

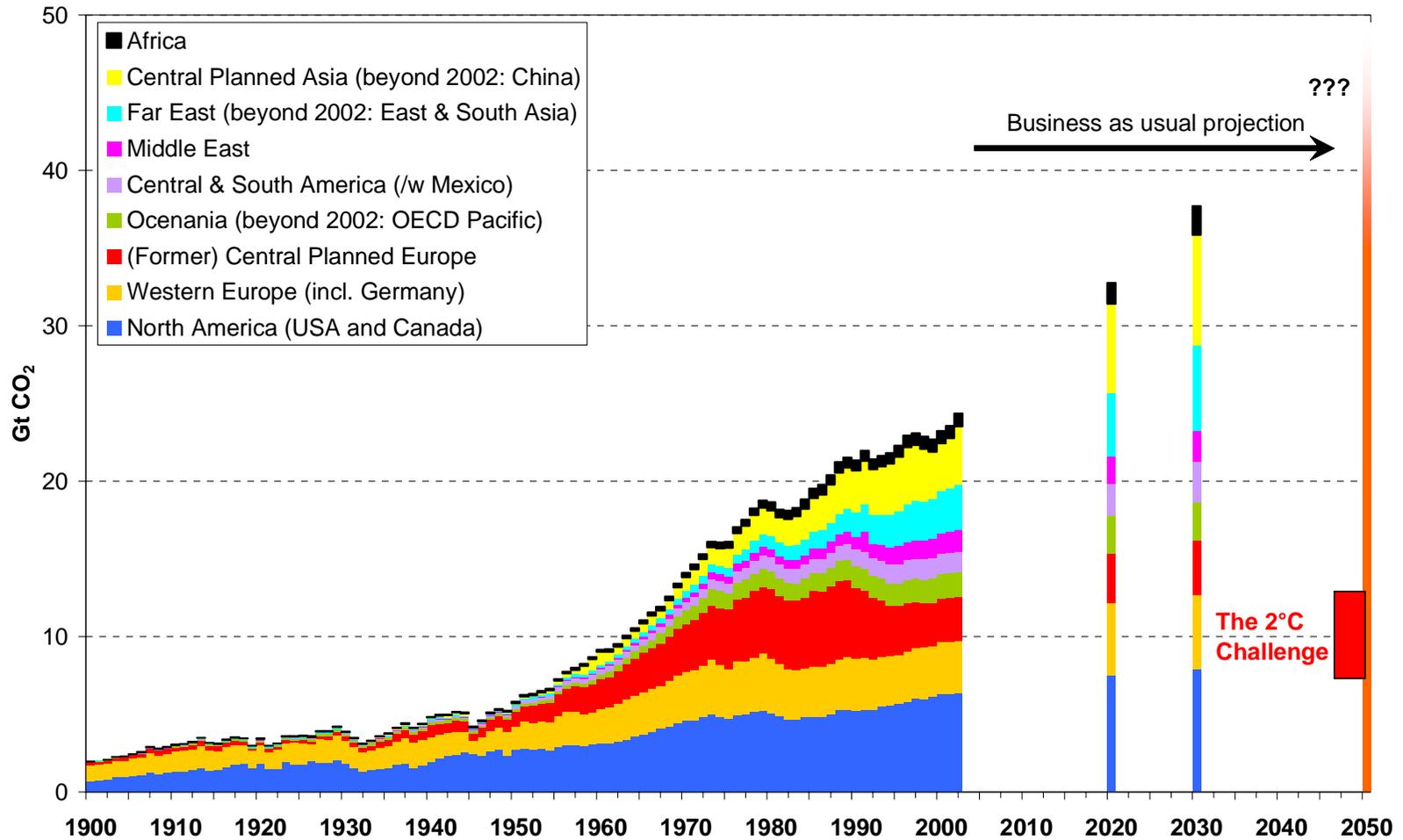
The Status of Nuclear Power in Europe and the Impact of Economics on its Future Development

