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SOURCING GAS: **in what market structure and at what price?**



George H.B. Verberg
President International Gas Union
POWER 2005, Venice, 18 May 2005





INTERNATIONAL GAS UNION

Covers >95 % of World Gas Sales
'Spokesman' of the Gas Industry



www.IGU.org



Non Members



Membership from 66 countries and 20 Associated Members



Not That Long Ago.....:The Gas Industry Started To Serve The Customer!

There is a Keen Local Interest
in Promoting Gas Usage

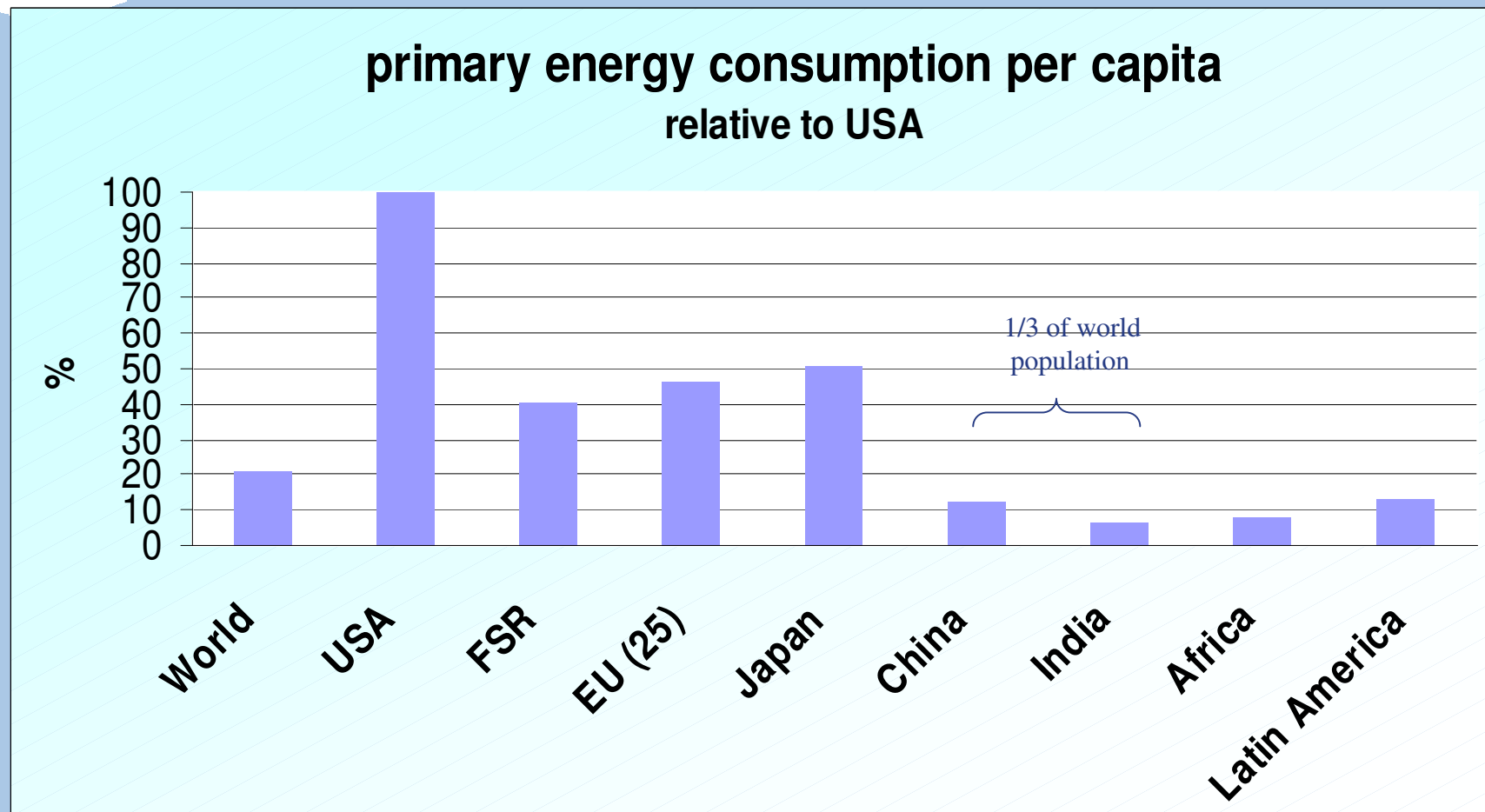


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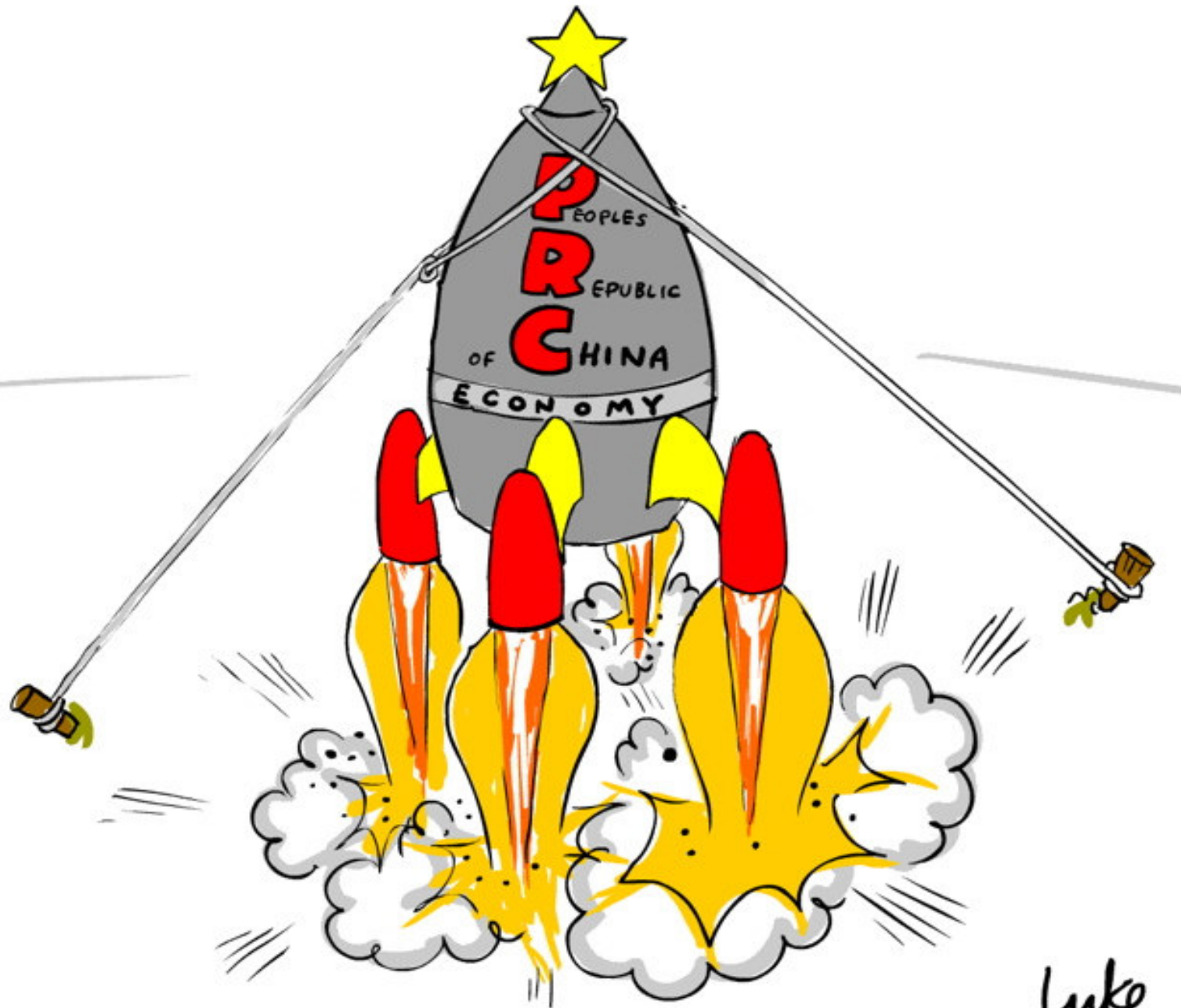
JONES
DAY



