



International Association of Oil and Gas Producers

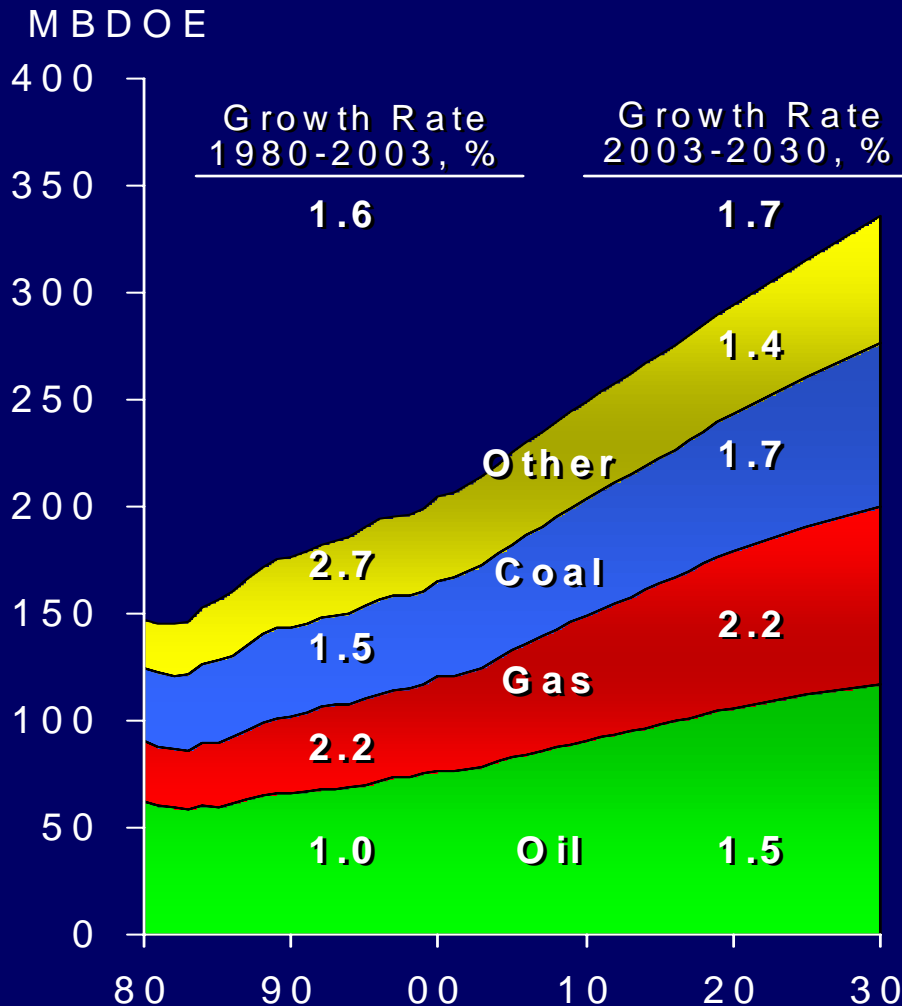
Oil and Gas Security of Supply for Europe

Norbert Liermann
Brussels Jan 18, 2005

Agenda

- **Global energy outlook**
- **Annual demand growth**
- **Resource base**
- **Investment**
- **Gas for Europe**
- **Technology is key**
- **Summary**

Global energy - growth continues

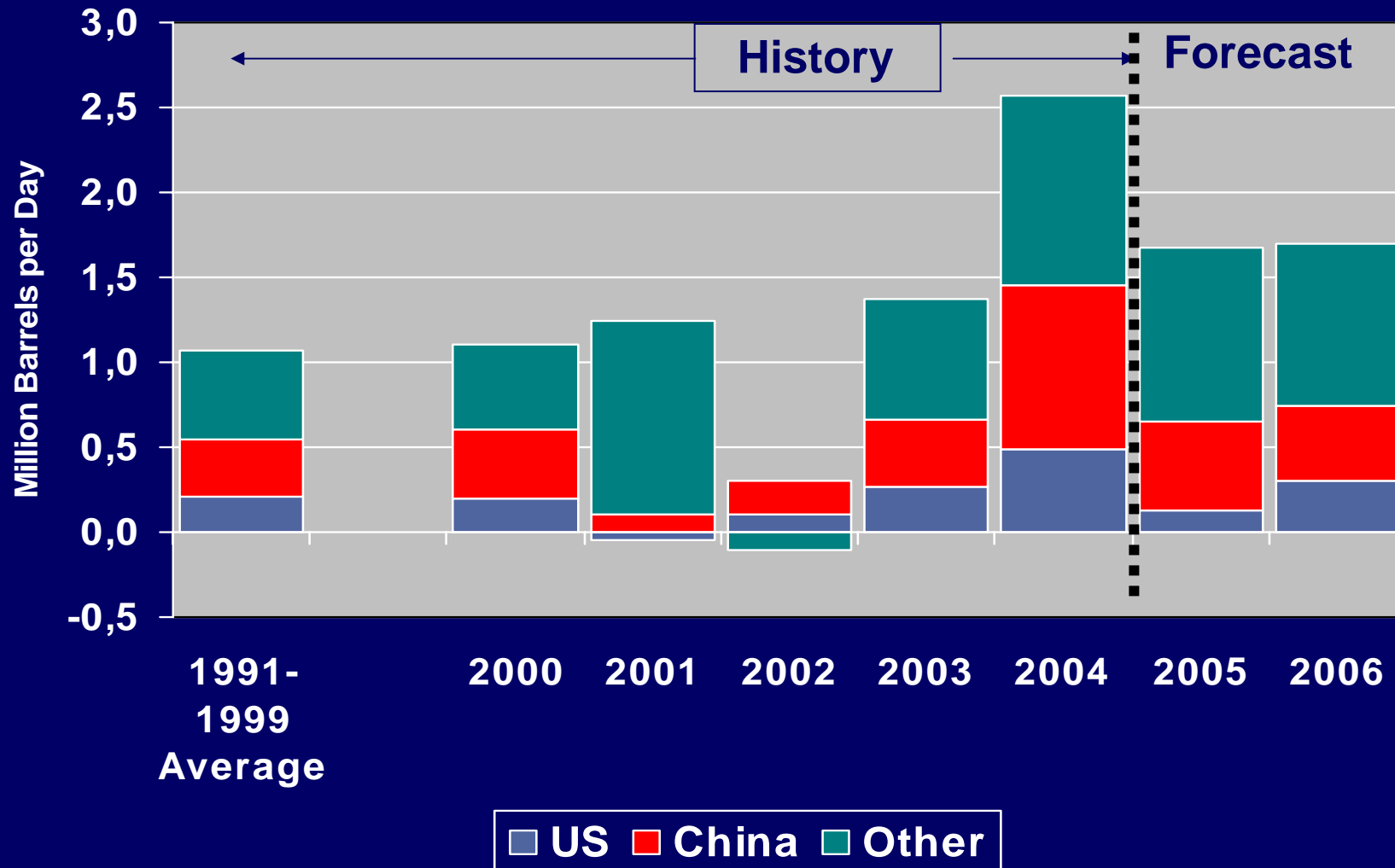


- Energy demand fuelled by economic and population growth
- Fossil fuels will retain their market share
- Renewables enjoy significant growth but remain marginal
- Energy efficiency gains included in forecast
- Energy price trends and developing countries' demand remain uncertain