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November 2007

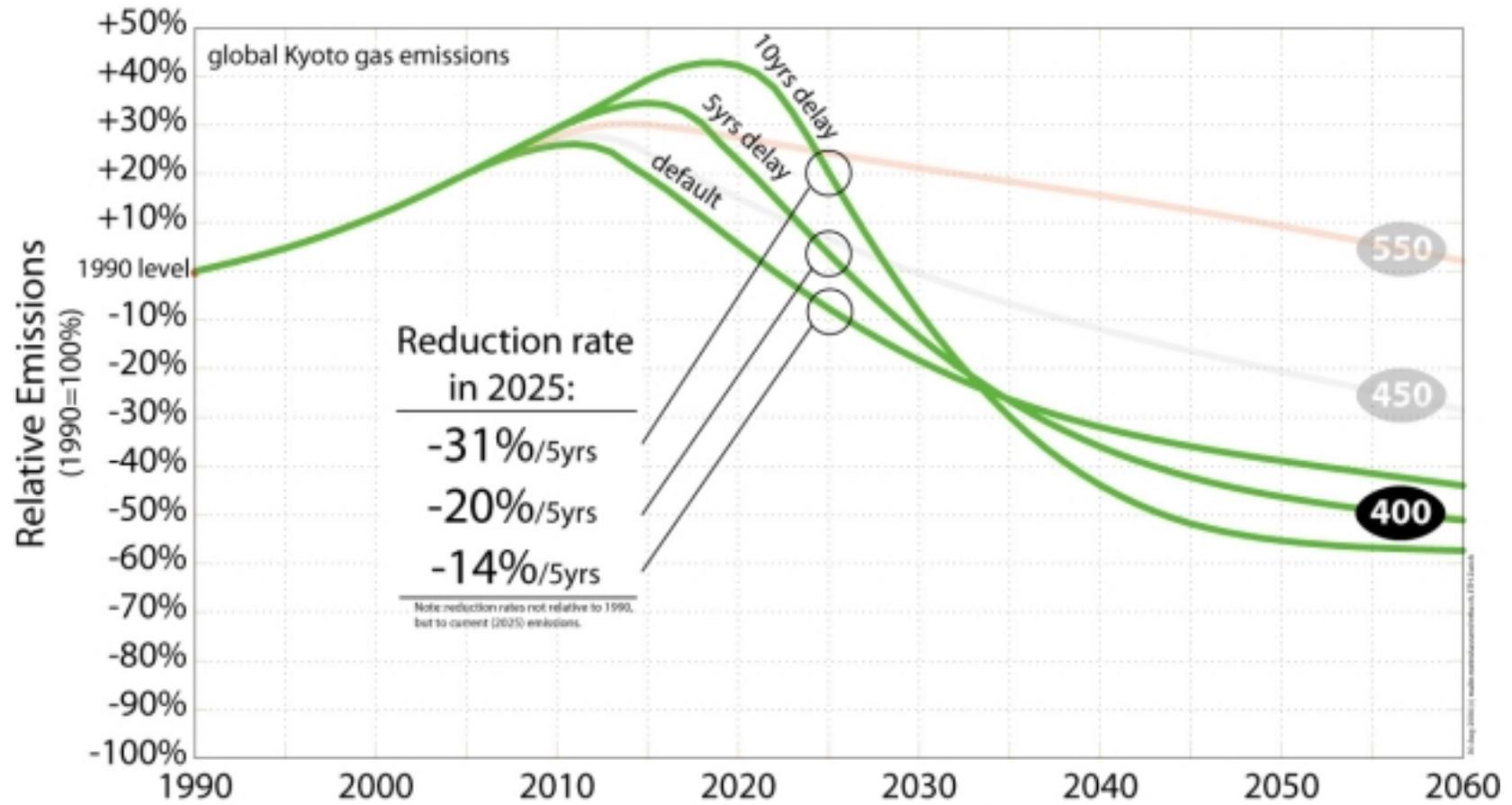
New Energy World

- Situation has changed !
 - Growing genuine awareness of climate change
 - World-wide growth in energy consumption
 - Resource depletion, especially in Europe
- These factors ***initially suggest the need to*** support the development of nuclear power.
- **HOWEVER...**

