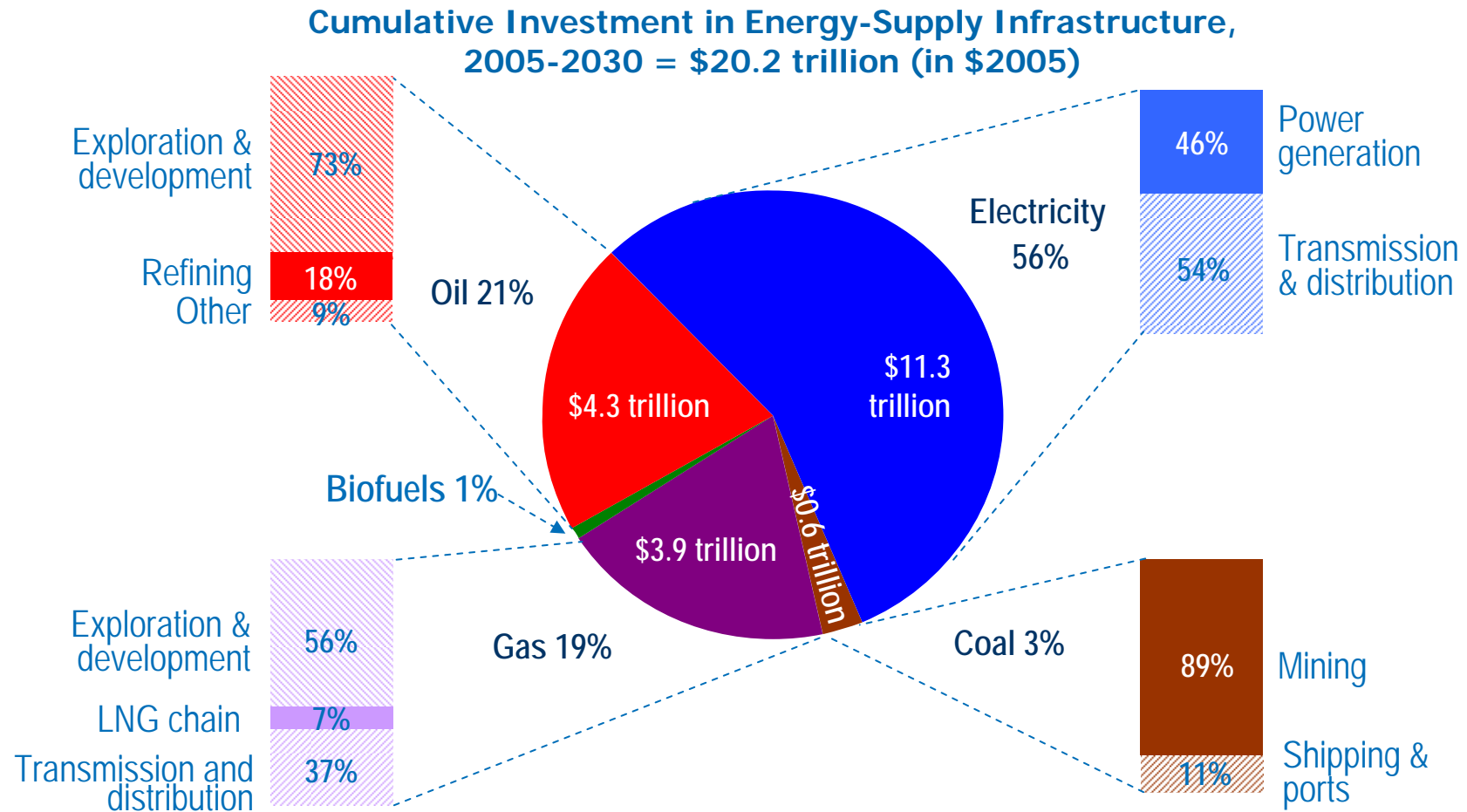


Source: CEDIGAZ

- Looming constraints on supply as dependence of major consuming regions grows
 - major exporting countries now tend to give priority to the development of gas on their local markets (Indonesia, Oman, Trinidad & Tobago, Egypt,..)
 - Caution about further export developments (Qatar has set a moratorium up to 2012).
 - Recurrent security of supply concerns (transit issues, cartelization of supply,..).

- The industry enters a new era in terms of gas developments
 - New supply/transportation concepts to access currently stranded, often marginal gas deposits, will increasingly become necessary (offshore liquefaction,..) to monetize smaller reserves.
 - new transportation technologies (growing role of on-board regasification, GTL, CNG) to offer more flexibility to the market.

