

Environmental regulation as a challenge for energy markets

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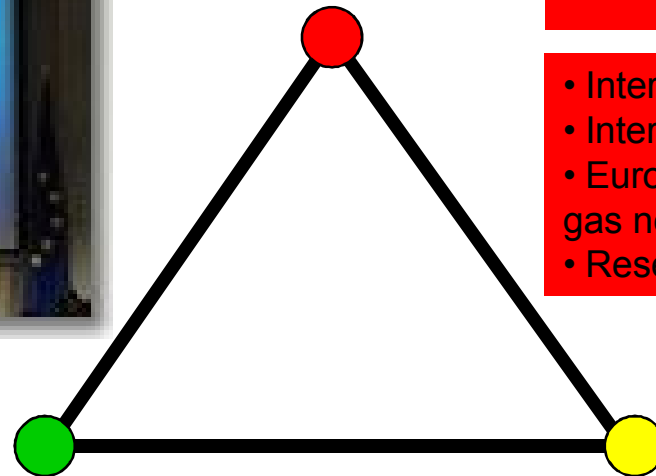
Euroheat & Power 33. Congress

June 18-19, 2007

Copenhagen



The three challenges



Competitiveness “LISBON”

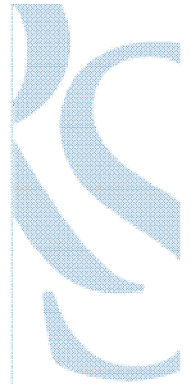
- Internal Market
- Interconnections
- European electricity and gas network
- Research and innovation

Sustainable Development ‘KYOTO’

- Renewable energy
- Energy efficiency
- Nuclear
- Research and innovation
- Emission trading

Security of supply ‘MOSCOW’

- International Dialogue
- European stock management
- Refining capacity and energy storage
- Diversification



Three agenda's

Kyoto

20% less CO-2
20% more energy efficiency
20% RES-share
in 2020

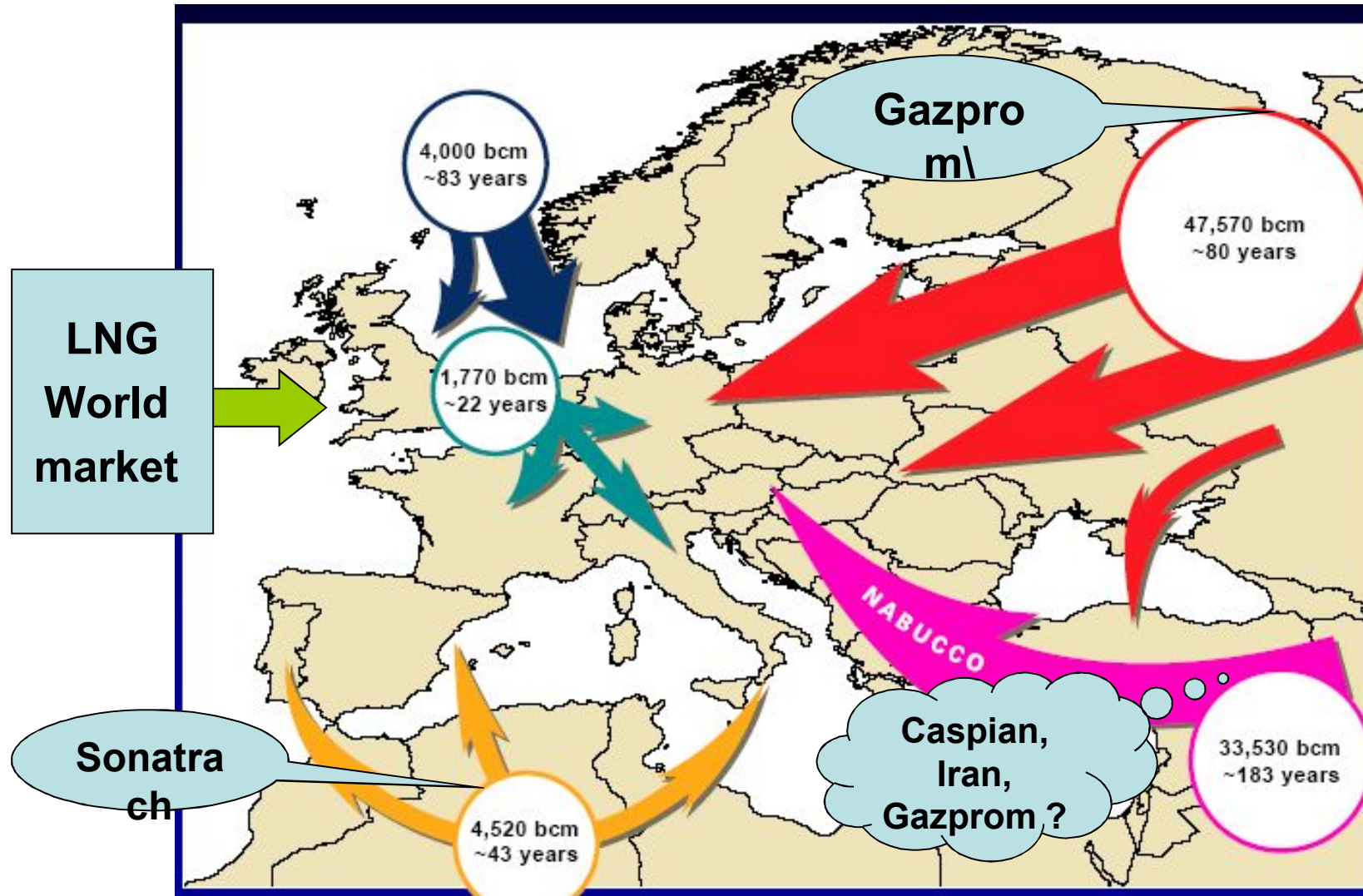
Lisbon

full compliance
open access & unbundling
no long-term contracts
adequate infrastructures

Moscow

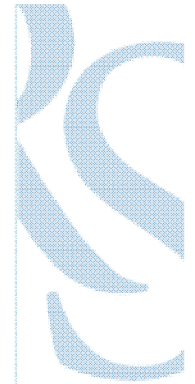
diversify away from
hydrocarbons
more interconnections
one voice in external
energy policy
dialogue & cooperation

EU's gas encirclement



**Security of supply
'MOSCOW'**

*How to face
the Russian
Position?*



Are we on the right track?