Source: ExxonMobil, 2004



... and annual demand growth is up

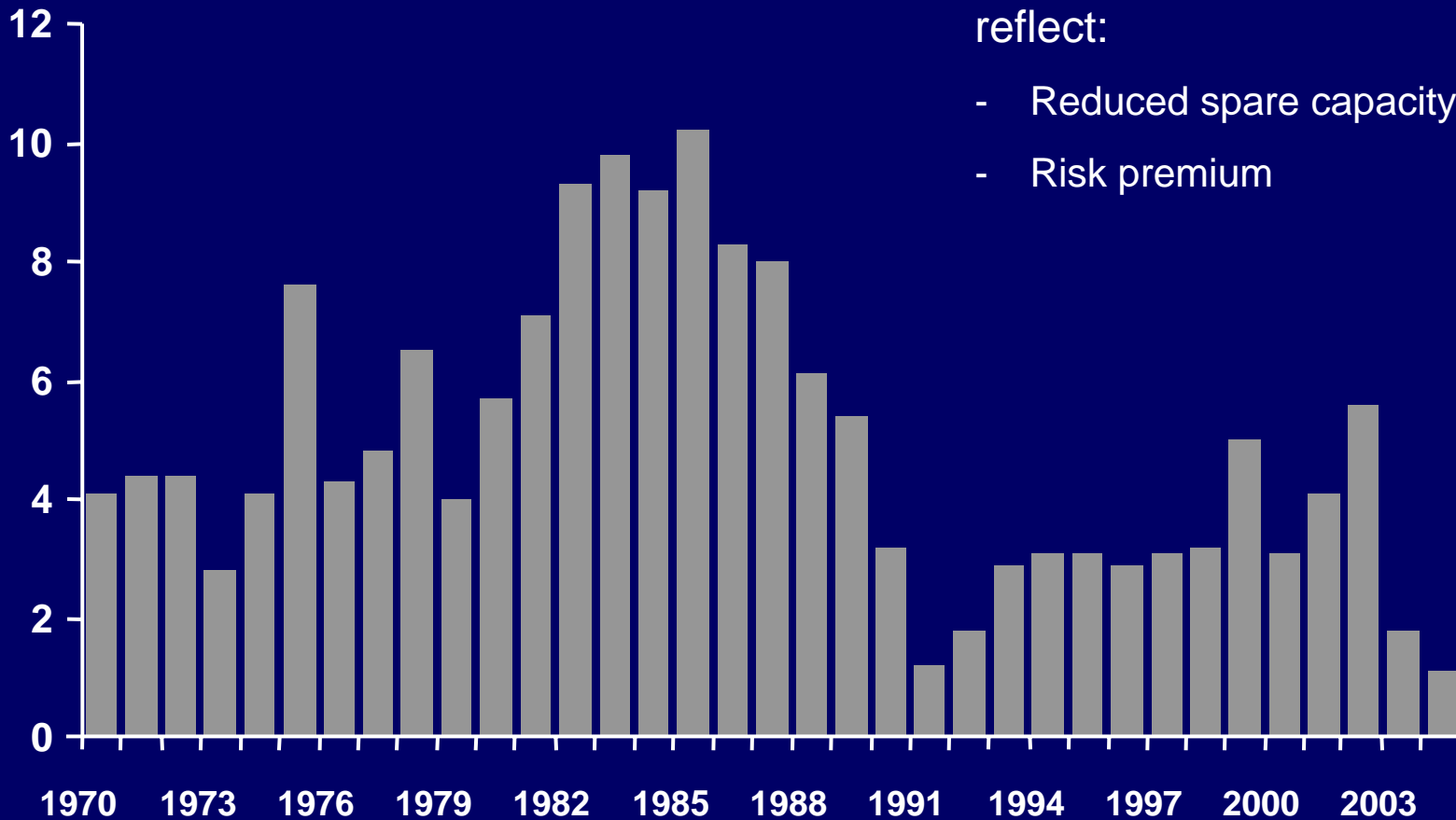


Source: EIA, Short-Term Energy Outlook, September 2005



OPEC spare capacity – at historic low

Million Barrels
per Day



- Recent oil price rise seems to reflect:
 - Reduced spare capacity
 - Risk premium