Energy consumption in perspective



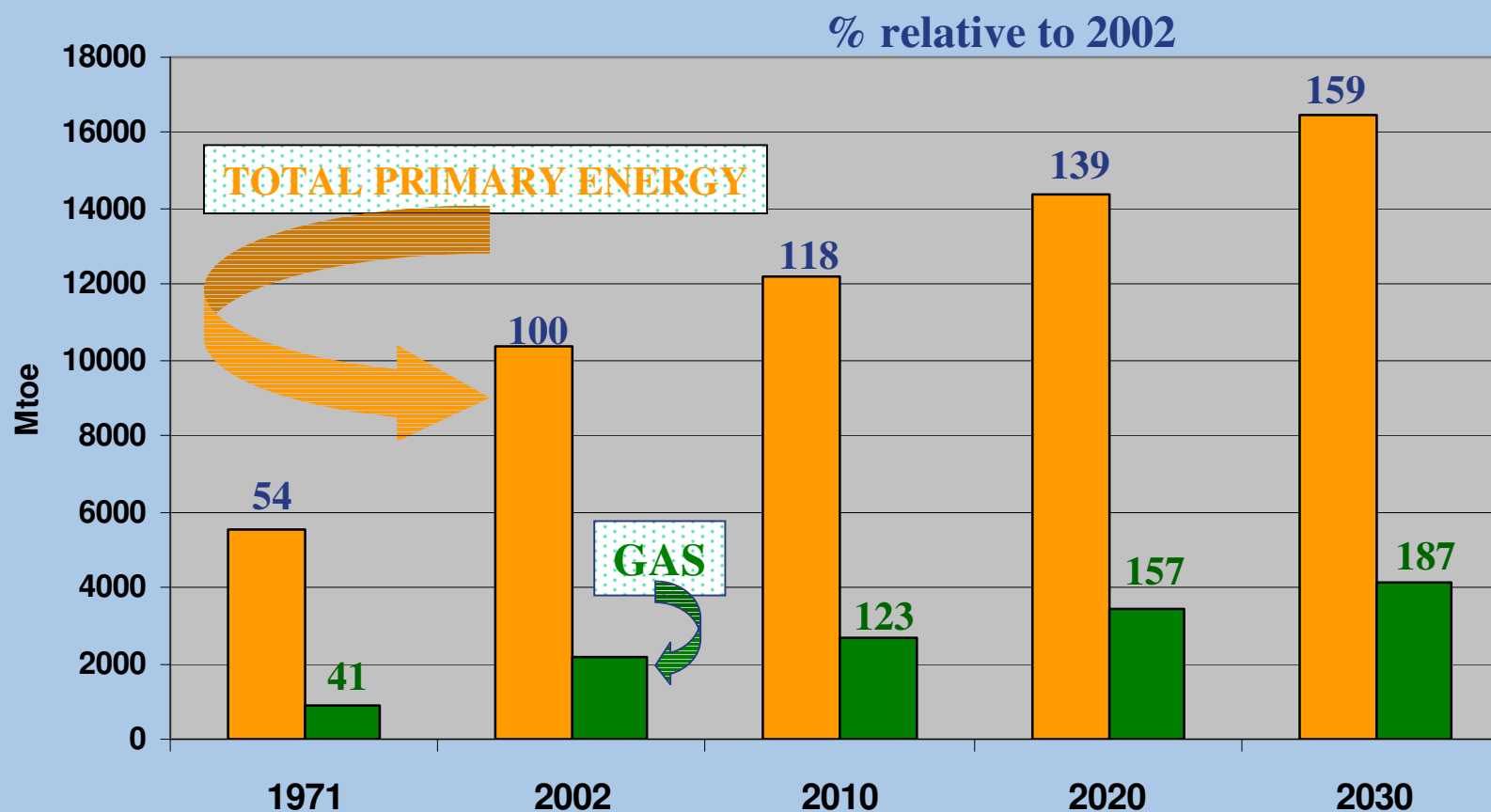
IEA data year 2002



Luke



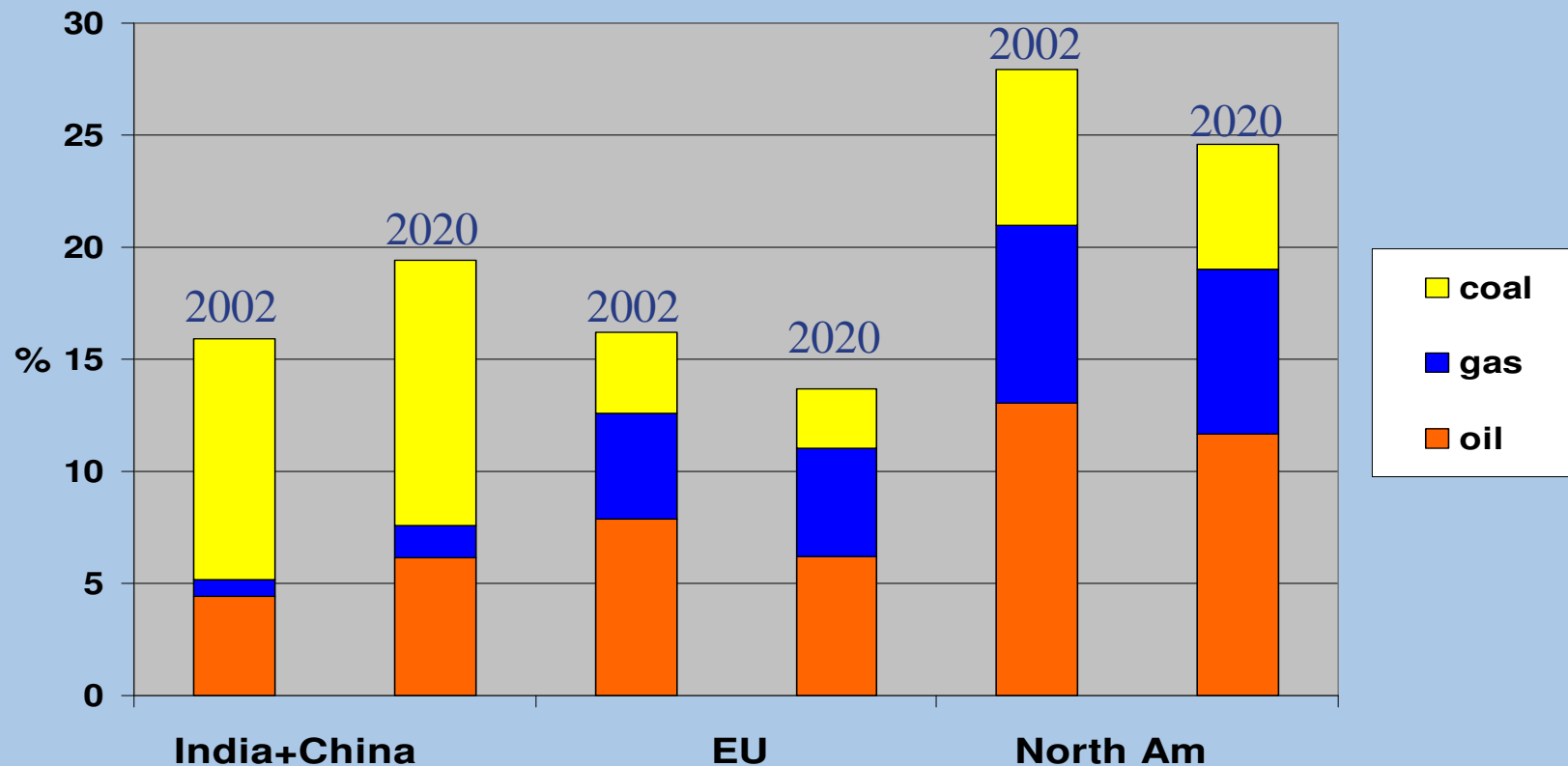
Global Energy Demand Forecast IEA WEO 2004





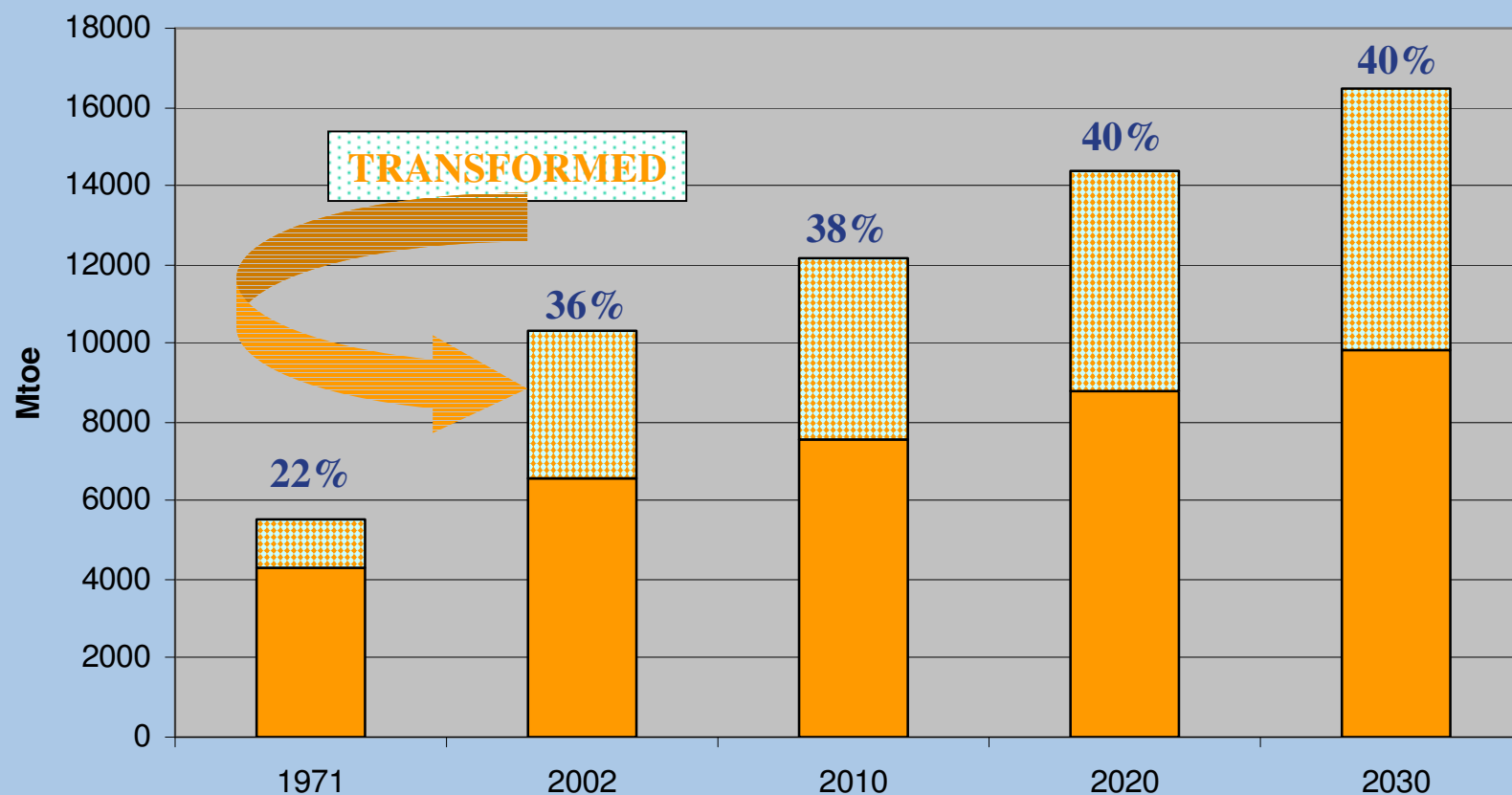
Emerging Markets Put Their Mark On Hydrocarbons Demand