**Competitiveness
“LISBON”**

Conclusions

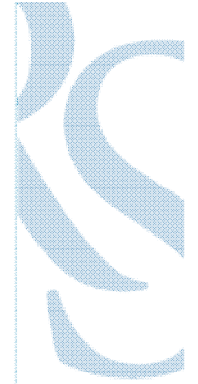
- Wholesale markets in the EU generally maintain the **high level of concentration** of the pre-liberalisation period
- **Lack of liquidity and limited access to infrastructure** prevent new entrant suppliers from offering their services to the consumer
- **Transit capacity**, crucial for market integration, could be used much more efficiently
- There is a **lack of reliable and timely information on the markets**, essential for healthy competition

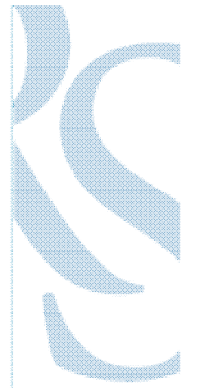
***DG COMP Sectory Enquiry:
From energy policy to competition policy***

**Sustainable Development
'KYOTO'**



The European Commission's 2020 Plan





G8 agreement to substantially cut CO₂ emissions

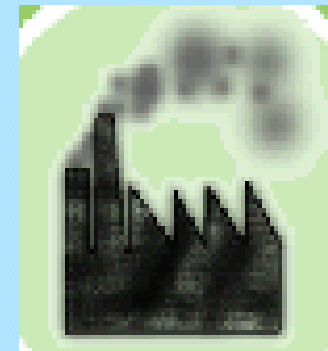


Environmental impact of power production

Power stations have environmental impacts.

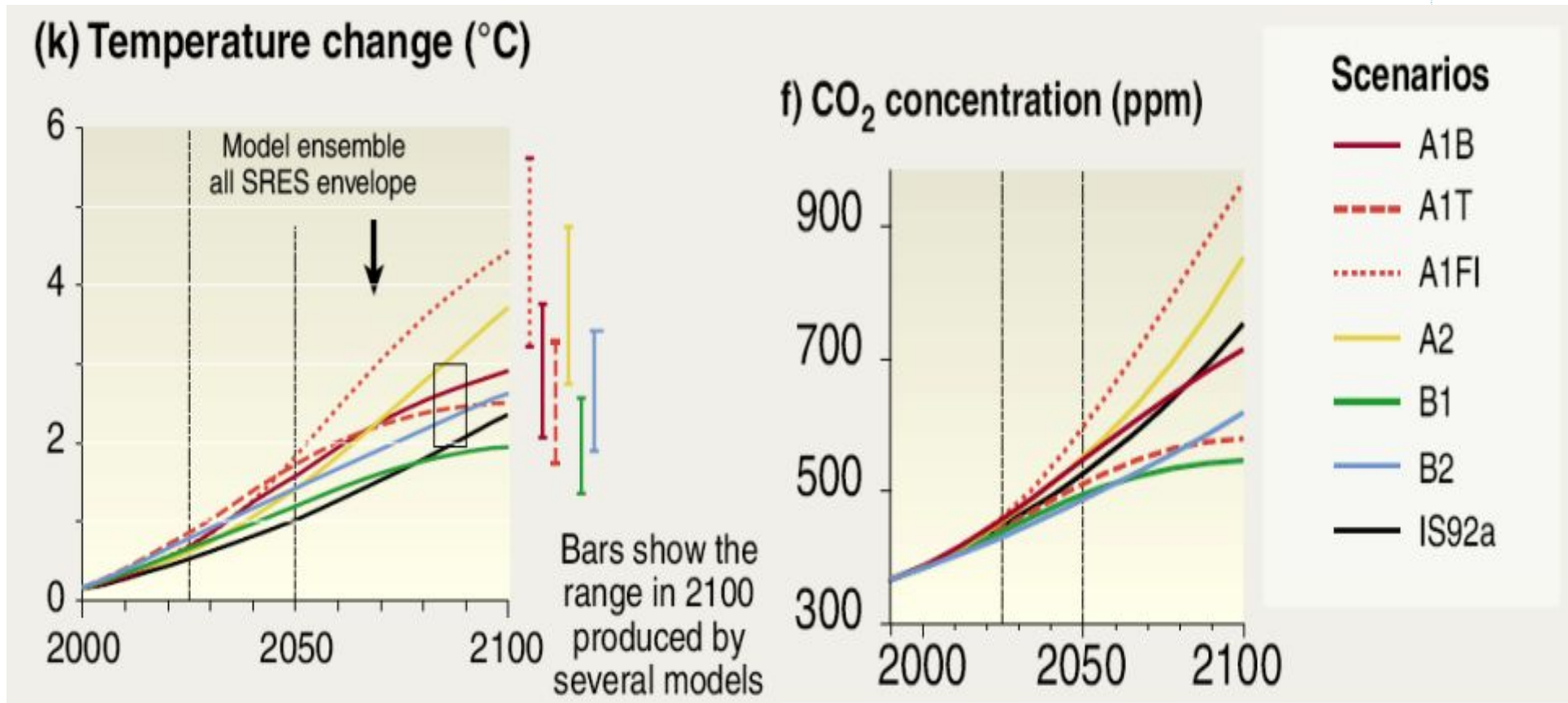
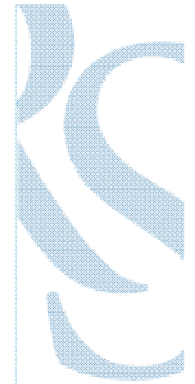
They are responsible for:

Acid rain	}	90% of SO ₂ emissions from LCP*
		68% of total SO ₂ emissions
		90% of NO _x emissions from LCP*
		23% of total NO _x emissions
Climate Change		25% of total CO ₂ emissions
Dangerous wastes		95% radioactive products



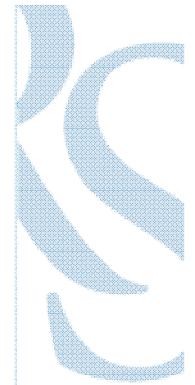
*LCP: 'Large Combustion Plants' (> 50 MW_{th})