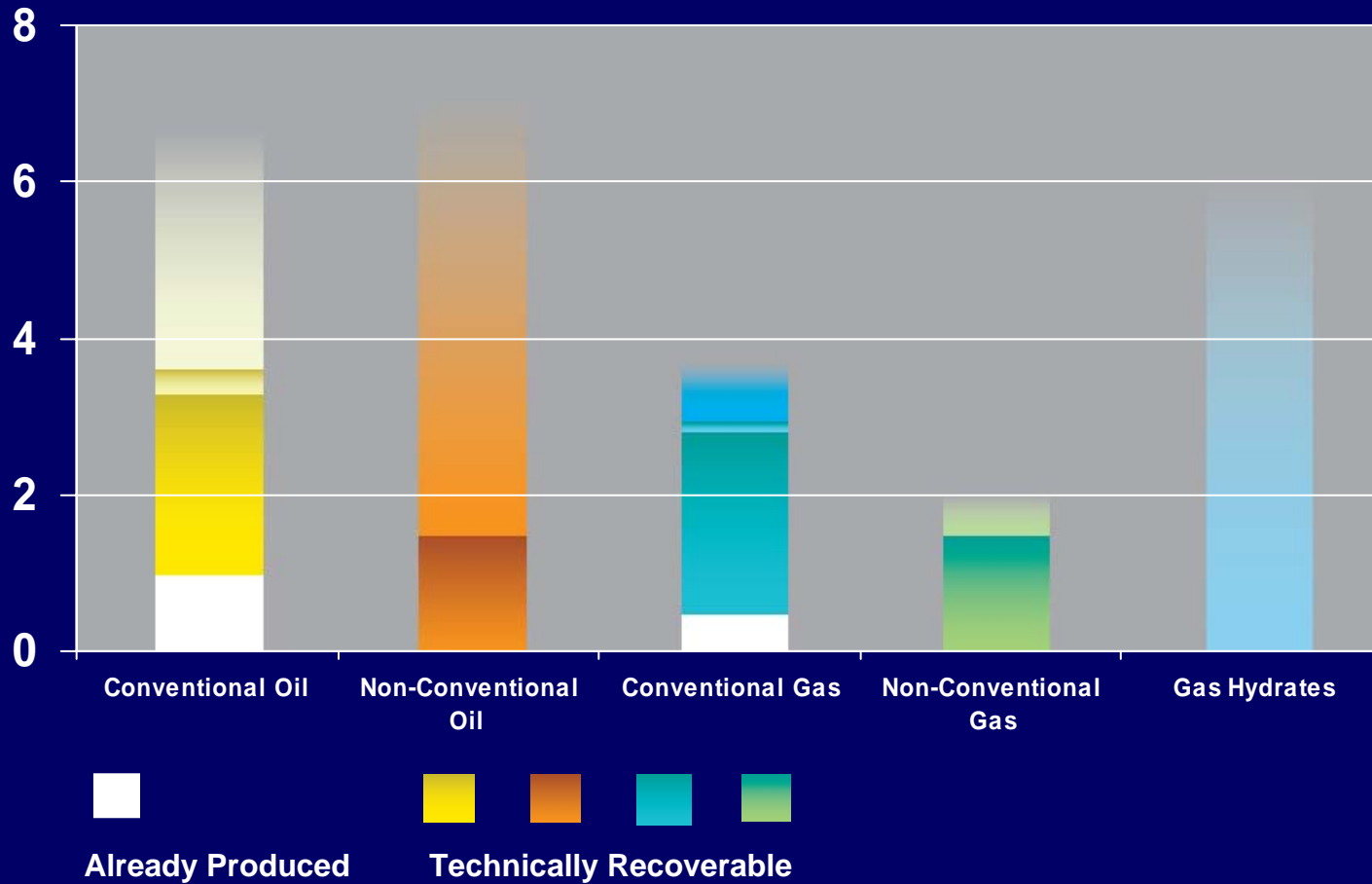
Source: DOE / EIA / BP



A substantial resource base exists

Trillion Barrels
Oil Equivalent

World Hydrocarbon Resources

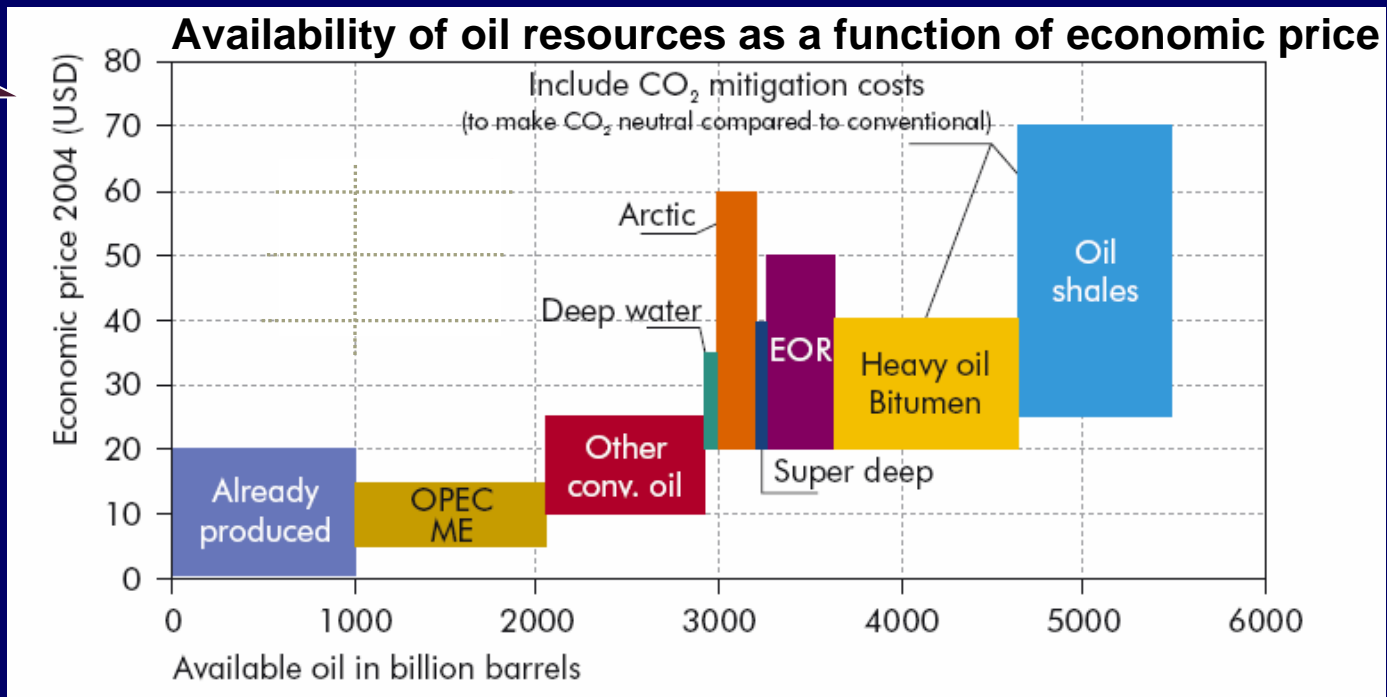


Source: IEA



... but it needs major investments

... at a growing price



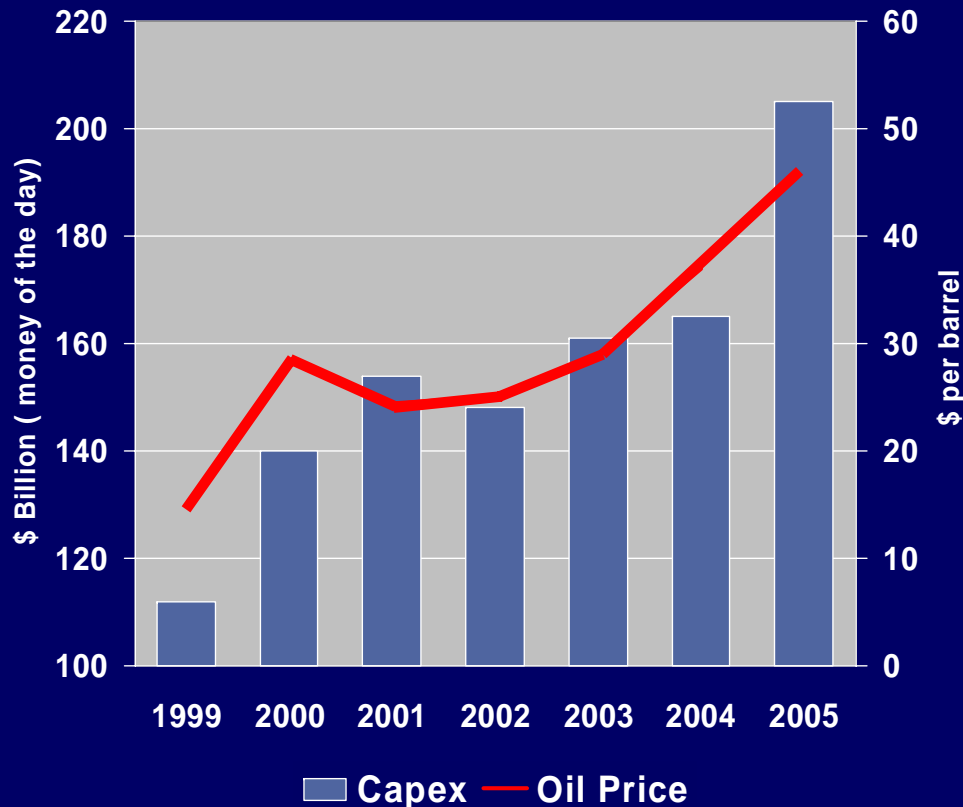
... in modern technology

Source: IEA



Industry investment is increasing

Global Upstream Investment



- **Upstream investments**
 - Up nearly 60% since 1999
 - In 2003 at \$160 billion
- **Predictions for 2005**
 - \$180 billion
- **Annual requirement to 2030**
 - \$200 billion

Source : J.S Herold / Harrison Lovegrove



Resources are not a constraint

- **Gas**

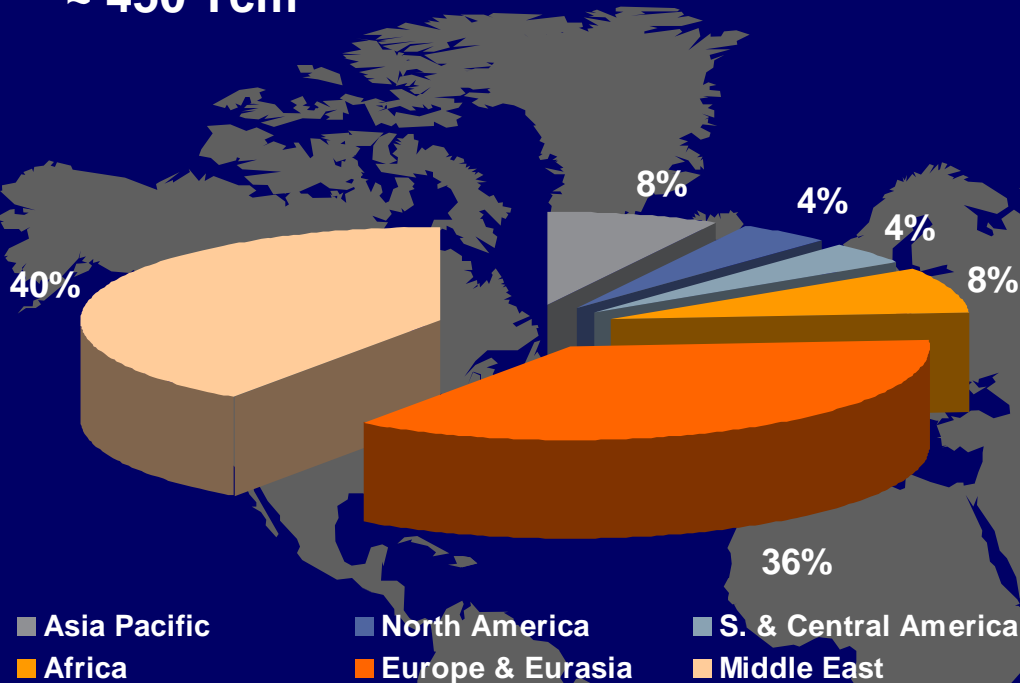
- Significant upside to support growing demand
- Market incentives exist to develop remote resources

- **Oil**

- Ample conventional resources exist
- Unconventional volumes untapped

Gas in abundance ...

Technically recoverable conventional gas:
~ 450 Tcm



■ Proven gas reserves

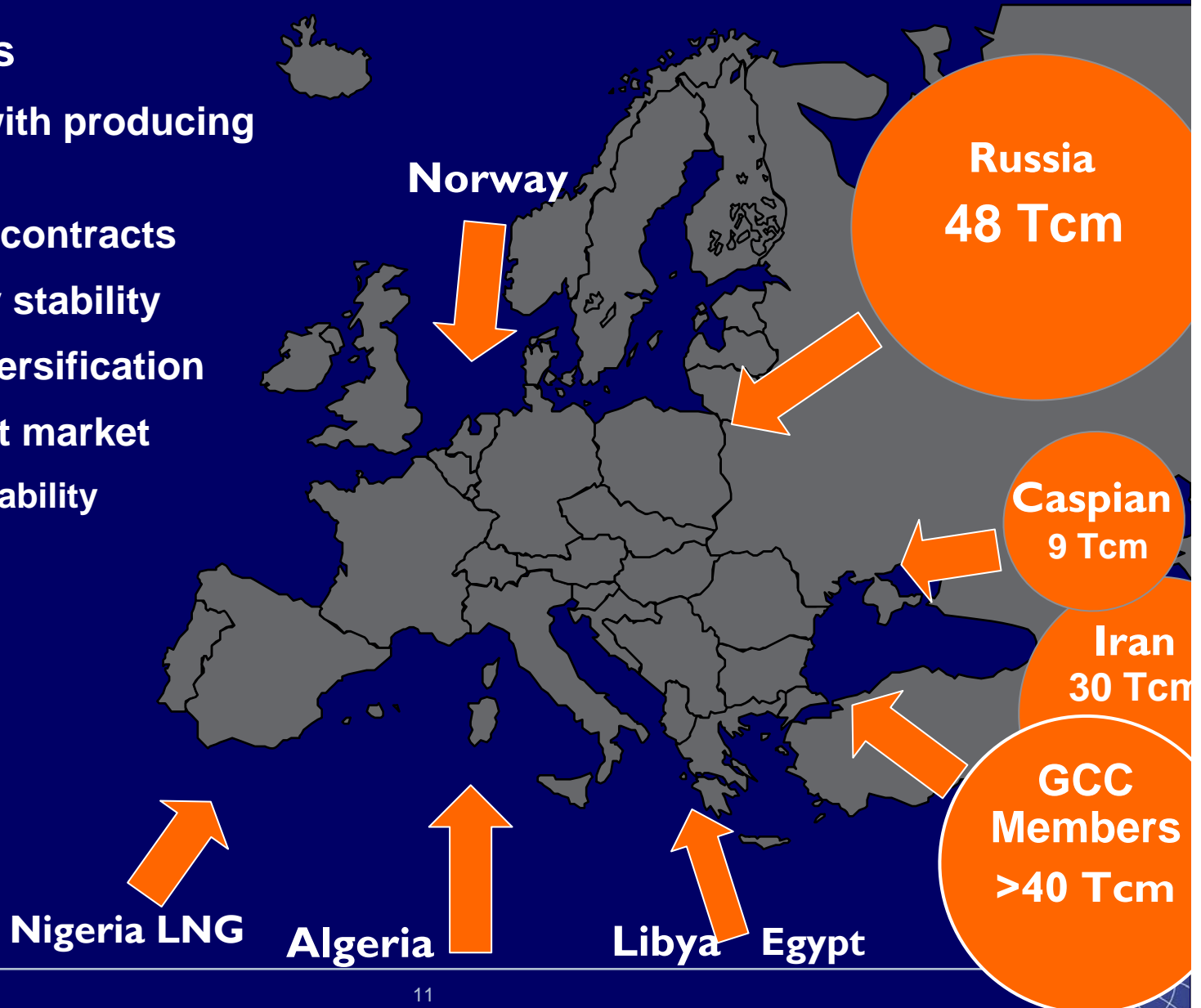
- 1984: 96 Tcm
- 1994: 143 Tcm
- 2004: 180 Tcm