% of Global Hydrocarbons Demand for each region
& Market Share oil/gas/coal per Region





Share of primary energy transformed into electricity and heat





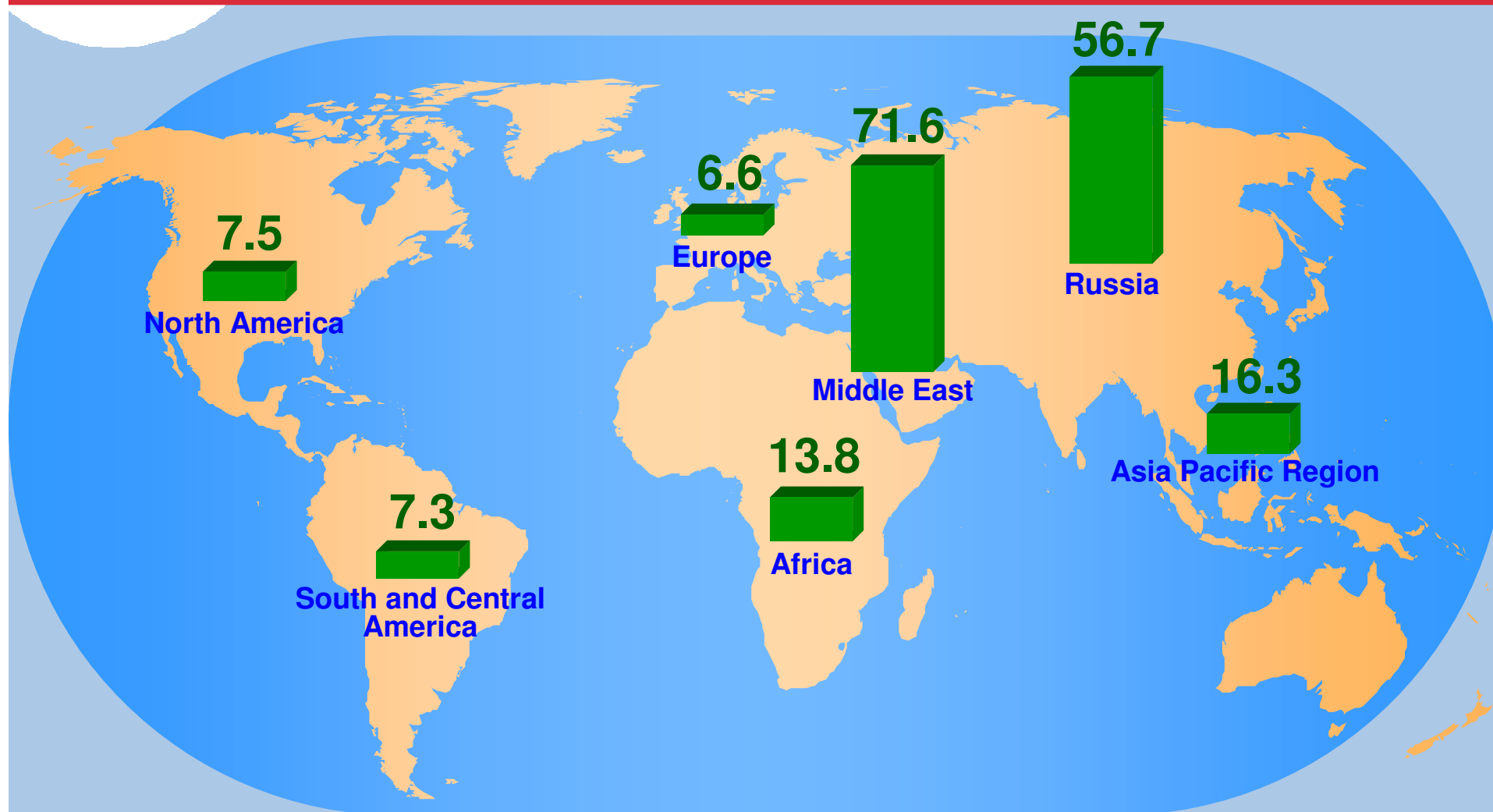
Conclusions 1 (volume)

- Thanks to the:
- ongoing economic growth in the “developed countries” and
- the very rapid and continuous growth in China and India (and Russia) and
- the continued general preference of the power generators for natural gas and
- the ongoing preference of public authorities for natural gas as the least polluting fossil fuel:

Natural Gas Demand is expected to continue to grow faster than oil and coal.



Proven world gas reserves 180 trillion cm R/P ratio ~60 years



Data: IEA WEO 2004 / Cedigaz/BP

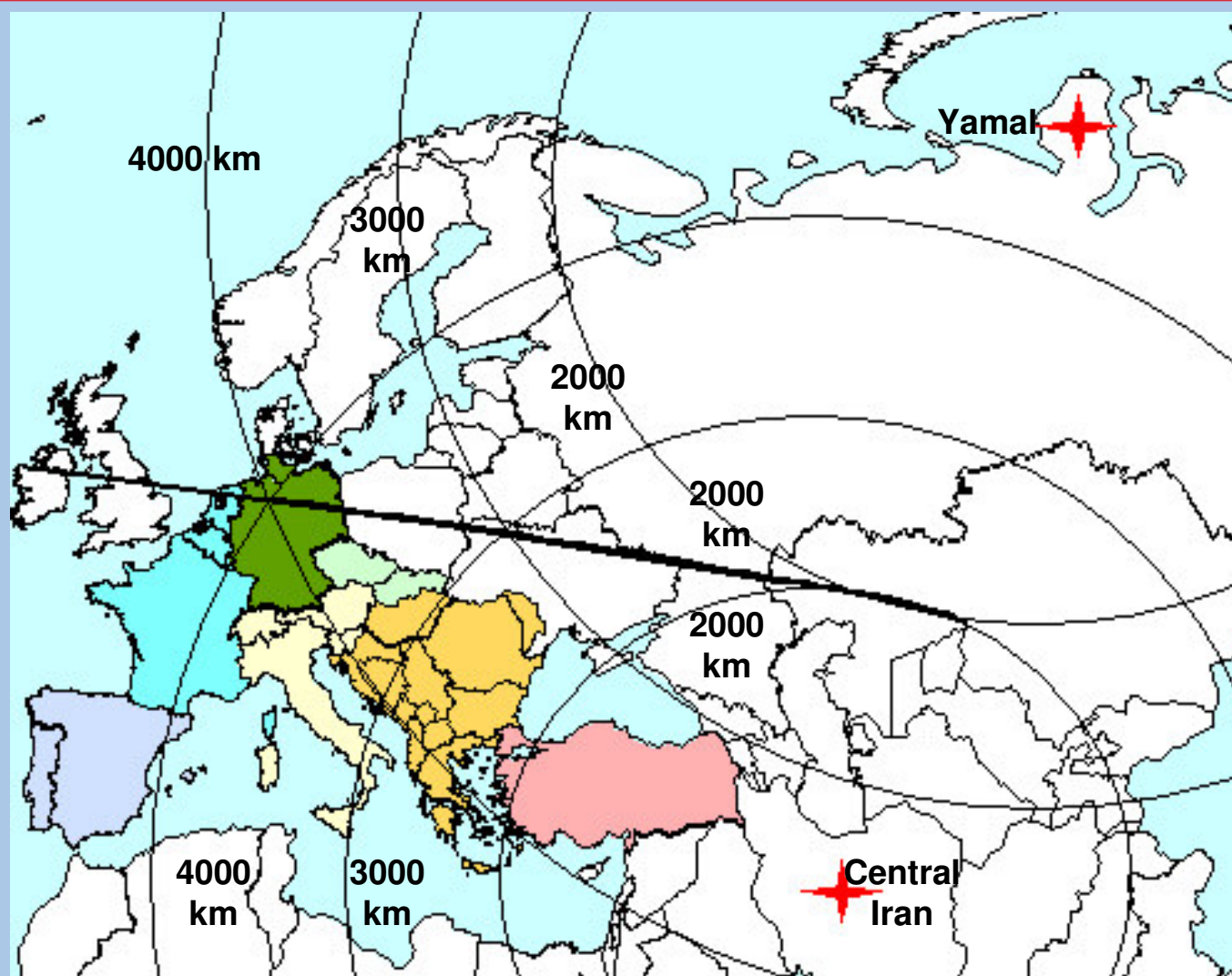


Strong demand not in regions of supplies

- **Fuel demand increases steadily: general economic growth (N.America, Europe, Japan, S.Korea, Taiwan), fast growing big 'emerging economies' (China, India, Brazil)**
- **New gas fields lie in remote areas and require long distance transport**
 - **New gas supply projects are technically and geopolitically more complex and more expensive**