Climate Change

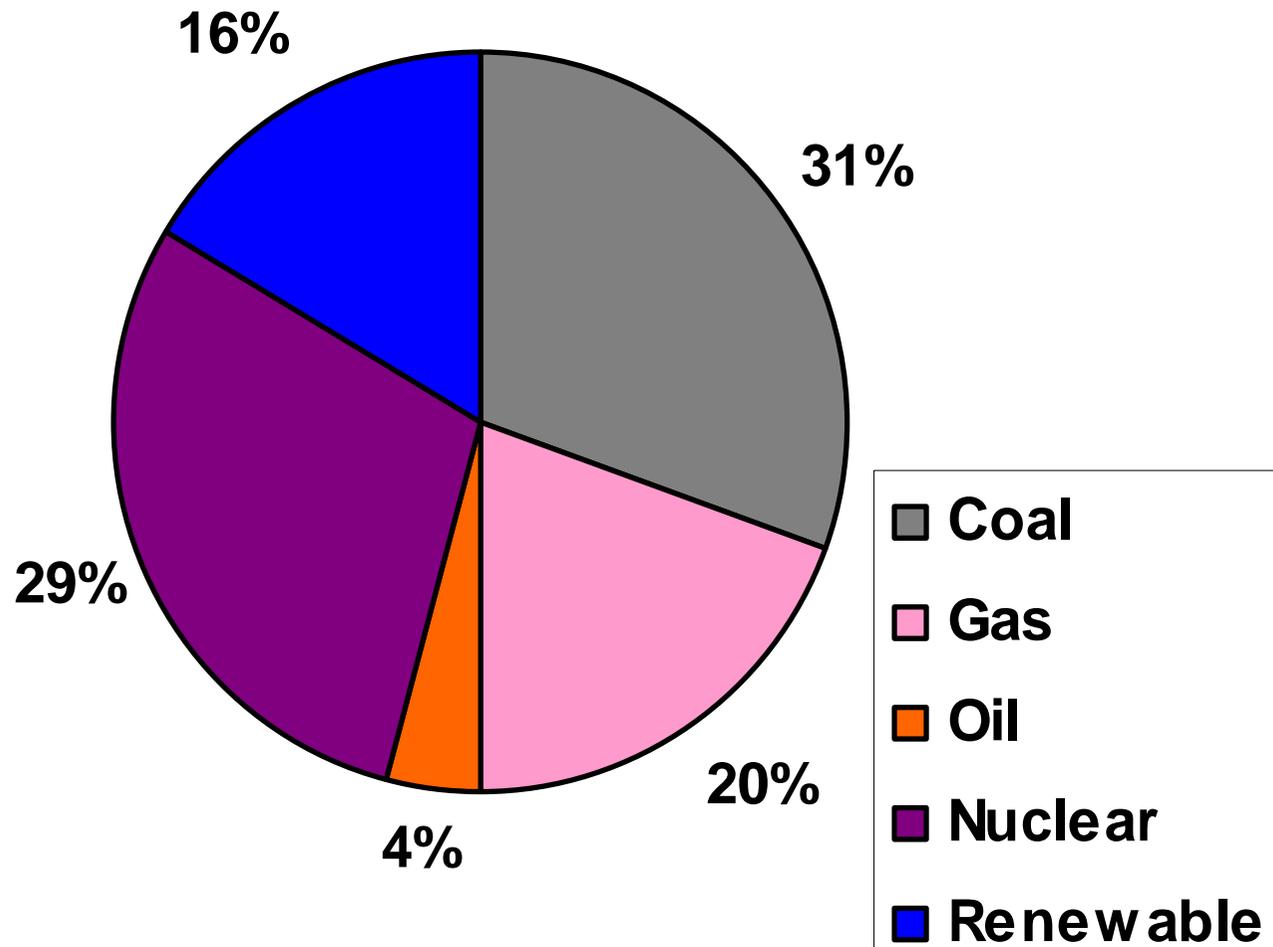


But timescales involved

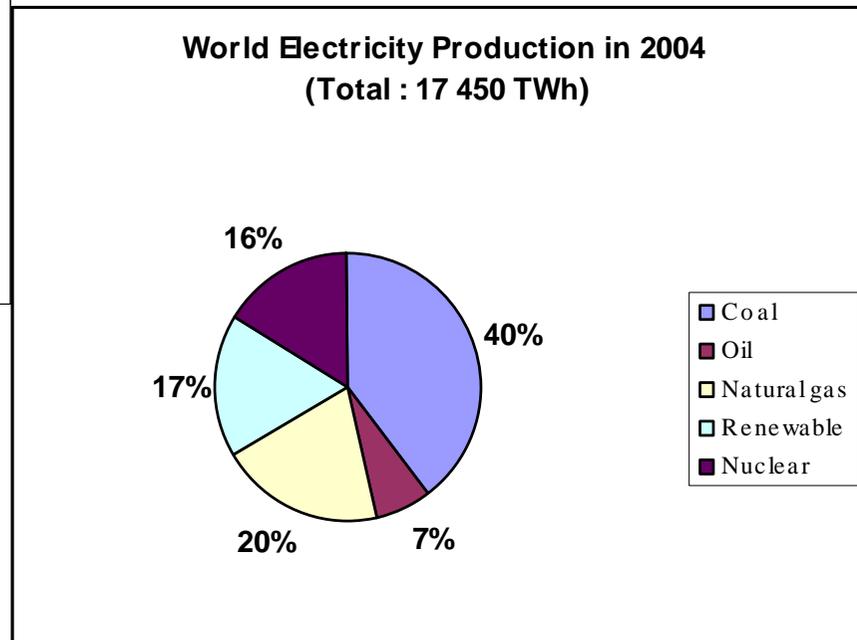
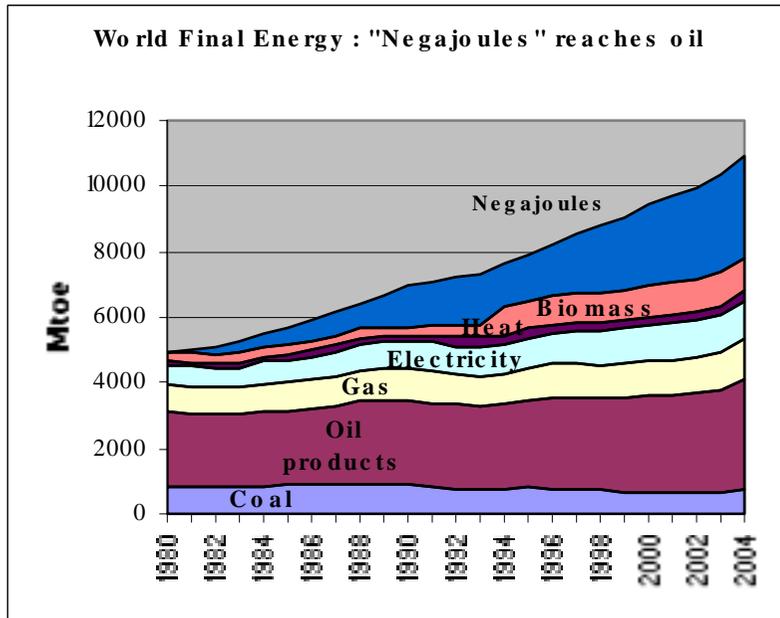


Notes: (a) The 5550Ca, 5450Ca, and 5400Ca mobilization scenarios are based on the EDW multi-gas emission pathway method, which builds on the gas-to-gas correlations within the pool of 54 SRES and Post-SRES scenarios (Meinhausen et al. submitted). (b) Land-use CO₂ emissions are sharply decreasing in the default scenarios. If constant CO₂ emissions from the land-use sector were assumed, the emission reductions of the Kyoto-gases (total CO₂, methane, N₂O, HFCs, PFCs, SF₆) have to be more pronounced. Alternatively, if emission allowances were given to avoided land-use emissions, overall emission allowances for the Kyoto-gases would have to be reduced accordingly (to 46 Gt/yr). (c) Delay profiles were calculated by assuming a 5 or 10 delay in global action. In the illustrative default scenarios, OECD and PEF regions are assumed to enter stringent emission reductions by 2010, and AEA and ALM by 2015.