■ Reserves-to-production ratio: 66.7 years

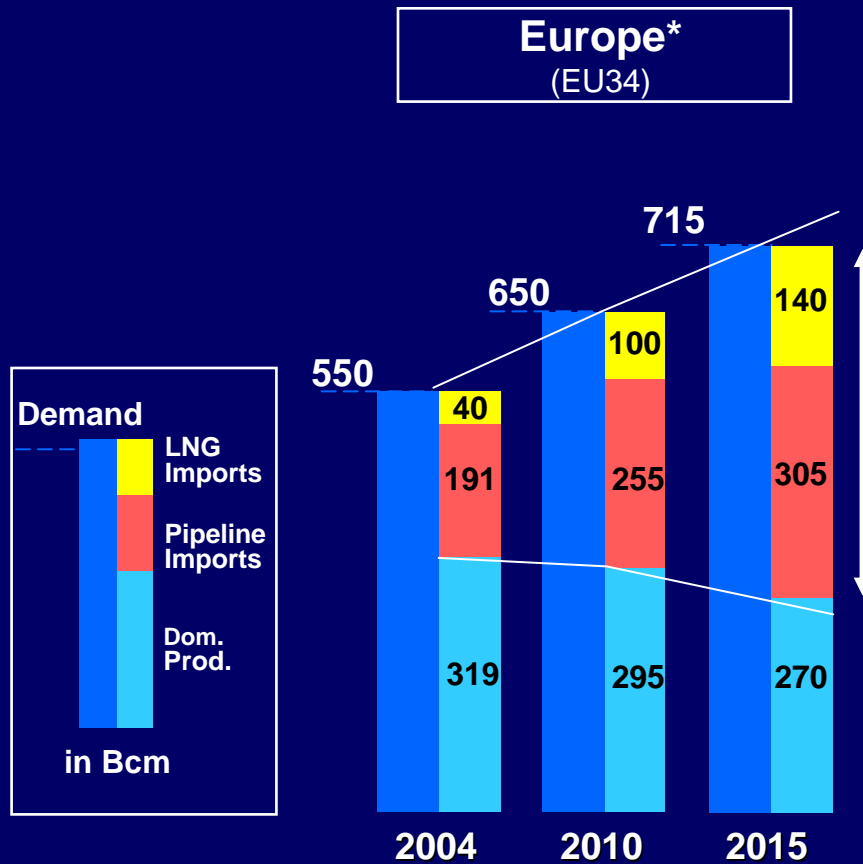
... and Europe is well positioned

...but it needs

- Dialogue with producing countries
- Long term contracts
- Regulatory stability
- Supply diversification
- An efficient market
 - Interoperability



... albeit from more distant sources



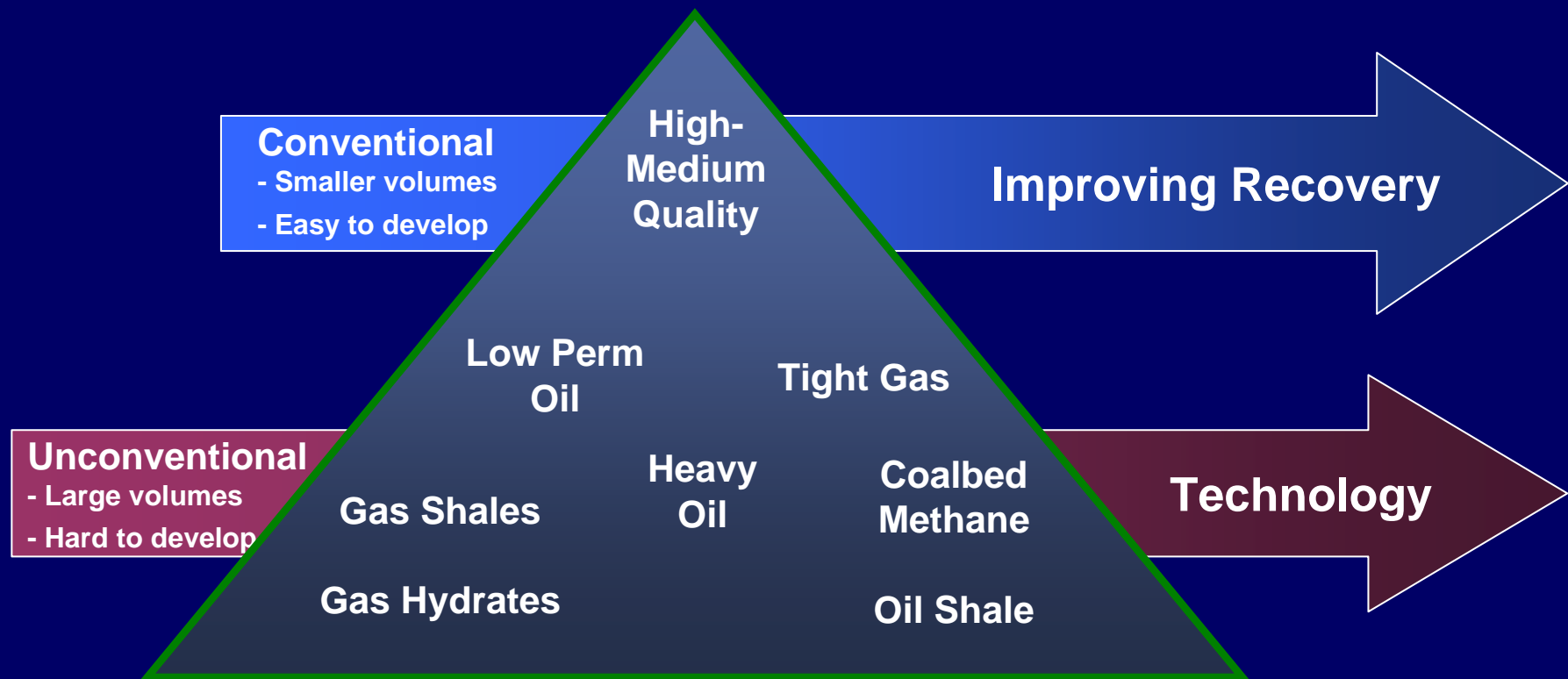
- **LNG**
 - Imports to triple
- **Pipeline gas**
 - Imports to grow by > 50%
- **Total imports by 2015:**
 - ~450 Bcm/y
- **Increased competition for supplies**