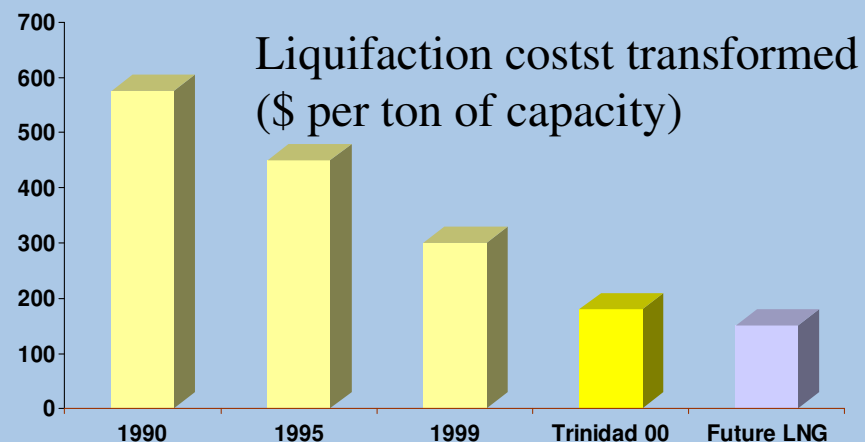
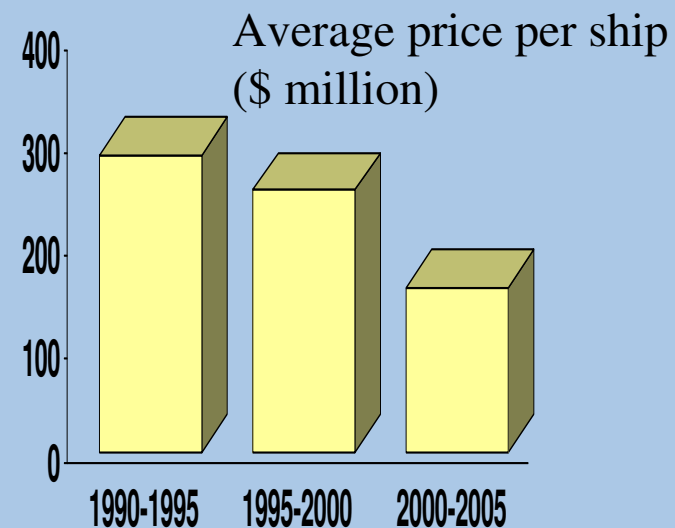
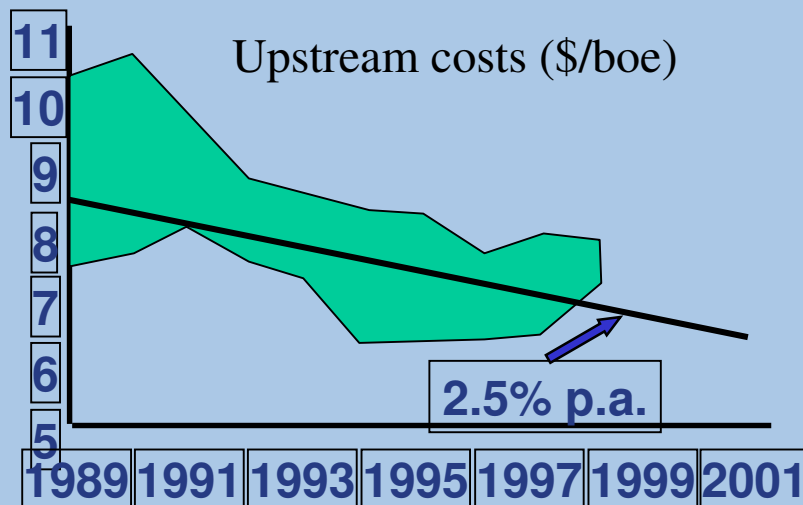


How to diversify further in Europe ?!





Costs in the LNG chain



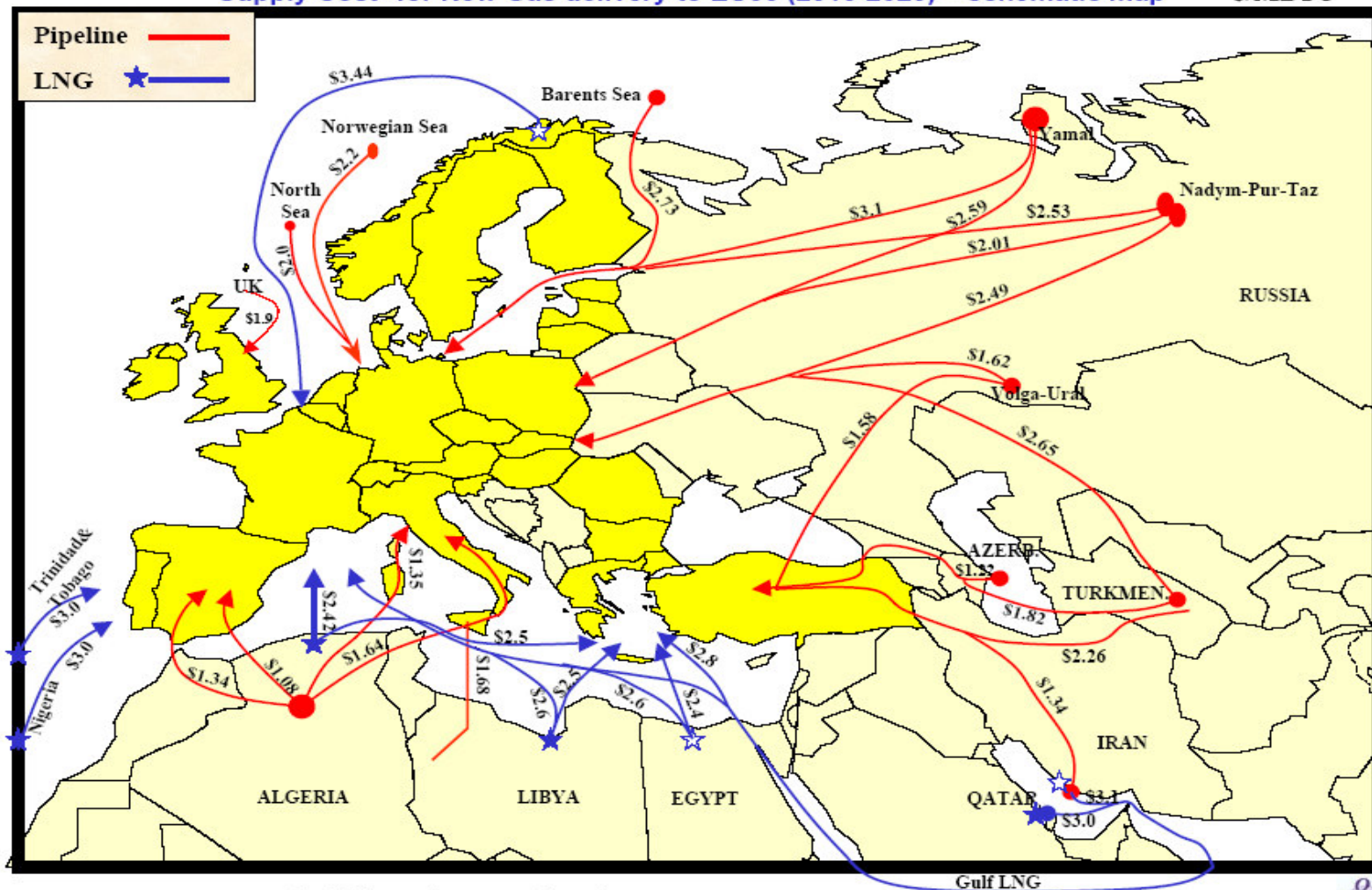
From a presentation by BP
(february 2003)