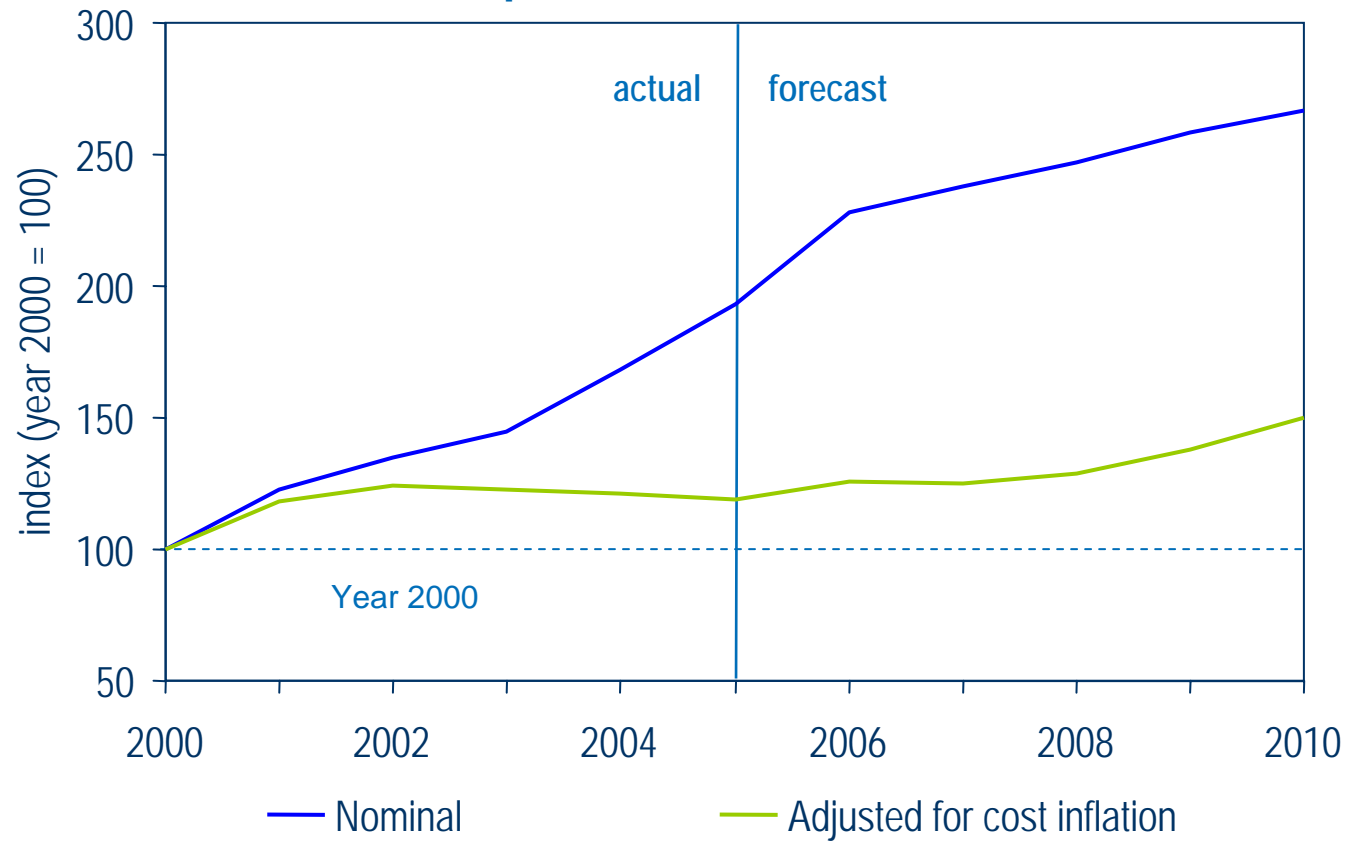
Huge investments are needed along the entire energy chain



Source: IEA, WEO 2006, Reference scenario

Impact of Cost Inflation on Oil & Gas Investment

Global Upstream Oil & Gas Investment



Source: IEA, WEO 2006

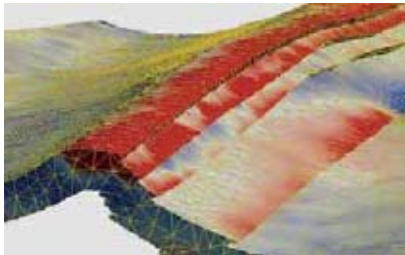
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The essential role of technology