* EU25 + Bulg / Cro / Rom / Turk
+ Norw/Bos/Mac/Serb/Switz

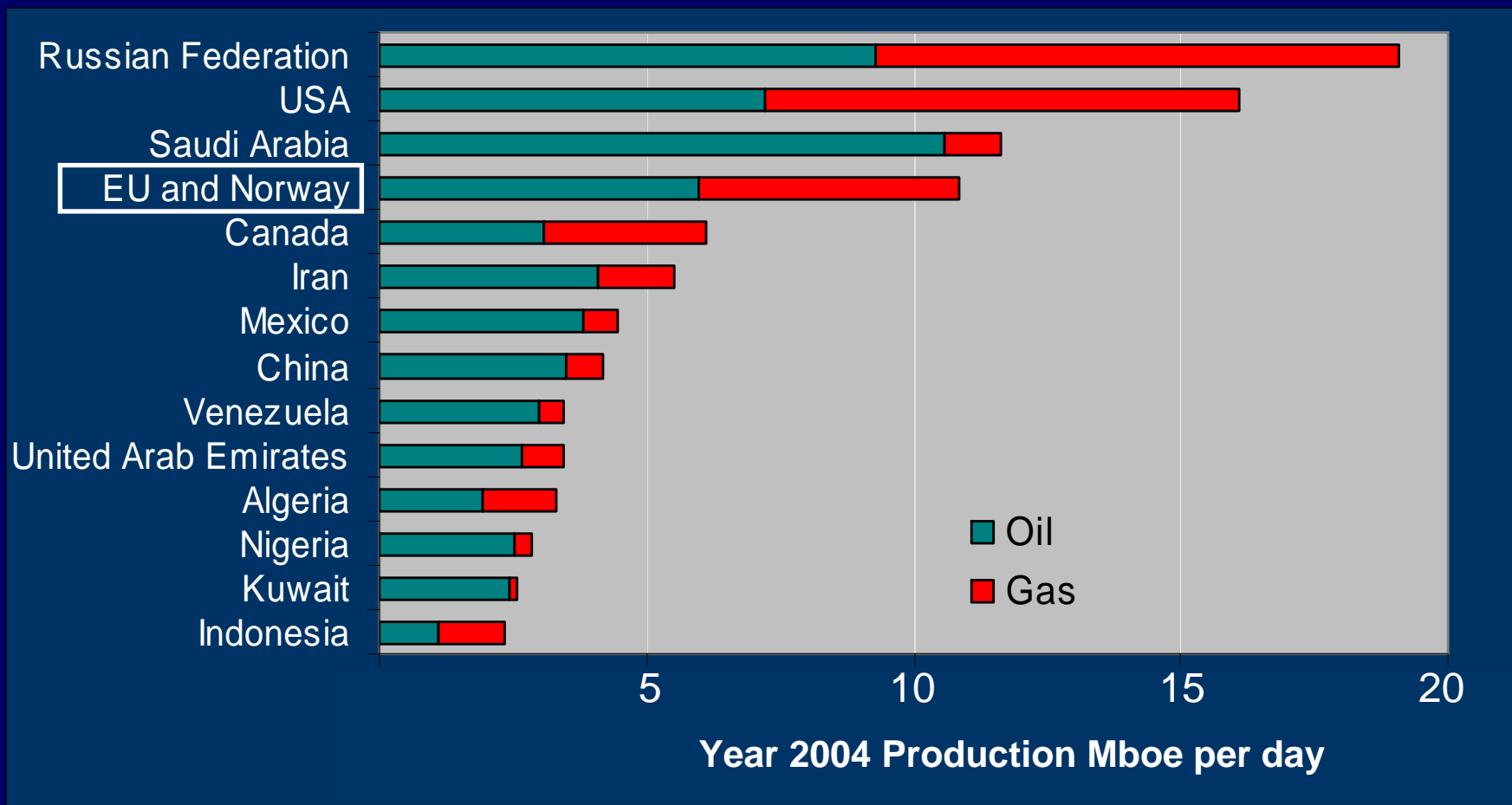
Source : WoodMackenzie, Cedigaz, Total



A growing challenge



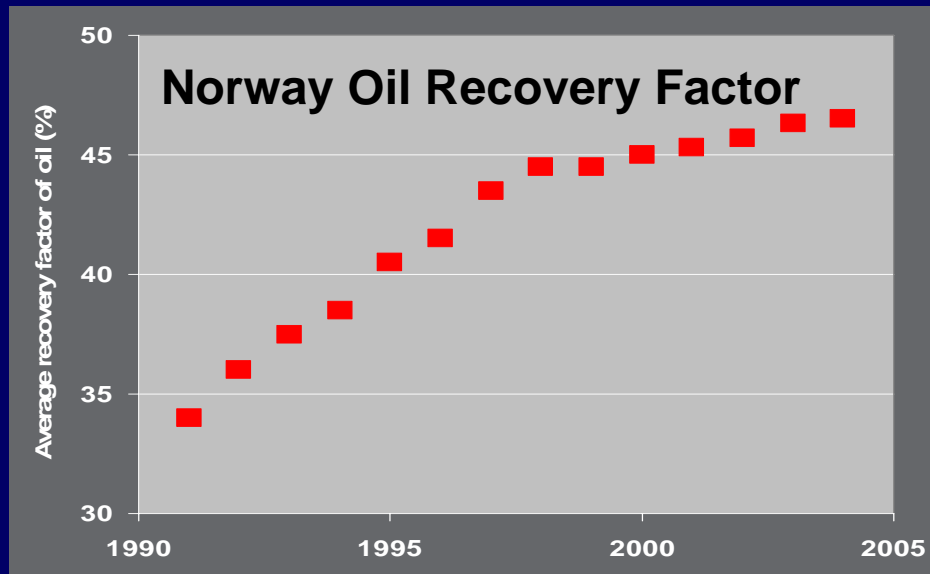
The European basin – a maturing producer ...



Source: BP Stat review 2004

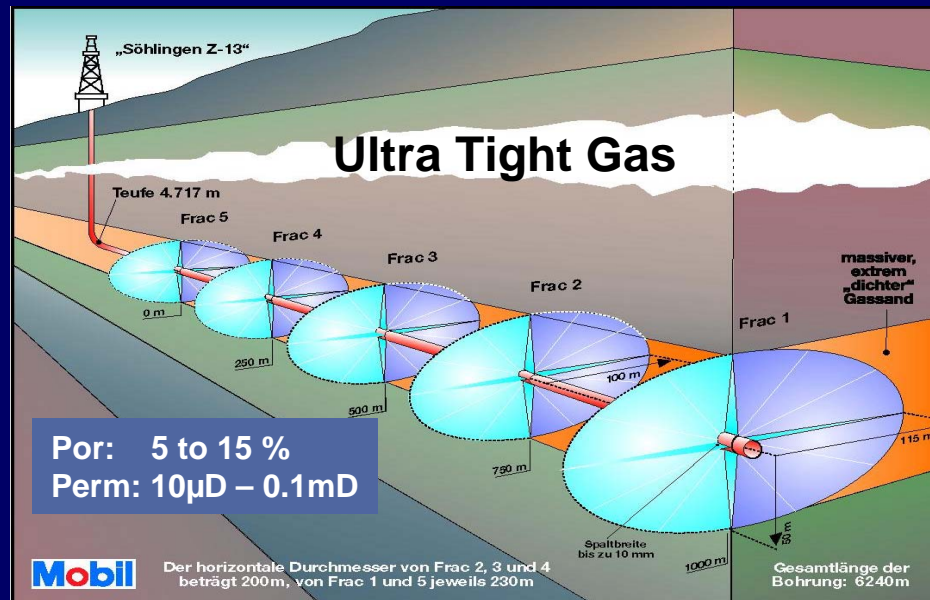


... supported by new technologies



Recovery factor up...

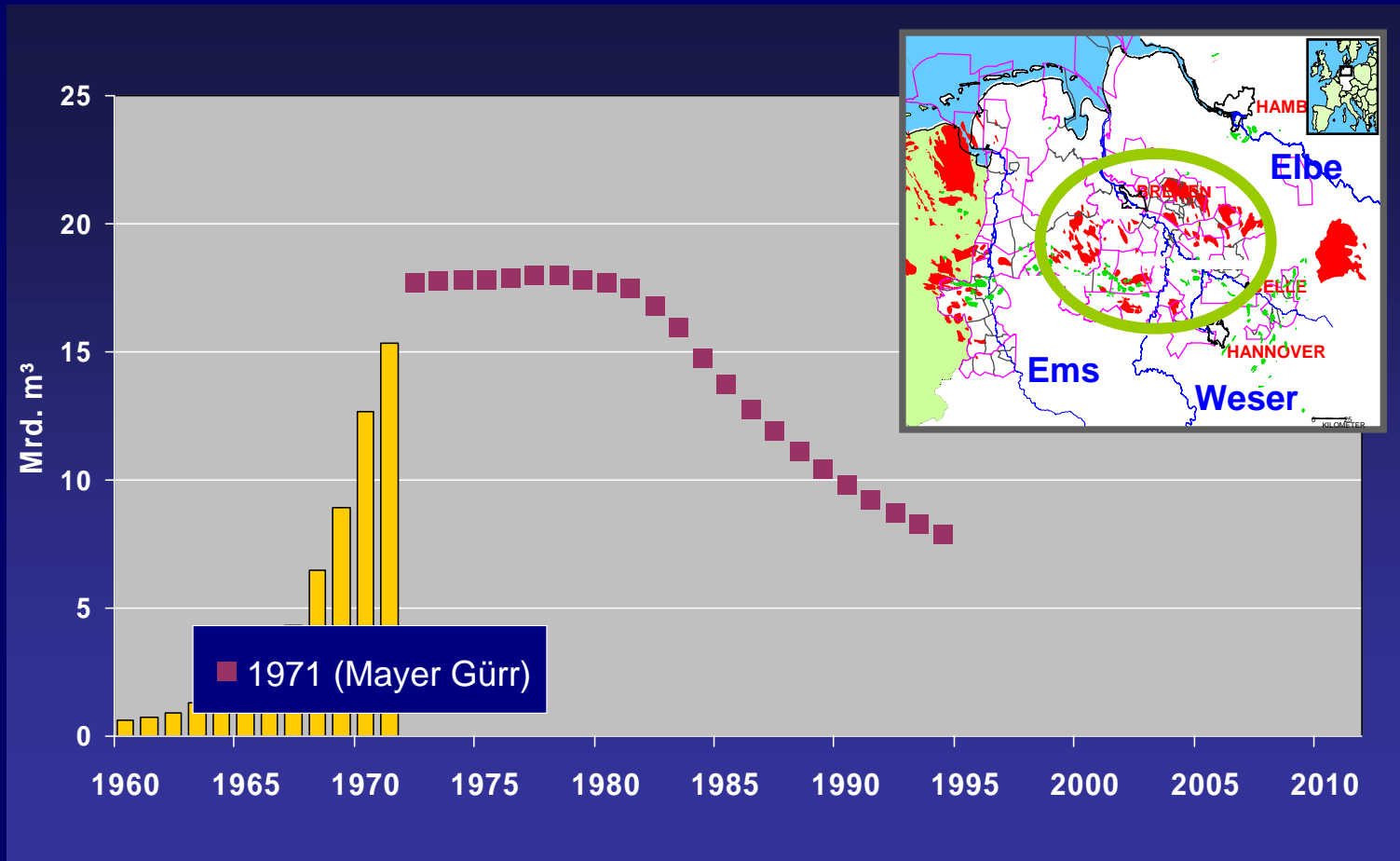
- World wide currently ~ 35%
- Increase by **1% equals 2.5 years** global energy consumption