Costs of Transport for Different Routes

Supply Cost* for New Gas delivery to EU30 (2010-2020) – schematic map

S/MBTU



Source: OME; 2001

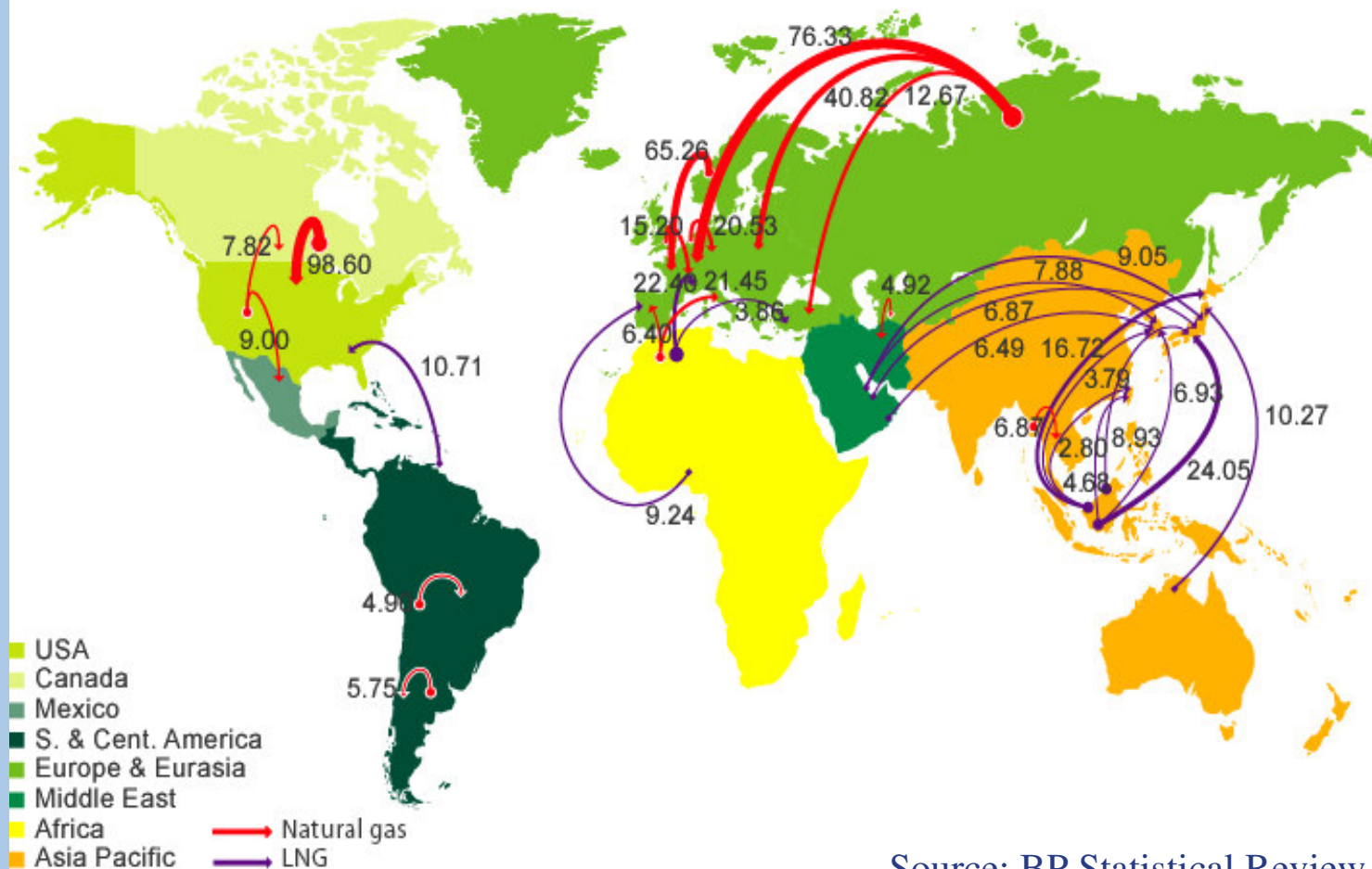
* excluding producer country's royalty





Major natural gas trade movements at the start of the 21st century

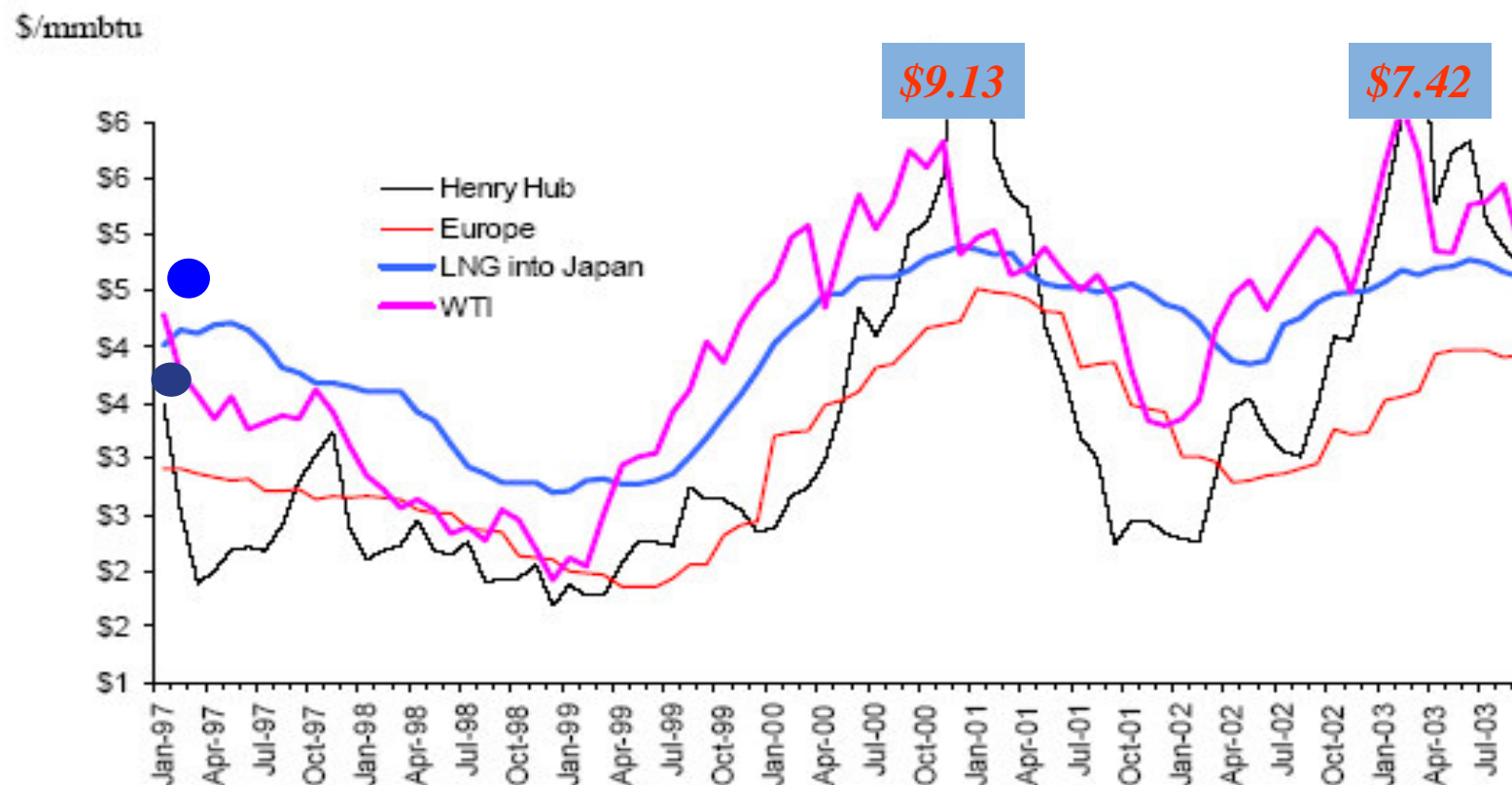
Trade flows worldwide (billion cubic metres)



Source: BP Statistical Review 2004



The price gap ; Henry Hub vs. LNG into Japan; oil and gas prices remain highly correlated



Source : *The future relationship between LNG pricing In the Asia-Pacific and the Atlantic-Mediterranean, PFC Energy*



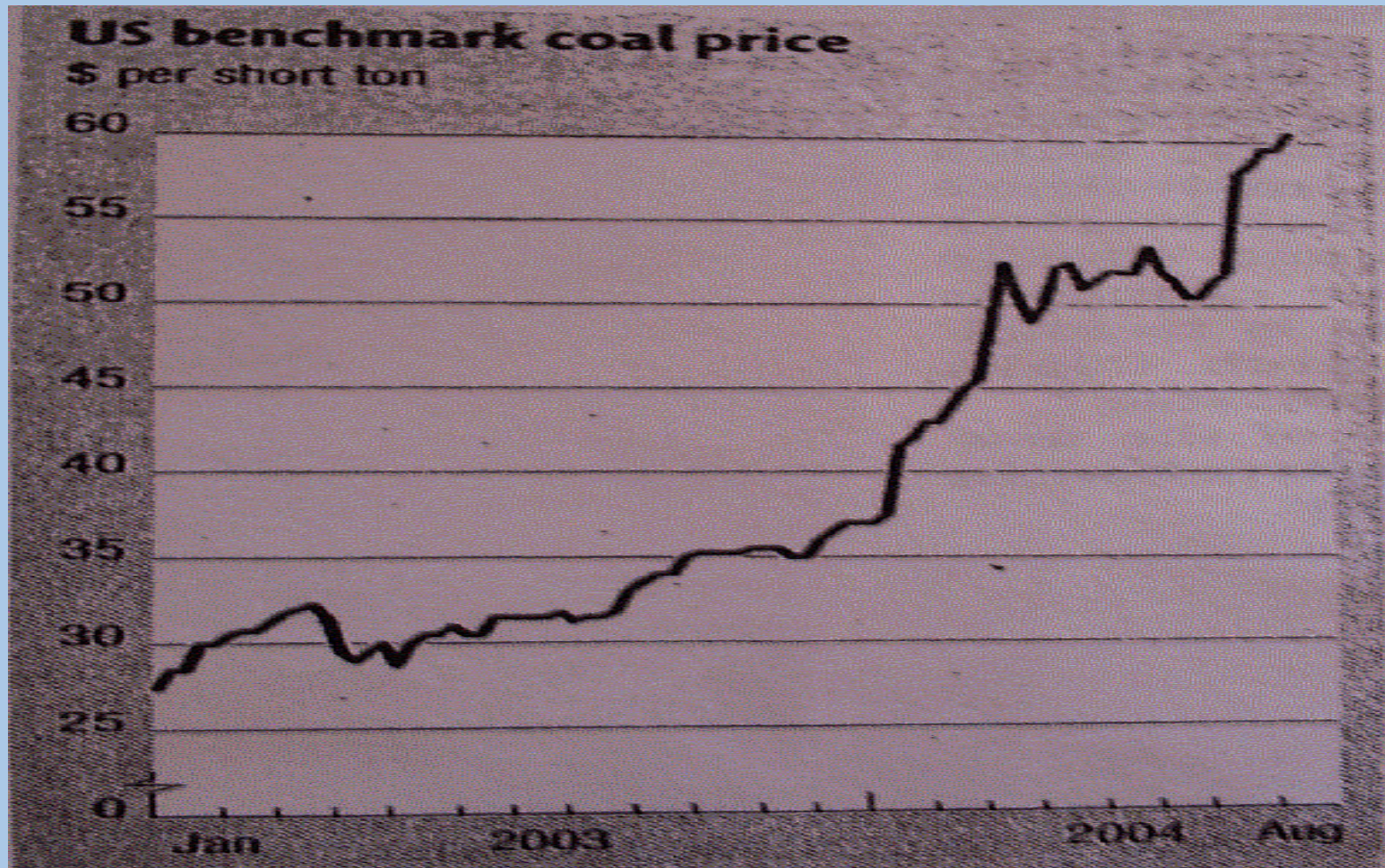
Natural gas' global business environment: oil prices

Oil prices in US\$ of 2004:

- **1864: 92\$/b, but at that time no oil dependent economy**
- **1980: 81\$/b, economic difficulties**
- **2004: 55\$/b**
- **Winter 2004/2005: 60+\$/b if the news of a severe cold spell in North America reach the press before the news of a slackening growth in China?(my prediction in October 2004)**



Business environment: since Jan. 2003 more than doubling of US coal prices!