Climate change and the carbon economy

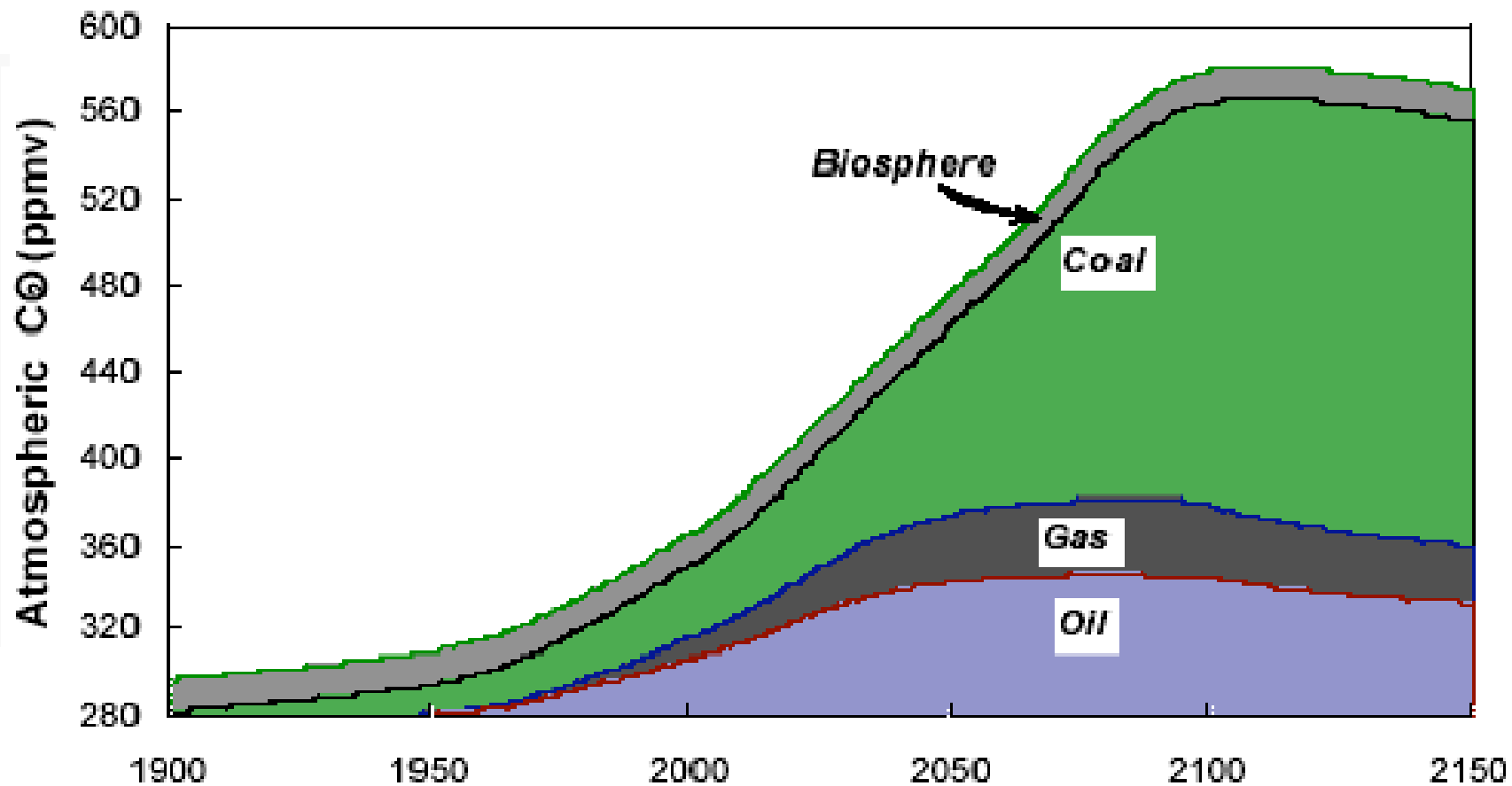


Source: IPCC, Special Report on Emissions Scenarios (SRES).

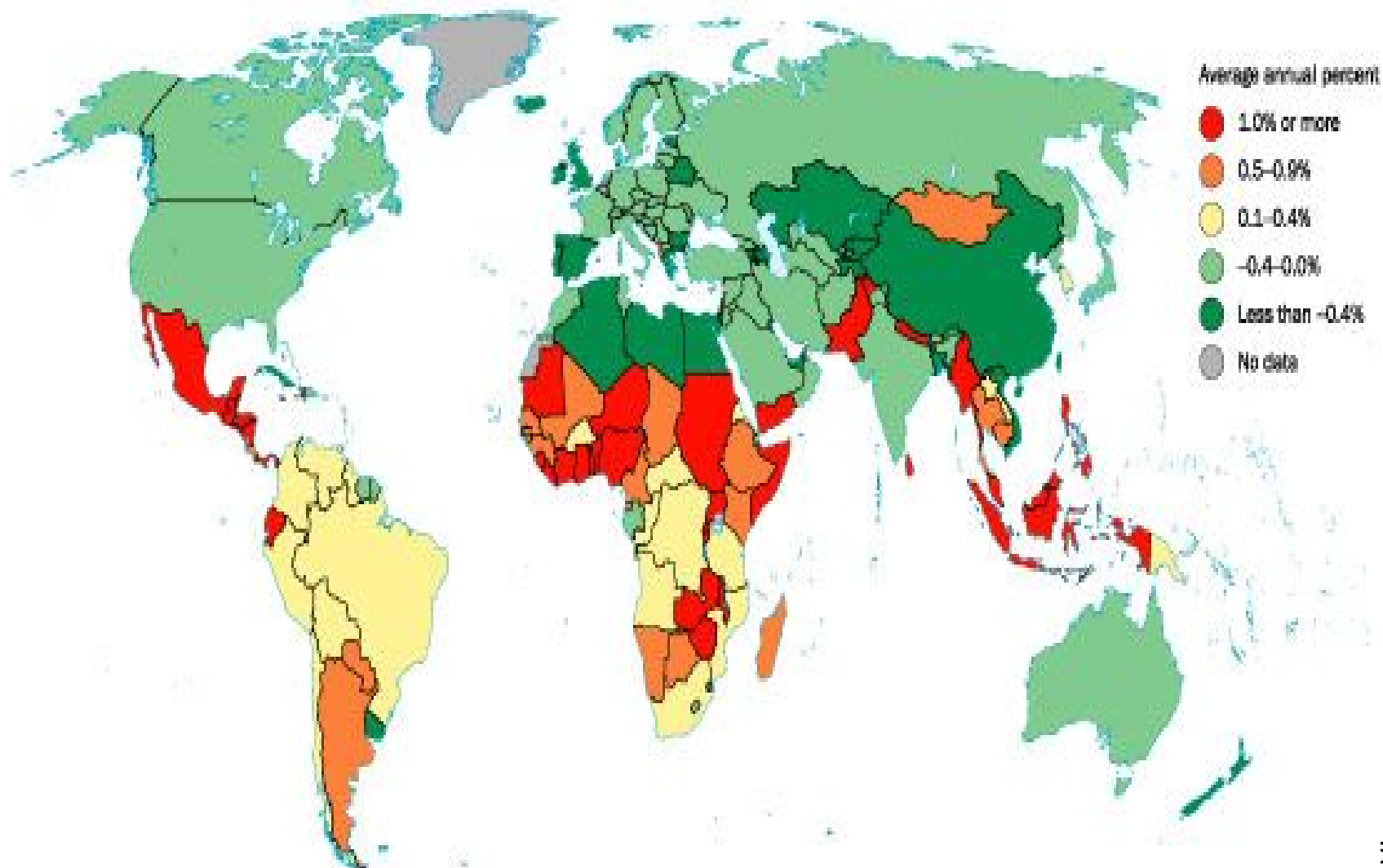
Climate change and 'peak oil'