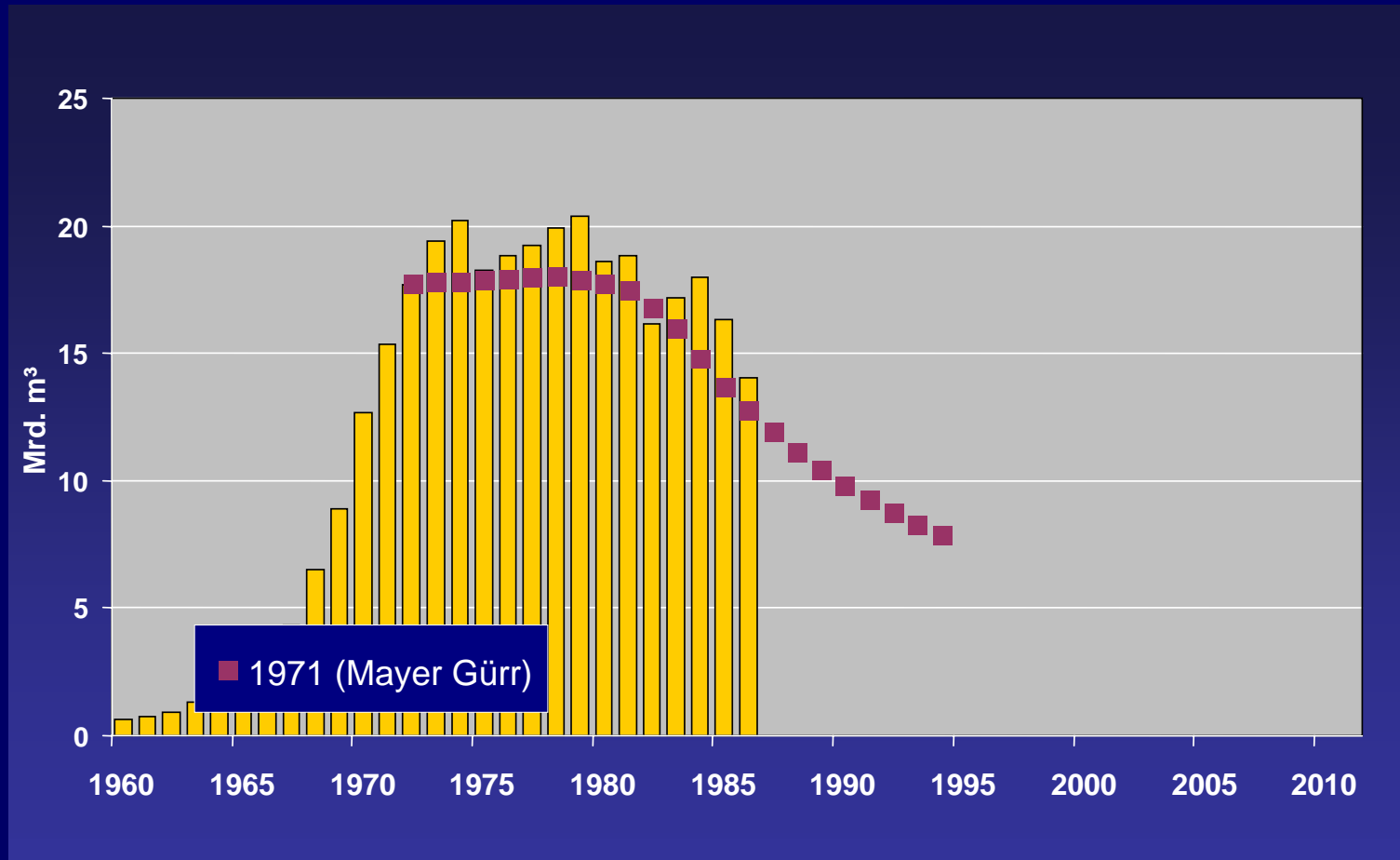
Technology to access unconventional oil & gas