EU 27 : Share of each source in electricity production (2006)

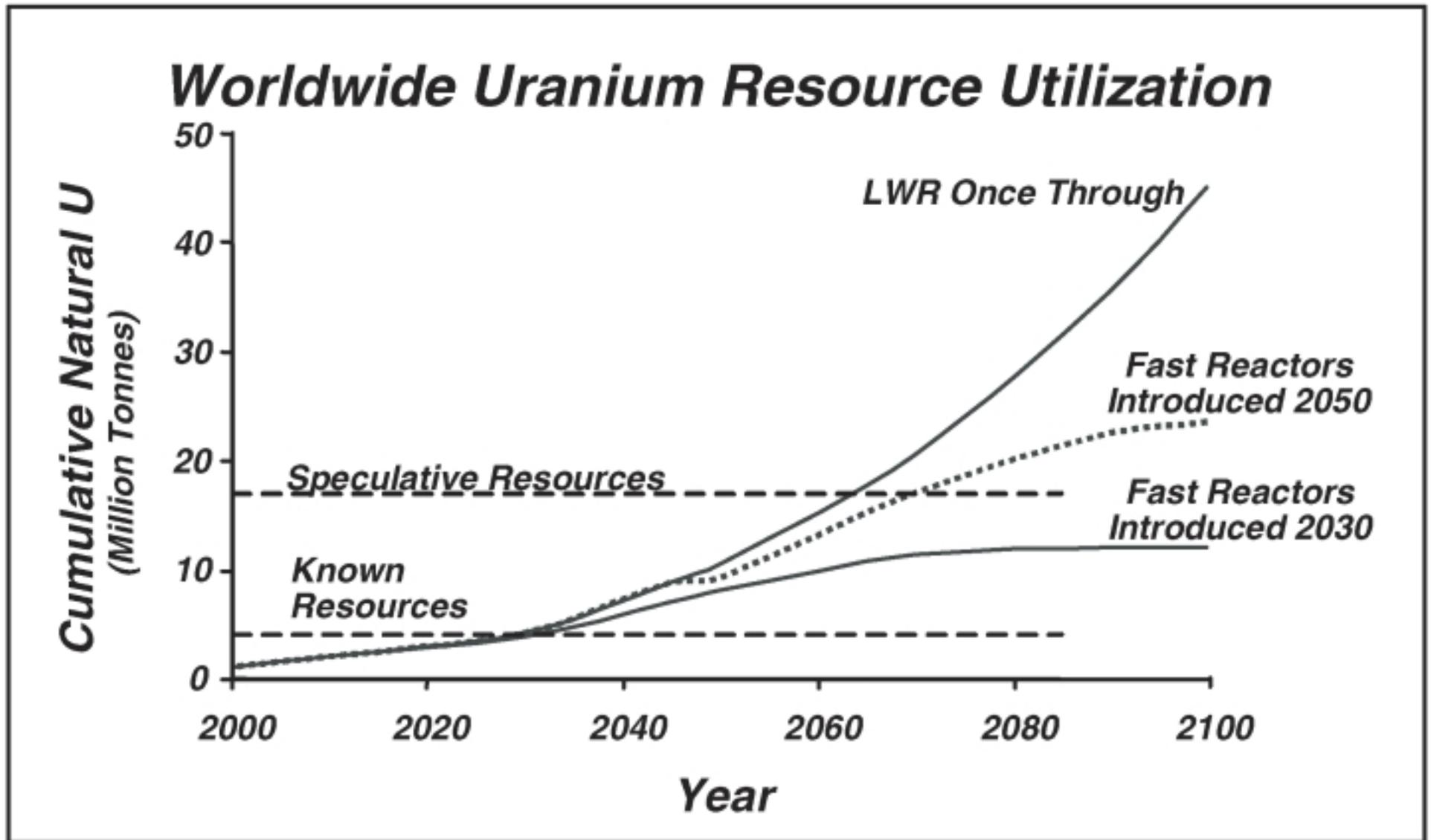


But Global Final Energy Consumption



Depletion of Fossil Fuels