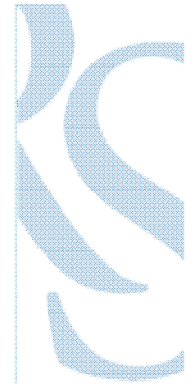
Business-as-Usual
(2% annual growth until 50% depletion, then 2% annual decline)



Deforestation (1990-2000)



Consequences of liberalisation



CHANGES DUE TO LIBERALIZATION	EFFECTS
Change in risk allocation	Change in the technology portfolio towards low private cost and less capital intensive technologies (natural gas combined cycles)
Change in dispatch and planning criteria	
Change in the role and capabilities of the government	Less direct capability to influence technology portfolio
Change in the demand	Price signals dominate active portfolio

Internalizing the environmental cost

FROM: *Direct Mechanisms:*

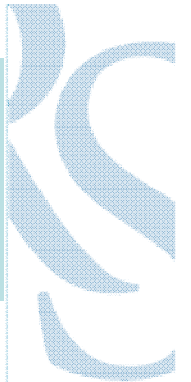
- Mandatory Planning and Command and Control

TO: *Indirect Mechanisms:*

- **Taxes:** Energy Taxes, Carbon Dioxide Taxes (including environmental cost)
- **Market:** Emission Trading, Tradable Green Certificates
- **Economic Incentives:** Renewables and Efficient Technologies (including relative environmental benefit)

Uncertainties due to difficulty in quantifying the environmental costs and limited experience with some mechanisms to internalize costs