- Tight reservoirs
- Deep water
- Difficult geography

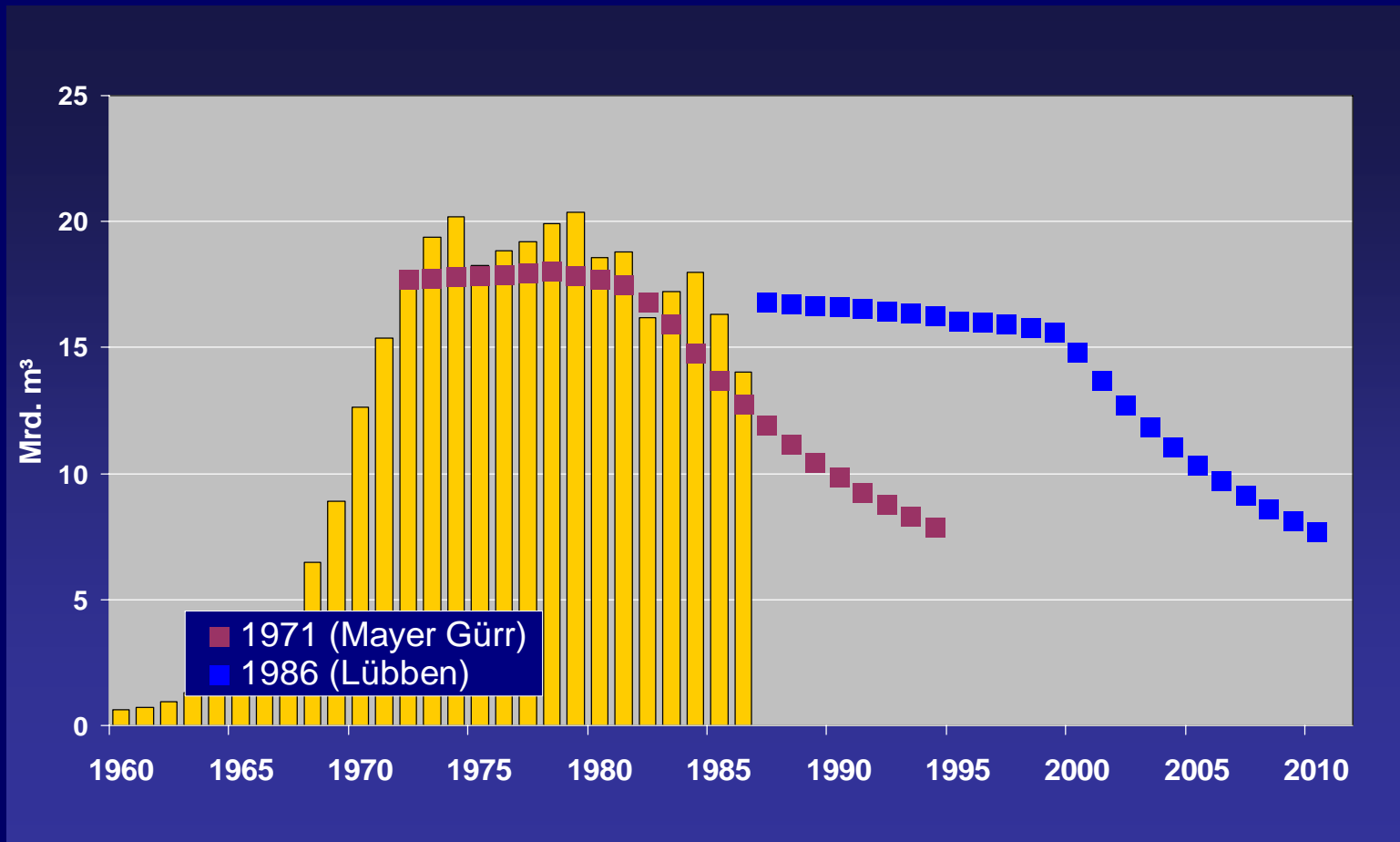
German gas



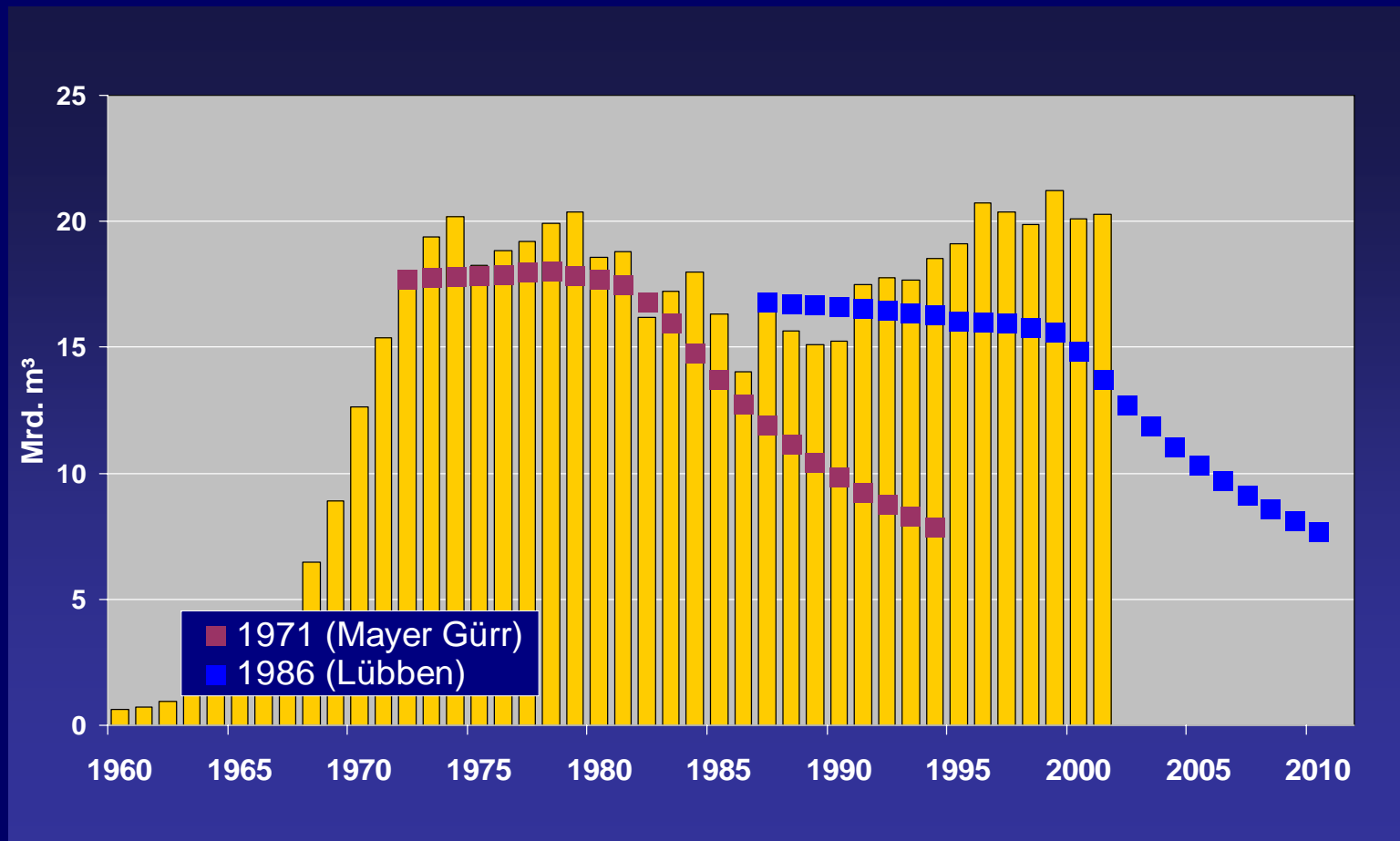
German gas



German gas

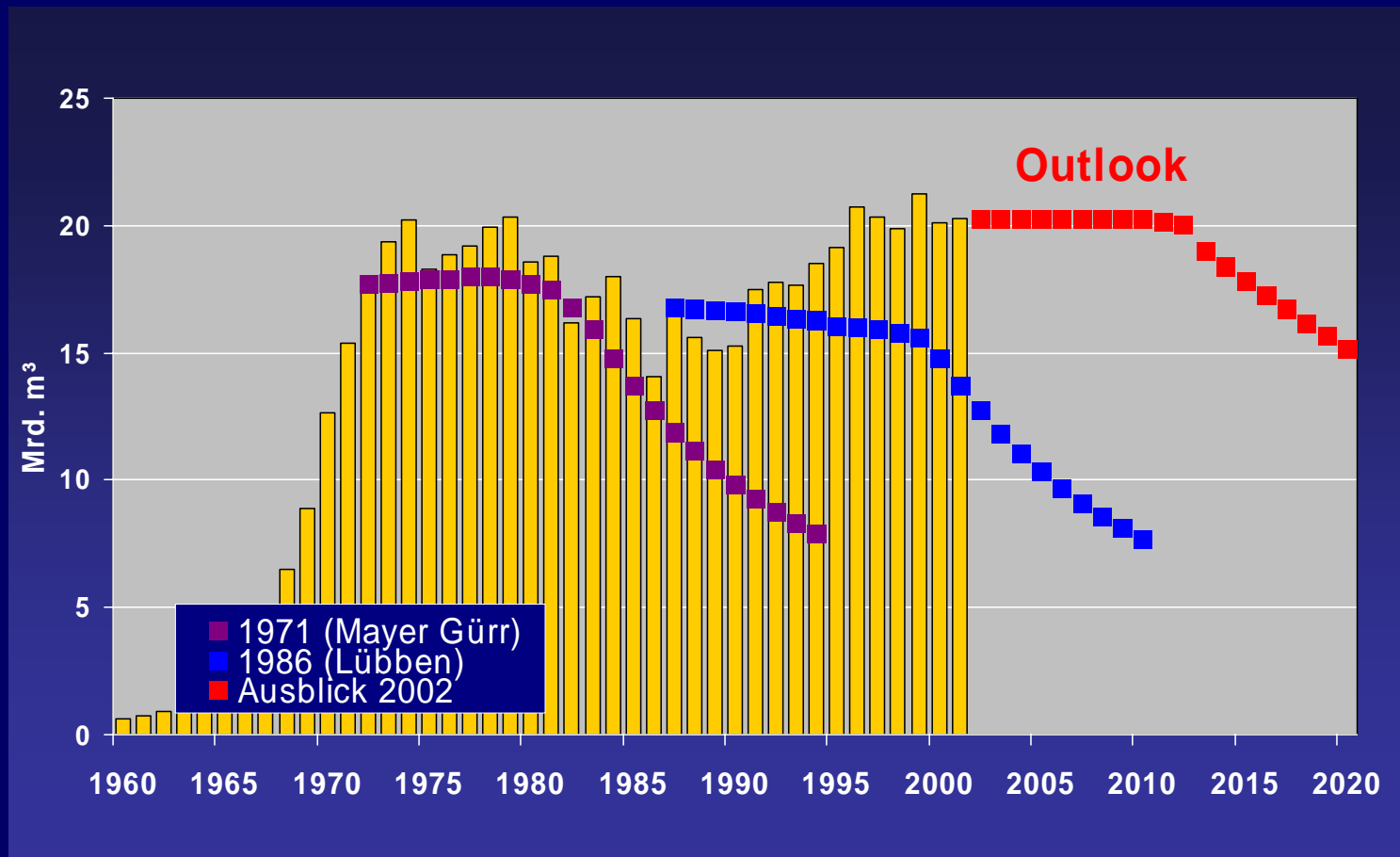


German gas



★ 3D seismic, sub salt imaging, horizontal drilling, sour gas processing

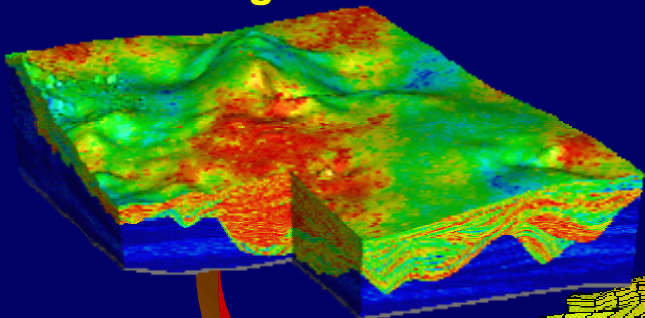
German gas – growth through technology



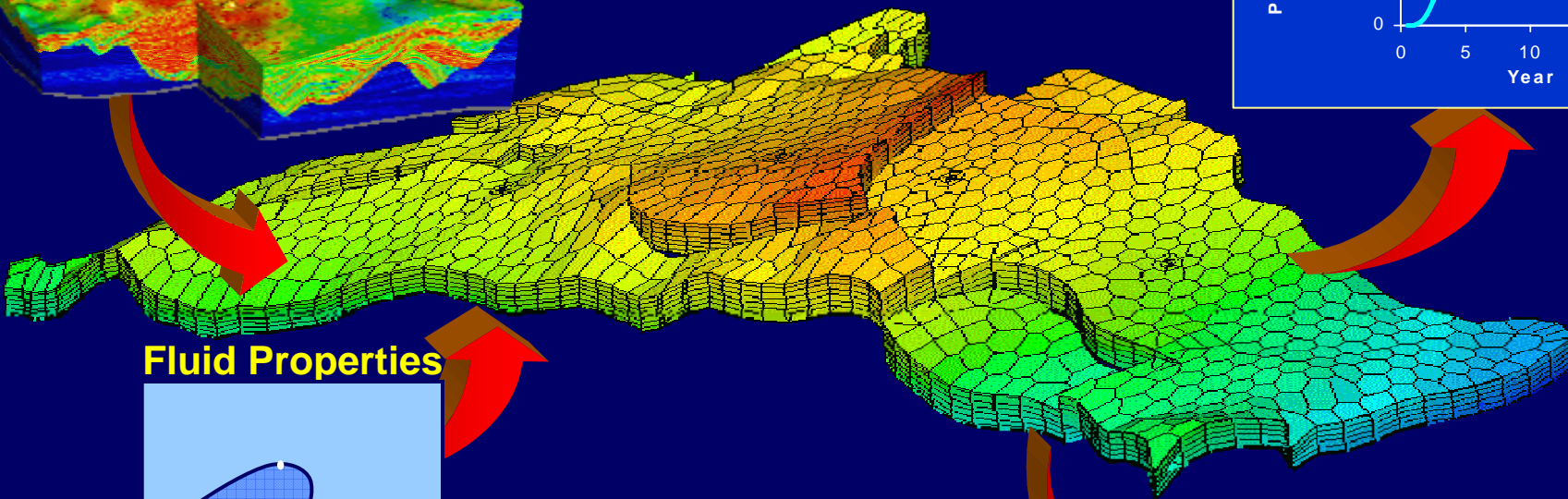