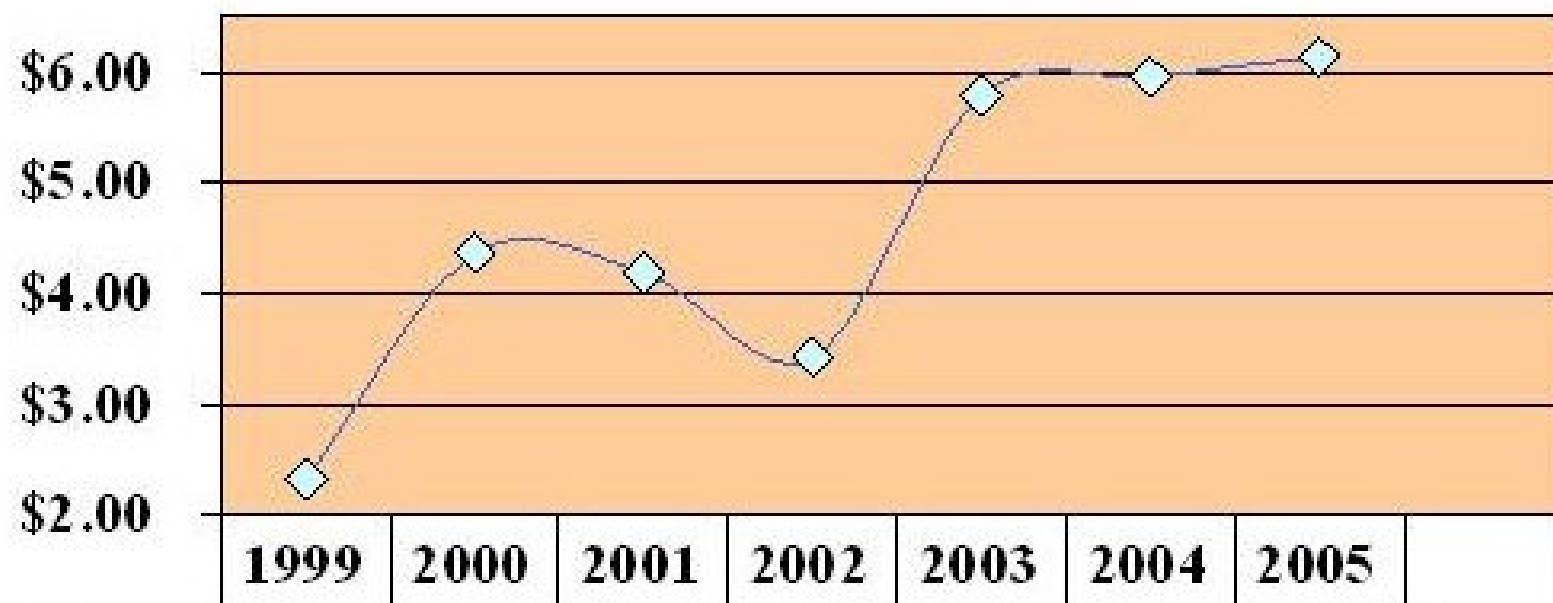
Conclusions 2 (prices)

- Due to the strong demand energy prices will stay relatively high (oil, gas and coal)
- Oil prices and gas prices will maintain to be structurally highly correlated regardless whether there is a contractual price link (like in general in Europe and The Pacific Rim), or whether there is a liquid spot market (like in the US and the UK).
- There are interesting price differentials for natural gas (LNG) in the different gas regions (N.America, Europe, Pac.Rim): invites price arbitration!



Natural Gas Spot Prices USA

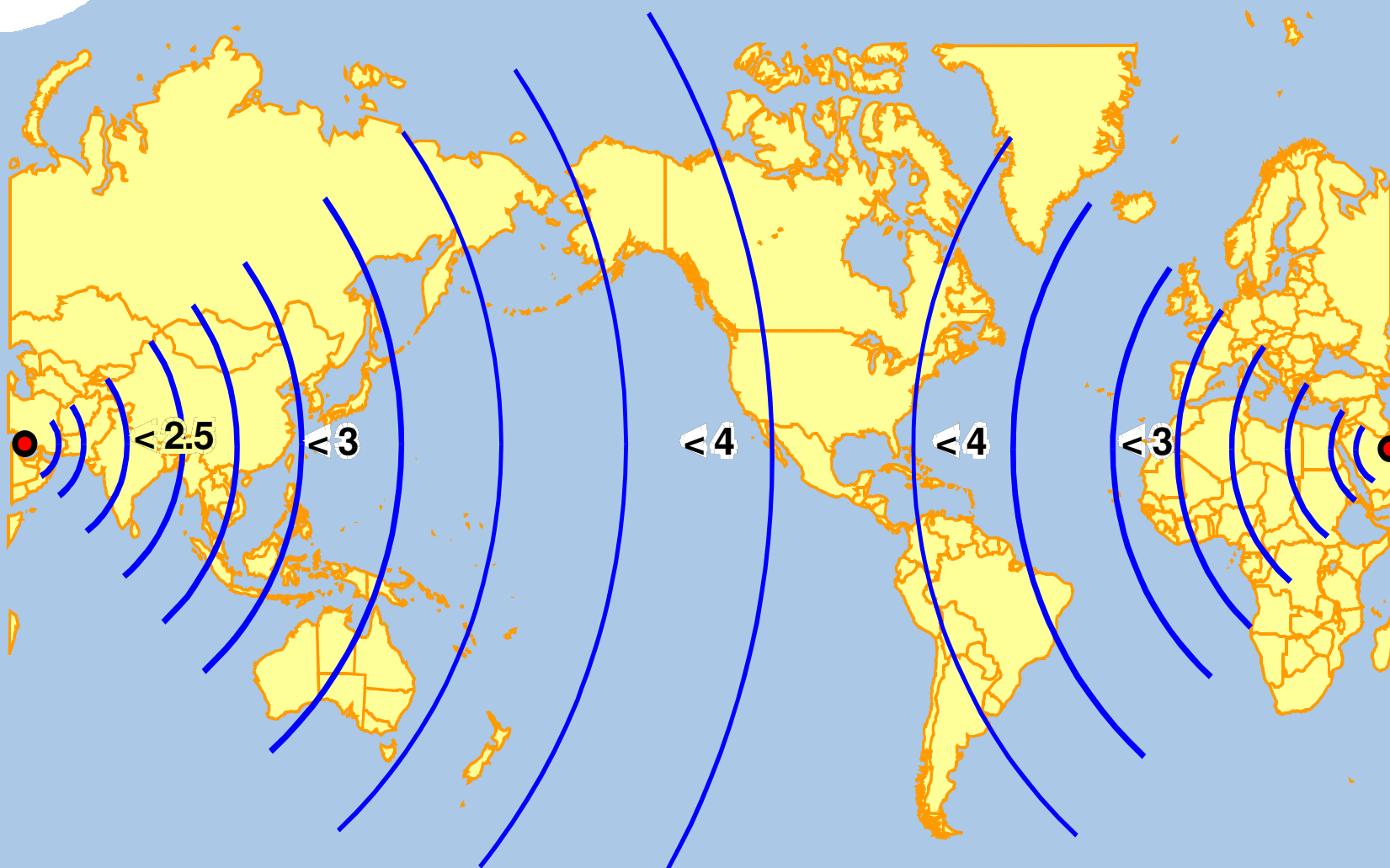
Natural Gas Spot Prices Have Risen and Fluctuated Since 1990s



	1999	2000	2001	2002	2003	2004	2005	
◆ Dollars per cubic foot	\$2.33	4.37	4.19	3.43	5.8	5.96	6.14	



Middle East LNG—Setting a New Global Cost Benchmark (\$ per MMBtu)



Source: Cambridge Energy Research Associates.

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27/05/2005

POWER 2005, Venice, 18 May 2005

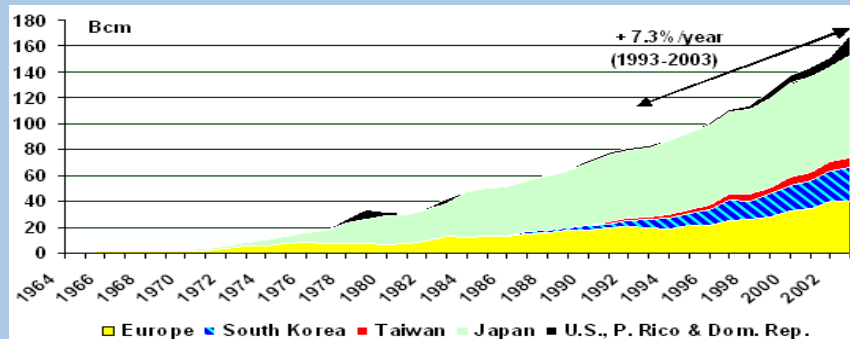
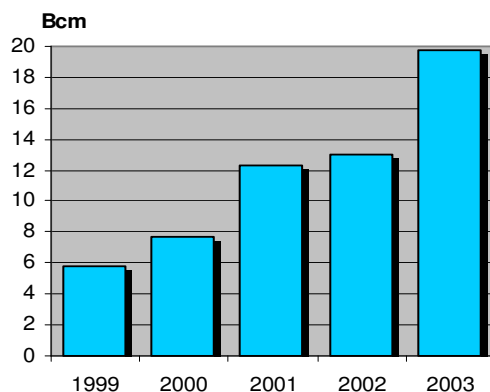
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IGU 2006