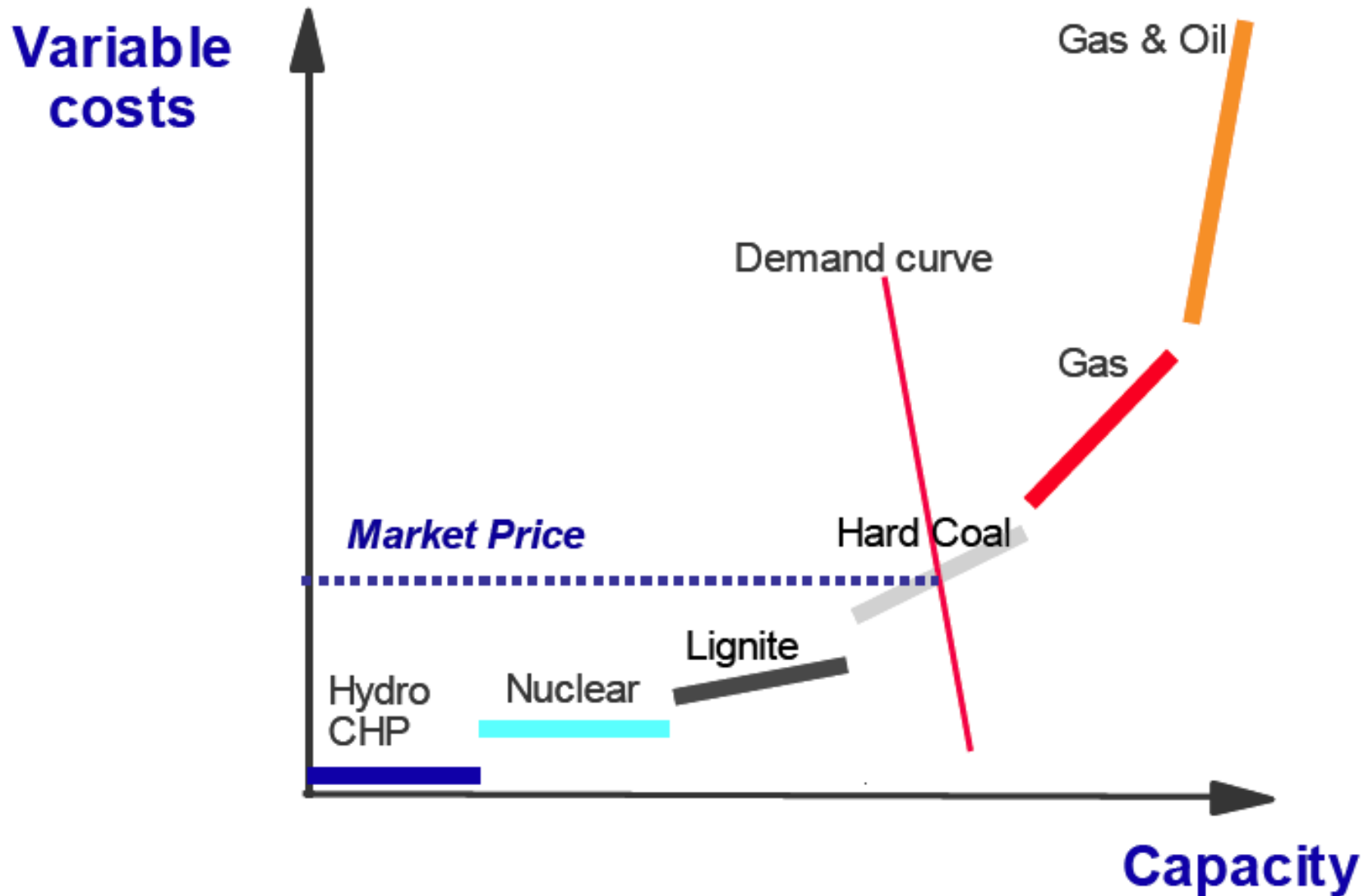
SLOWLY BUT SURELY



Carbon intensity of fuels

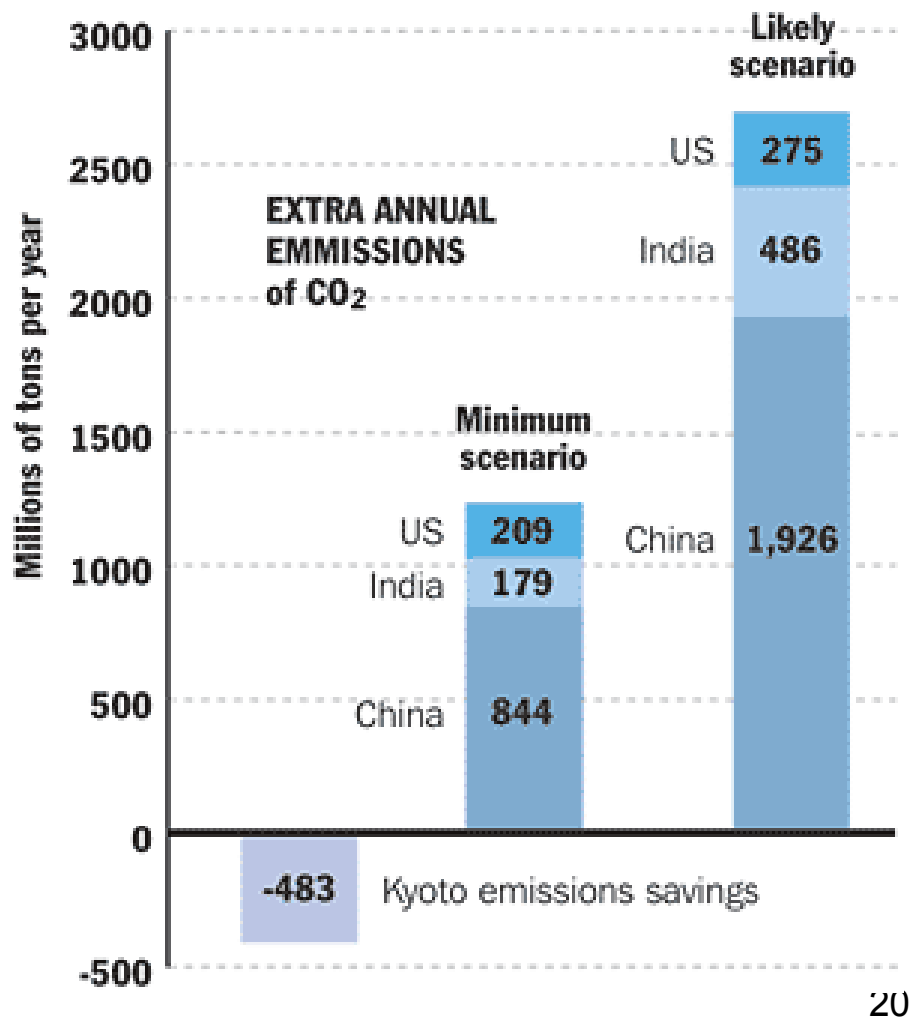
Fuel source	MtC/EJ	Ratio to Natural Gas
<i>Natural gas</i>	14.4	100 %
<i>Crude oil</i>	19.9	138 %
<i>Coal</i>	25.4	177 %

Impact of CO₂ costs on electricity price



Kyoto targets versus additional emissions from planned coal plants

By 2012, expected cuts in greenhouse-gas emissions under the Kyoto treaty will be swamped by emissions from a surge of new coal-fired plants built in China, India, and the United States