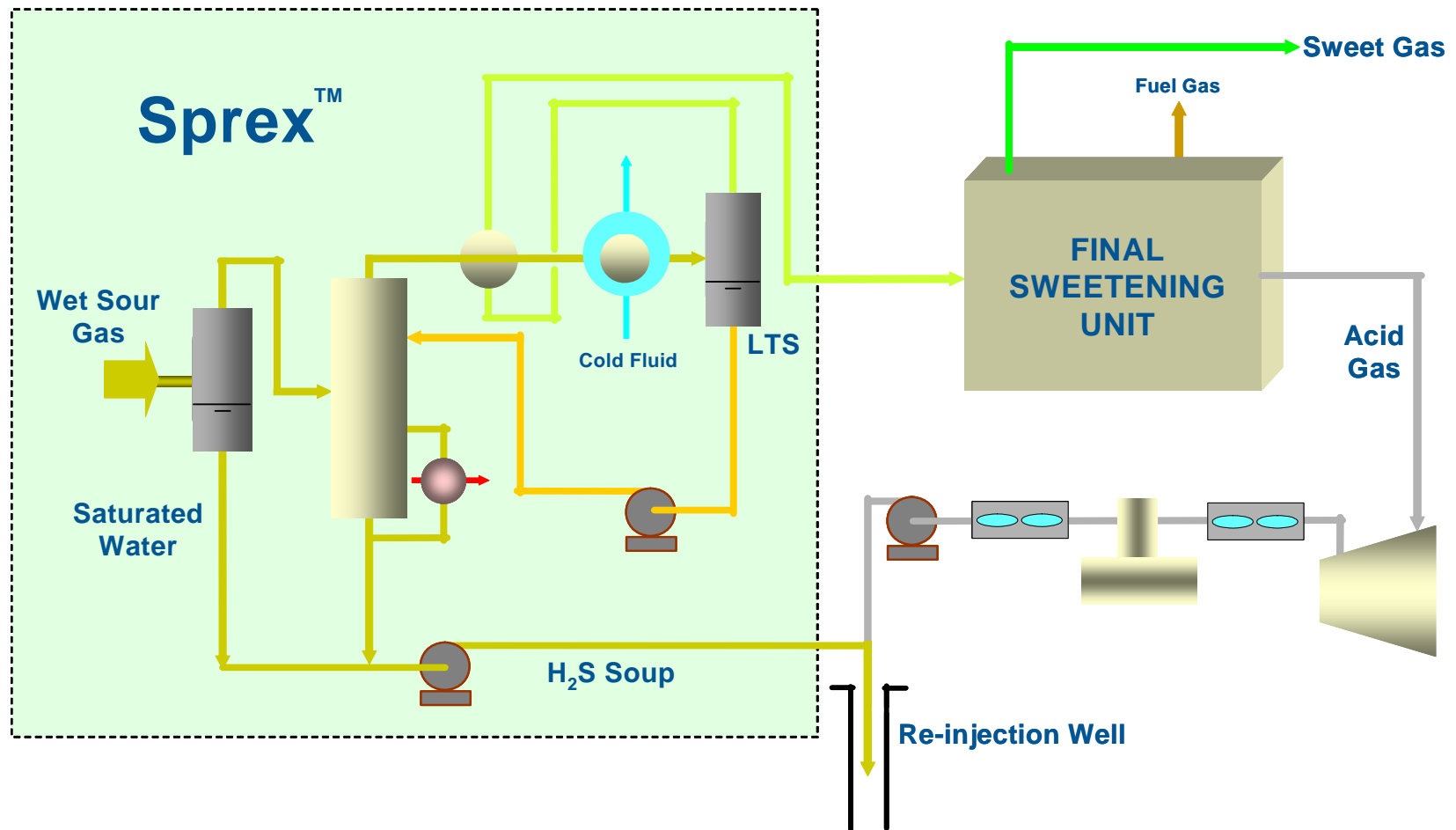
- To help finding new resources, producing and making them available to the market in the long-run,
- To help reduce the negative impact of fossil fuels on climate change.

Pushing back the limits in oil & gas exploration and production



- **Increasing exploration success rates:** developing basin modelling software incorporating the quantification of uncertainties (foothill zones...)
- **Improving field recovery** (field management).
- **Developing fields in extreme environments** (Arctic, ultra-deep offshore...)

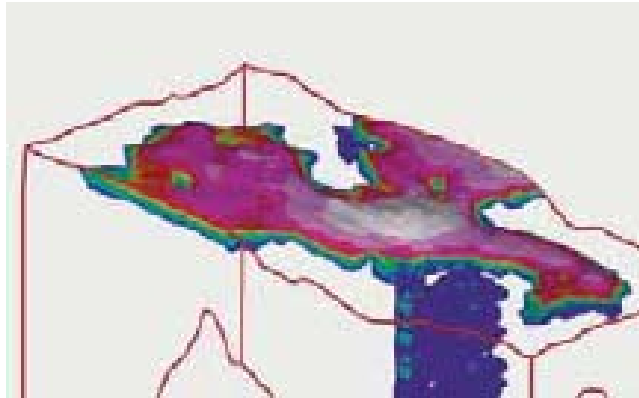
Gas treatment: Sprex® process



Lacq treatment demonstration plant



Capturing and storing CO₂ to combat the greenhouse effect



- CO₂ capture technologies
- Transporting and injecting liquid CO₂
- Geological storage of CO₂
- IFP : important leader in this field at a European level. IFP is involved in 11 CO₂ projects, three of which it leads (Castor, Coach, Inca CO₂).

Natural gas as a transport fuel

- NGV : a competitive option

- GTL : a new route for high quality diesel

Concluding remarks

- Natural gas will undoubtedly participate to the anticipated growth of world energy demand. However, gas has to compete with other energy sources
- It's further growth will be conditioned by a number of factors, including Post-2012 Kyoto rules. The price of the ton of CO₂ will be a key element
- Technology will contribute to bring solutions
- Huge challenges in developing and financing the gas industry are ahead.



Innovating for energy

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