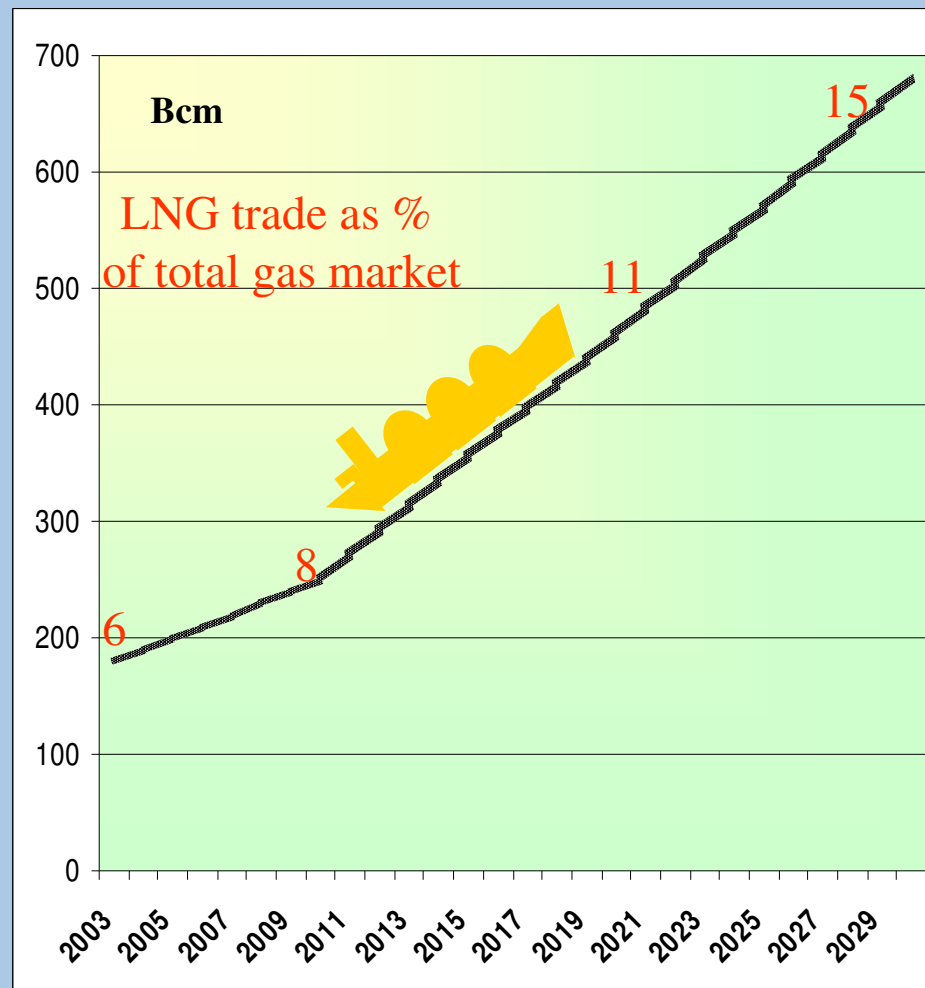


LNG trade history and perspectives

short-term trade



History (CEDIGAZ)



Forecast (IEA weo 2004)



International LNG trade: connecting markets





Conclusions 3 (global competition)

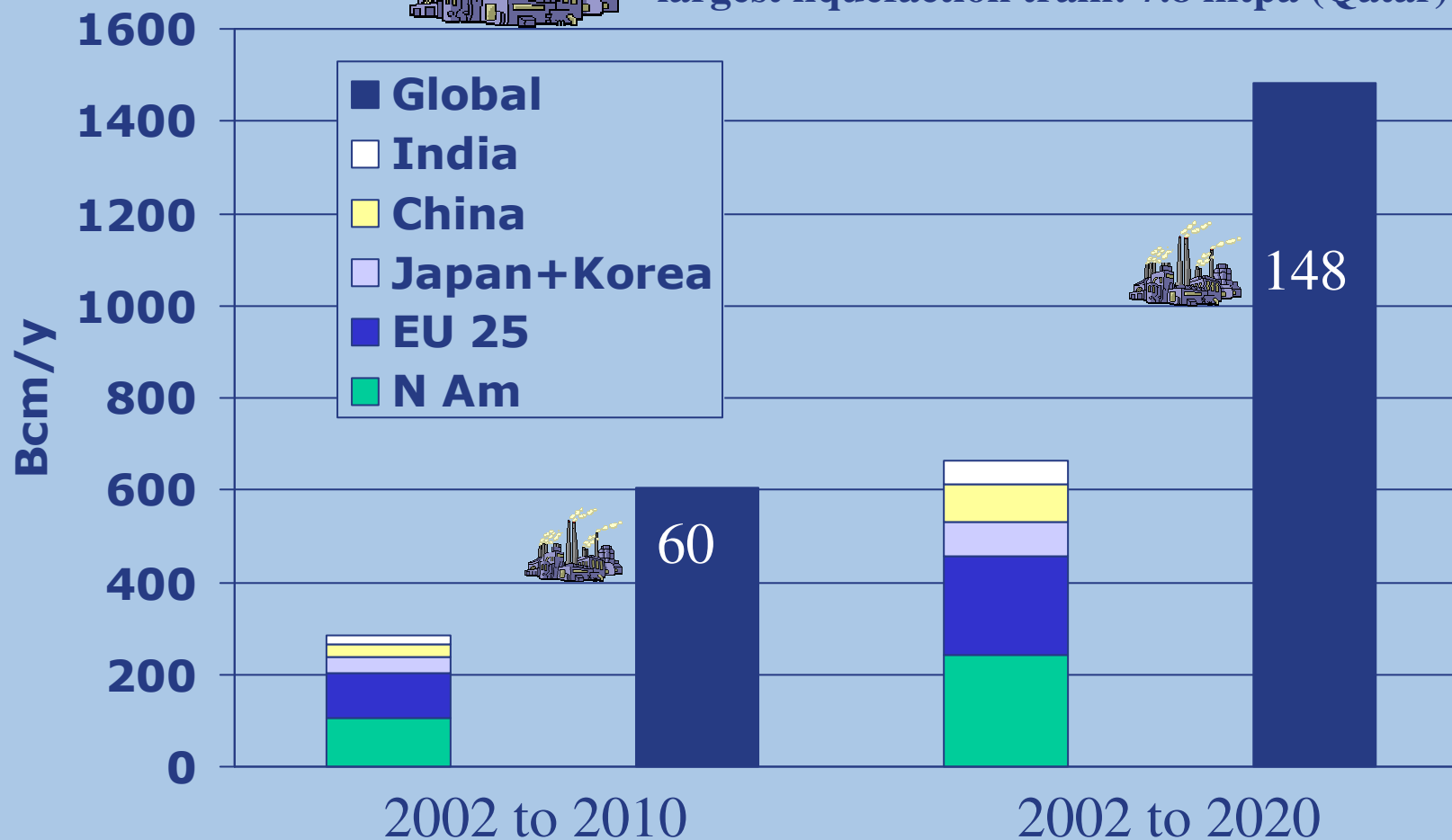
- Price levels of natural gas in the different gasregions are so high that LNG is competitive wherever it originates from,
- Traditional gas supply patterns (Russian gas to Europe, Mid Eastern gas to Pacific Rim, North America autarctic) will give way
- The big gas demand regions will compete with each other for supplies.



Incremental Global Gas Demand from 2002 to 2010, 2020



largest liquefaction train: 7.8 mtpa (Qatar)





So for Many Decades to Come...

- **Enough natural gas, but**
- **Regions of demand are NOT the regions with reserves, so**
- **A lot of long distance transportation and transit,**
- **Through many countries or narrow sea straits**
- **And production areas are more and more difficult and costly**



Giant investments necessary from now until 2030

- **Electricity:**
 - 4800 GW capacity
 - \$4600 bln in generation
 - \$5200 bln in transmission & distribution
 - 45/55 developed/developing economies
- **Gas:**
 - \$2700 bln
 - 50/50 upstream (exploration & production) and downstream (transmission, distribution, storage, LNG-chains)
- **Coal:**
 - 'Only' \$400 bln (mines, shipping, ports)



BUT will investments upstream come in time?

- **More and more Oil CIEs do have difficulties in getting access to gas reserves under acceptable and stable conditions ;**
- **Top people like Thierry Desmarest (TOTAL), Lee Raymond (ExxonMobil) and Lord Brown (BP) pointed to this recently;**
- **Mandil's question (Oct.2004): wouldn't it be better if Oil CIEs would invest more instead of executing shares buy back schemes could well be a symptom of these difficulties.**



May 3 2005: IEA warns for shortfall of investments in energy

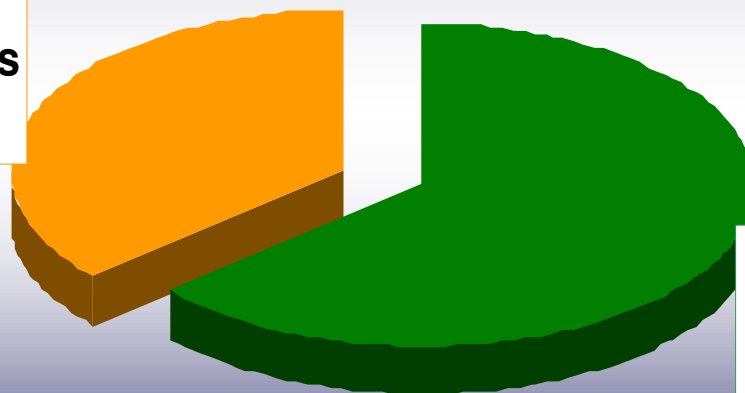
- **Global investment remained below the IEA's 2003 estimate of the \$16.000bn needed by 2030 to meet demand;**
- **Lehman Brothers / Citybank predict investments in exploration will rise by less than 6% in 2005 against 12% in 2004:**
- **So there are problems to be solved and challenges to be met!**



Who owns the gas (and oil) reserves?