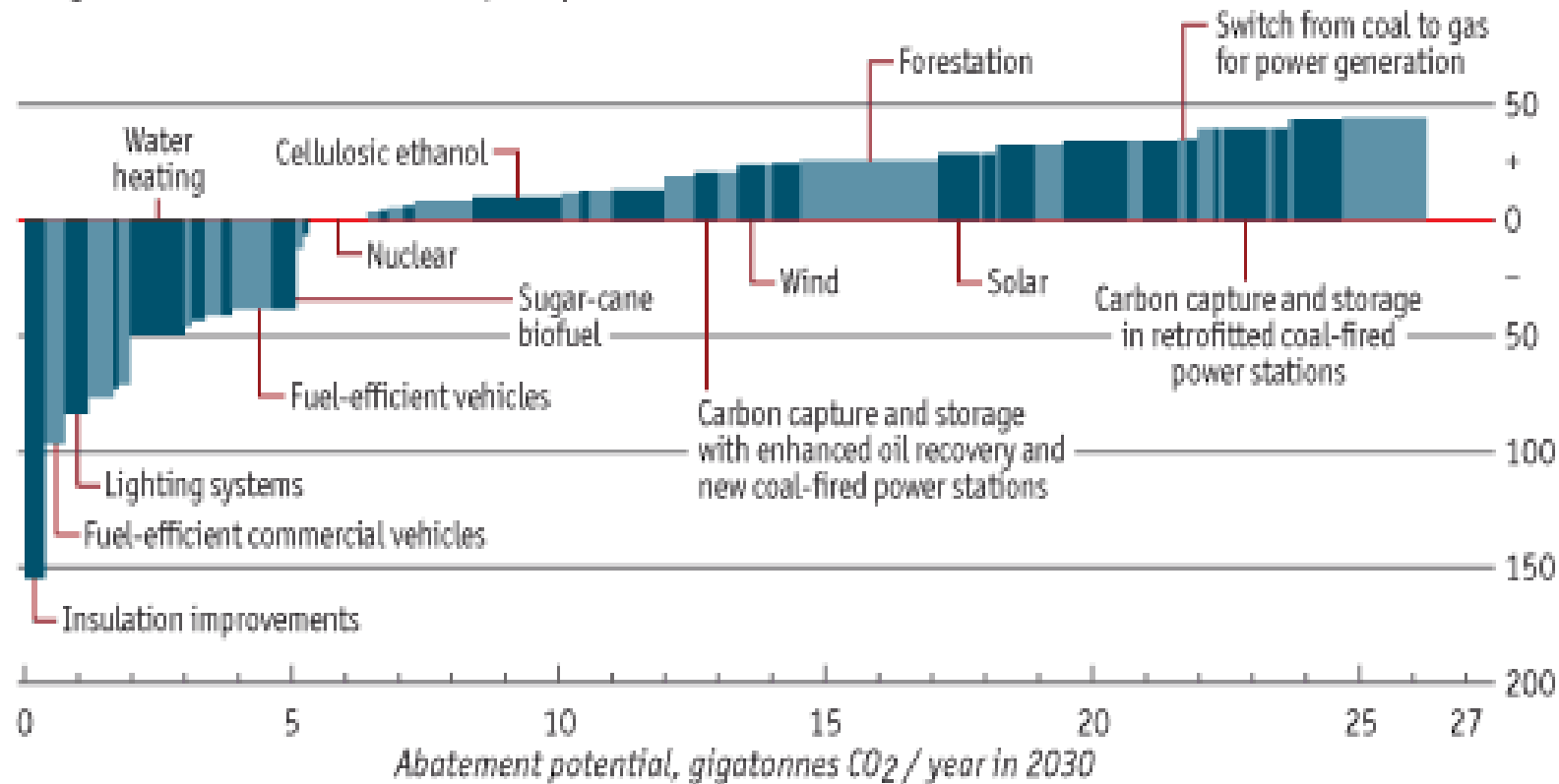
The costs of carbon reduction



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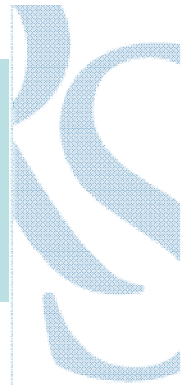
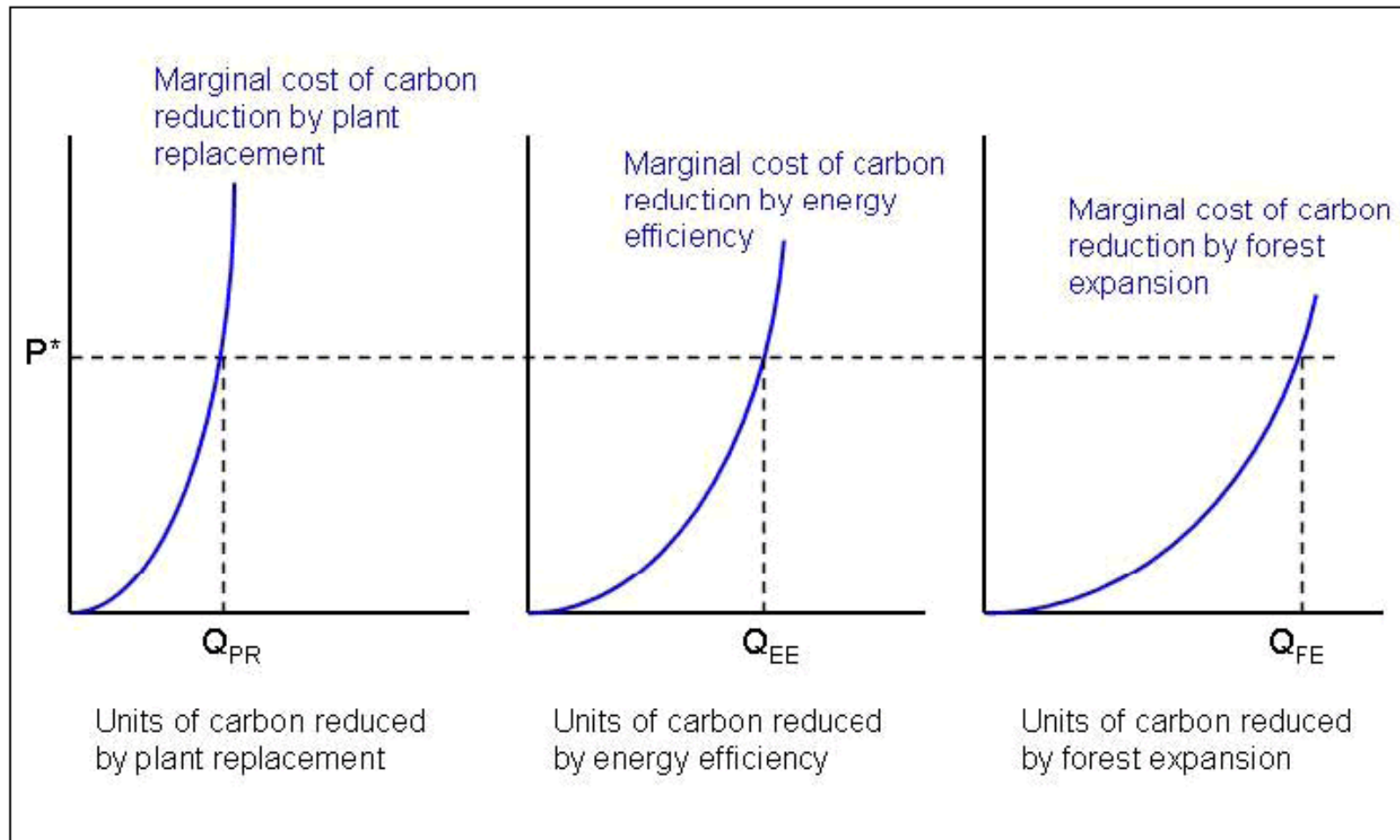
The cost of cutting carbon in different ways