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Integrating technology ...

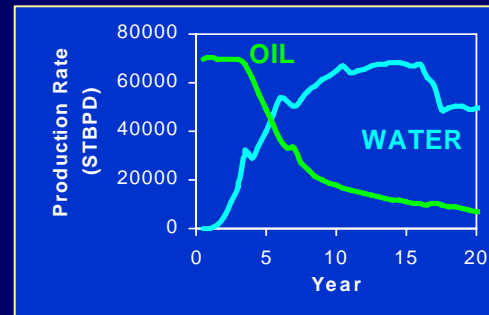
Geologic Model



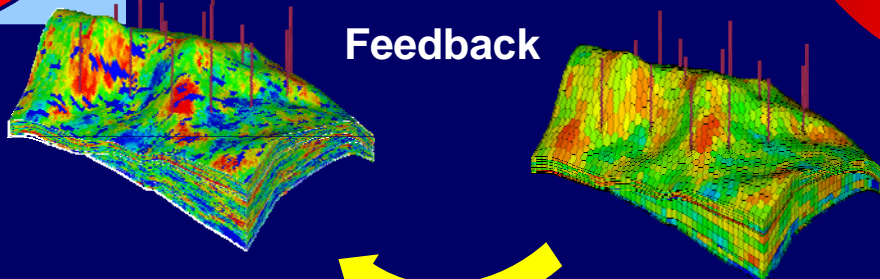
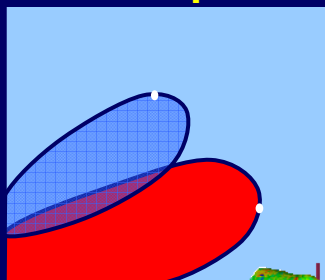
Reservoir Simulation



Produktion Data



Fluid Properties

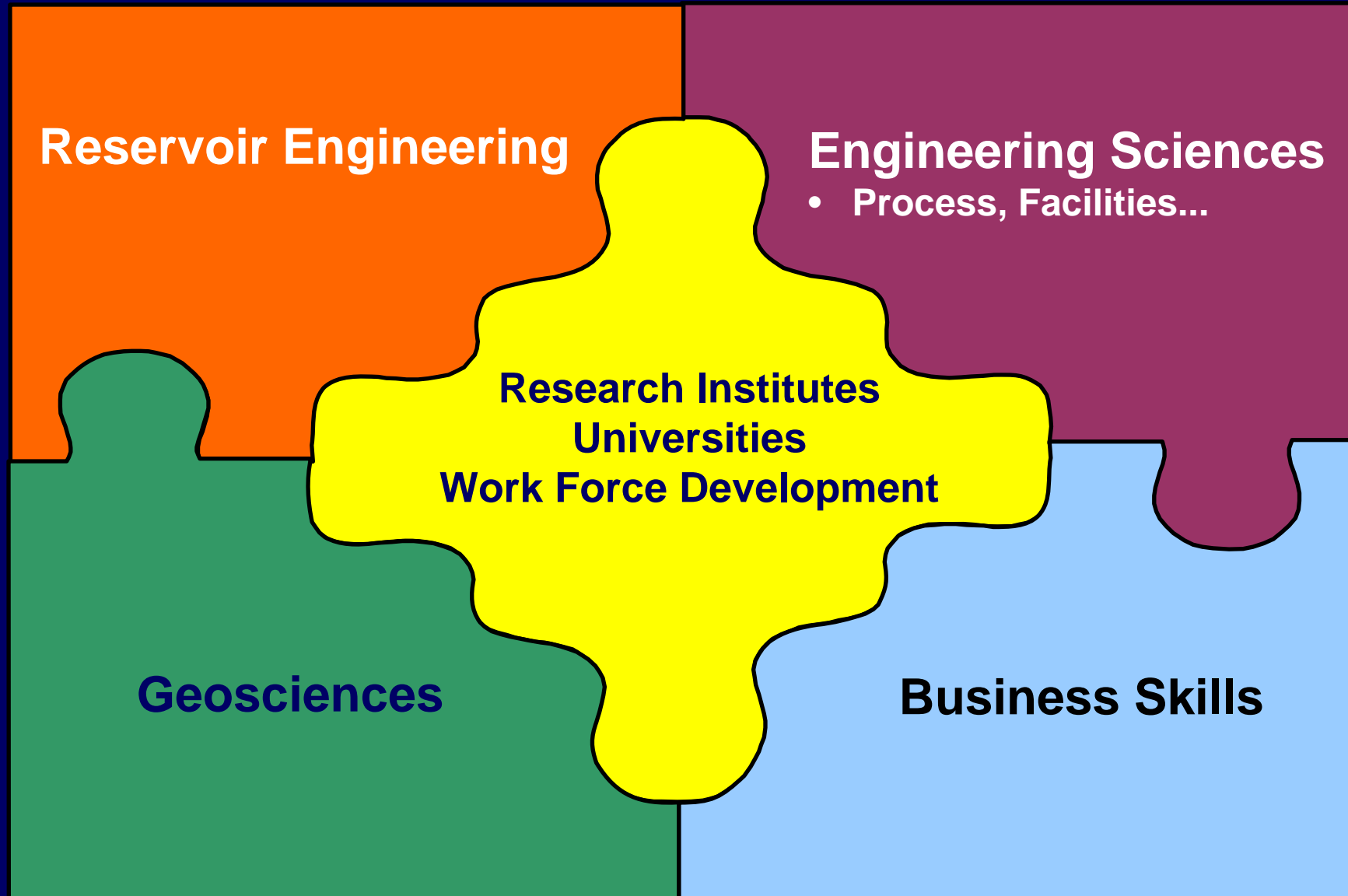


Feedback

Facility Data



... and people



...in summary

A shared challenge

Thank you for your attention!