CONTROL OVER PRODUCTION OF REMAINING COMMERCIAL RESERVES NATURAL GAS

Private
companies
36%



State
controlled
companies
64%



Europe's security of supply and LNG

- **Not only Europe likes to diversify its supplies; The only cost-effective way to cope with the security of supply issue,**
- **Also the suppliers like to diversify their sales portfolios;**
- **LNG will increasingly connect the present separated gas markets in the world;**
- **Long term contracts will remain Europe's backbone for pipeline gas and LNG;**
- **Some 9% of LNG sales are at present spot-sales, and it is expected to grow to some 20% in the coming years.**



Europe's security of supply and LNG (2)

- **Growing LNG trade will enable price arbitration, so prices in the demand regions become more and more inter-linked, it will take time: >5 years**
- **The growing LNG spot market enhances flexibility and competition, at the same time it is an essential tool for the big gas suppliers to push gas prices in the desired direction (a reliable supplier cannot close the valve for a LT-gas contract, but he can for spot supplies)**



Europe is not the only one



Regarding U.S. Gas Supply and the role of LNG and/or Alaska.....

There is no Plan B!

Marie Fagan (CERA)





Conclusions 4 (security of supply)

- The rapid growing dependency rate for oil and gas of a limited number of supply regions and
- The increasing security issues which go together with long haul oil and gas transports (by pipelines and by LNG-tankers)
- Raises the awareness of security of supply
- Geo-political issues will become more important for all tradable energies; also for natural gas.



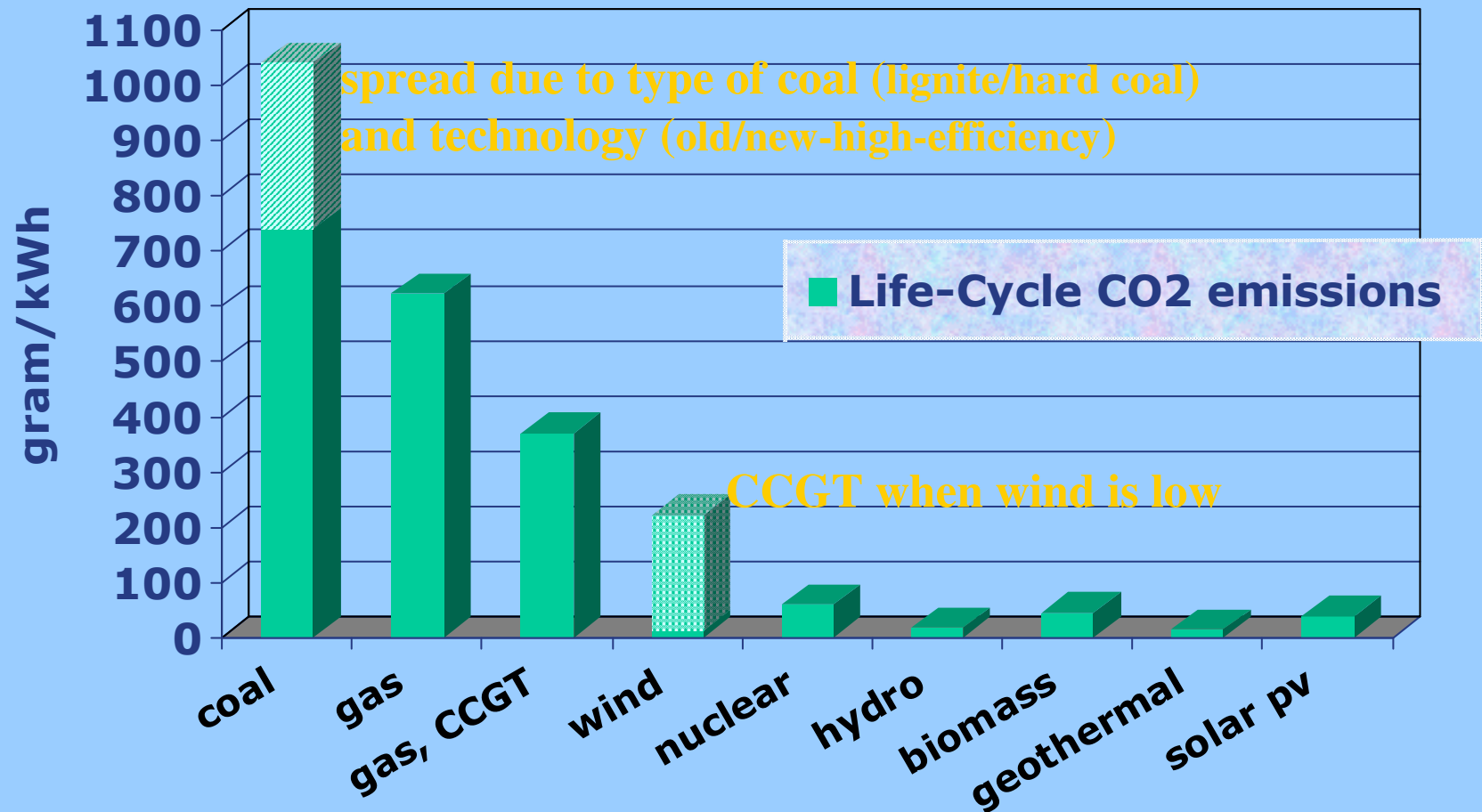
Cost comparison various power generation technologies

Base load (7500 – 8000 h)	Coal	Gas (CCGT)	Nuclear
Cost per MWh, incl. fuel (\$)	35 - 42	35 - 41	30 - 67
Investment per kW (\$)	820 - 1300	420 - 540	1663 - 2000
Project lead time (month)	36 - 48	20 - 40	60 - 78
Lifetime (years)	30 - 40	20 - 40	40 - 60

Source: Clingendael International Energy programme, report to be published



CO₂ emission from power plants



Sources: life-cycle assessment of electricity generation systems and applications for climate change policy analysis, Meier, 2002, published on website Nuclear Energy Institute; own data; IEA



Conclusions 5 (gas the fuel of choice)

- **For financial-economic reasons,**
- **For environmental reasons,**
- **For space planning reasons** (gasfired powerstation needs a lot less space than a coal fired one)
- **For cooling water requirements** (gasfired powerstations need a lot less cooling water than coalfired ones or nuclear)
- **Natural Gas will be the fuel of choice!**



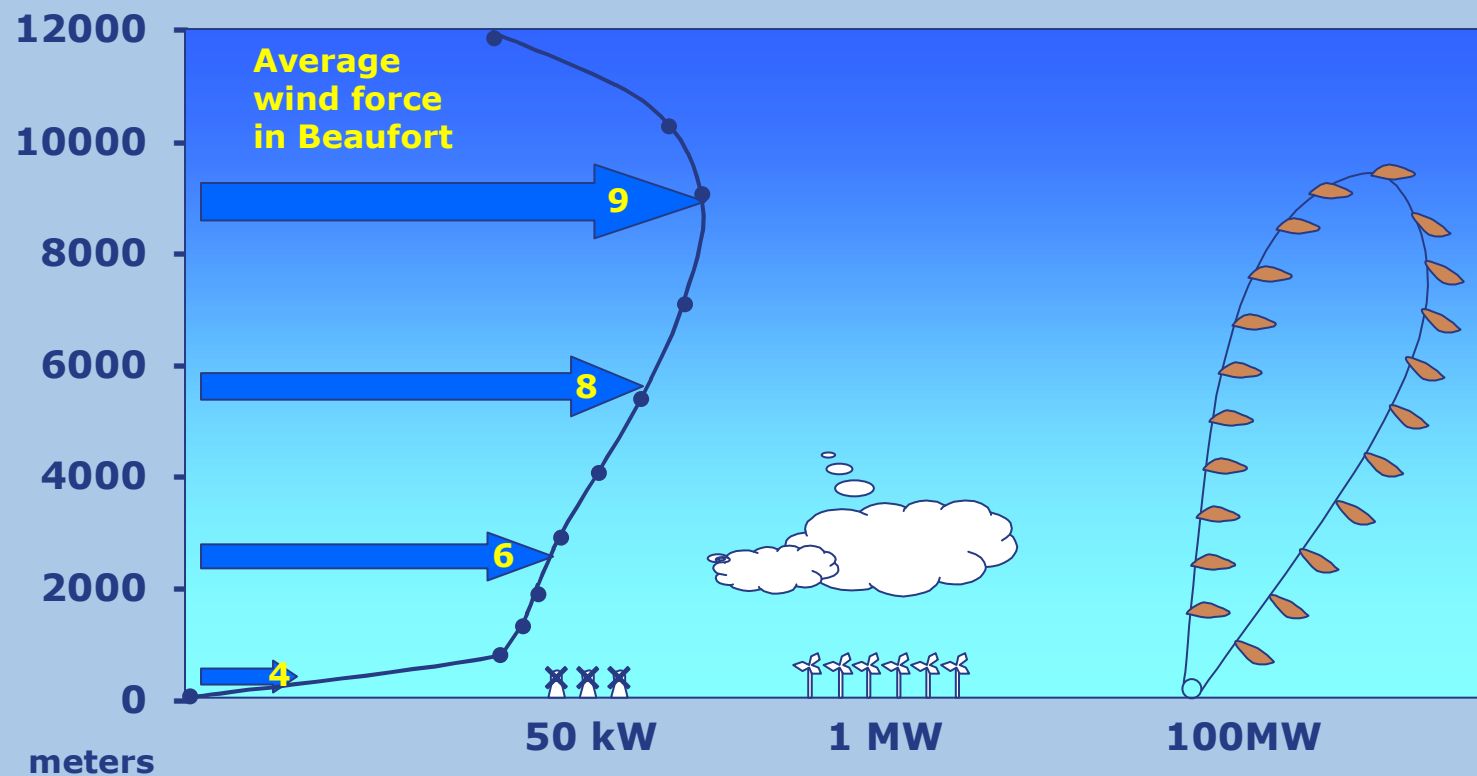
But as a responsible industry we acknowledge:

- **The best supply is the saved m3**



Energy technologies of the 21st century

Ladder mill, the next generation of wind energy



Three generations of wind mills



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**Thank you,
for your attention**

See you in Amsterdam!
**23rd World Gas Conference and
Exhibition**
June 5 – 9 2006

...and perhaps in Busan, South Korea, 23-25 May at the
ICT2005 Congress on ICT
in the Energy Business