Marginal cost of abatement, examples €/t CO₂

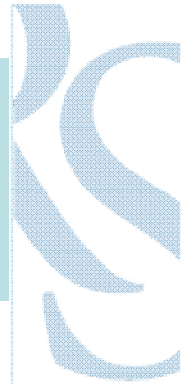


Source: Vattenfall

Carbon Reduction Options

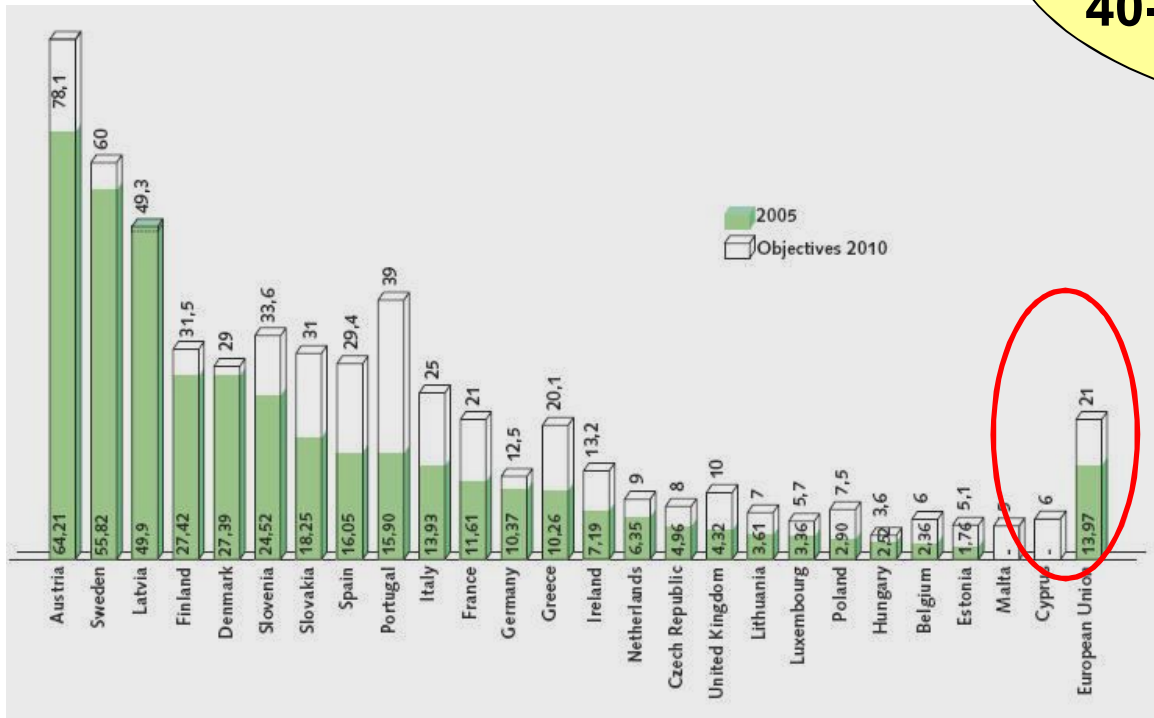


Renewable energy sources: its all electricity...



**Fuels for electricity:
The fossil/uranium/renewables dilemma's**

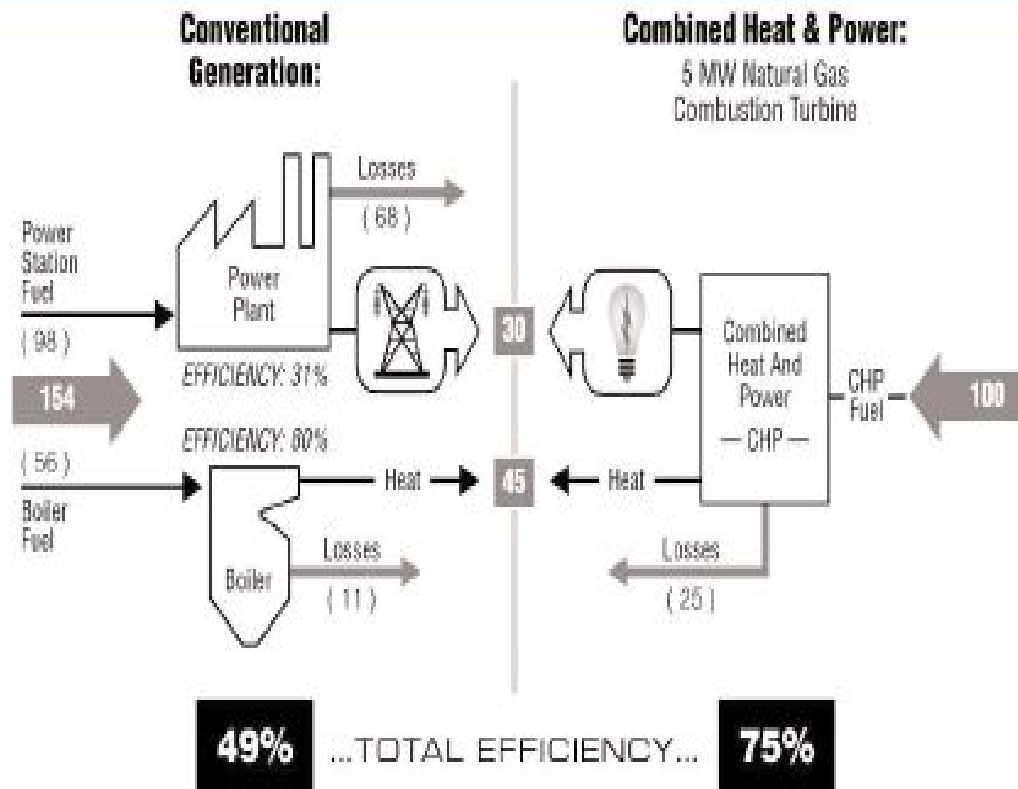
**Electricity-in-energy share:
20% RES-in-energy, i.e.
40-50% RES-in-electricity?**



**EU-RES 2010 target: 21%
2005 performance: 14%**

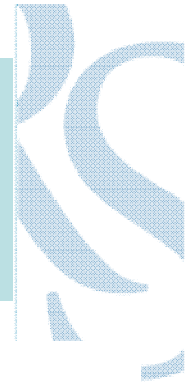
CHP

Figure 1. CHP System Efficiency

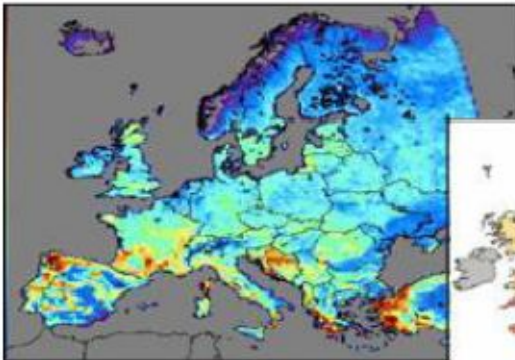


Source: EPA 2004.

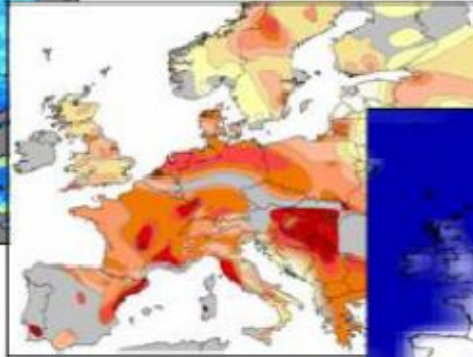
Renewables



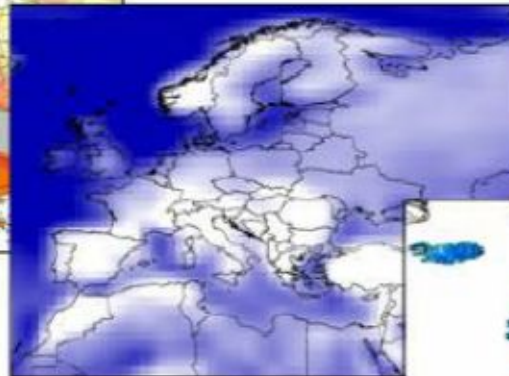
Biomass (620) TWh



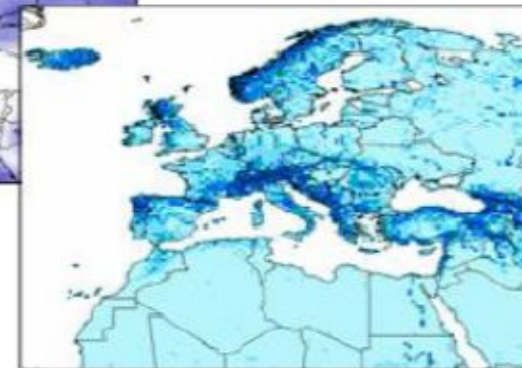
Geothermal (380) TWh



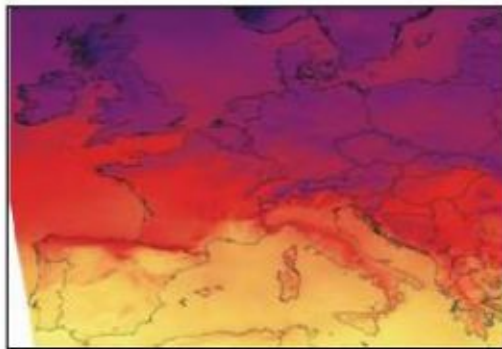
Wind Energy (1520) TWh



Hydropower (910) TWh



Solar Energy
(1730) TWh



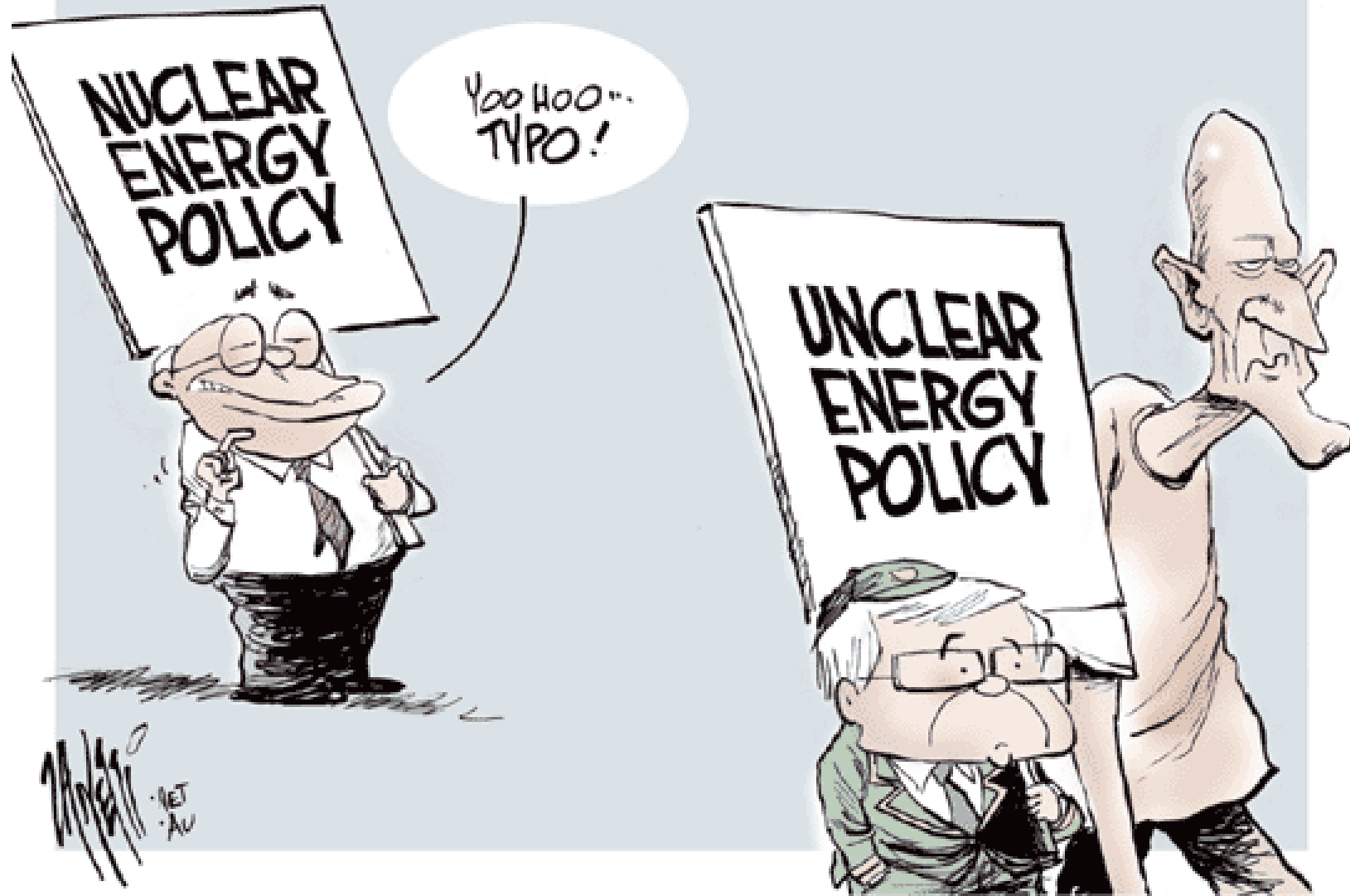
Source: Trans-CSP 2006

Airtricity

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CAS

ON FIXING GLOBAL WARMING...



EUROHEAT & POWER - 33. CONGRESS
CHP/DHC: BUILDING OUR FUTURE
18-19 JUNE 2007, COPENHAGEN

Thank you for your attention!

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