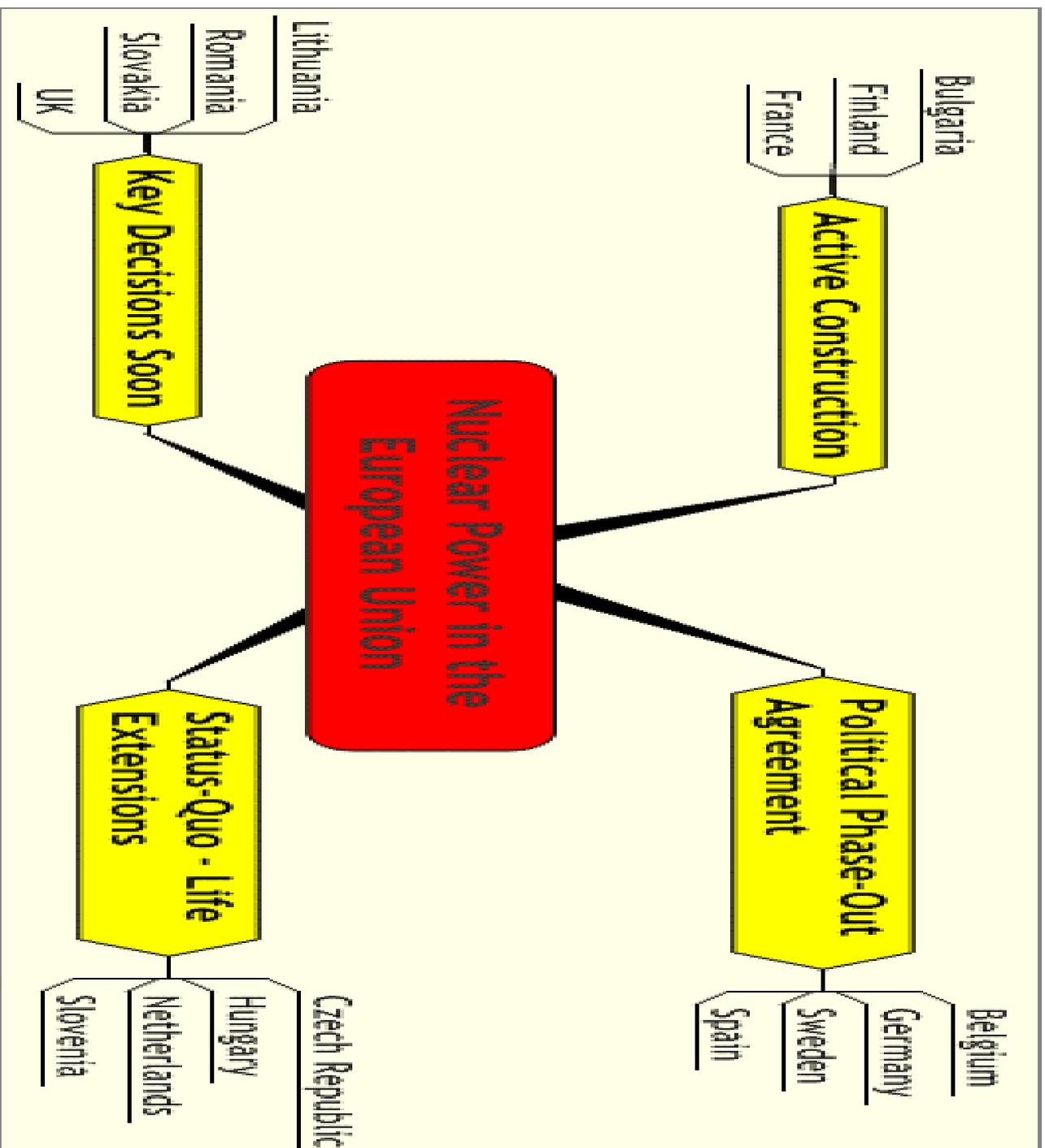
- According to BP current production vs reserves ratios for major fossil fuels are:
 - Oil – 40 years
 - Natural Gas 63 years
 - Coal 147 years

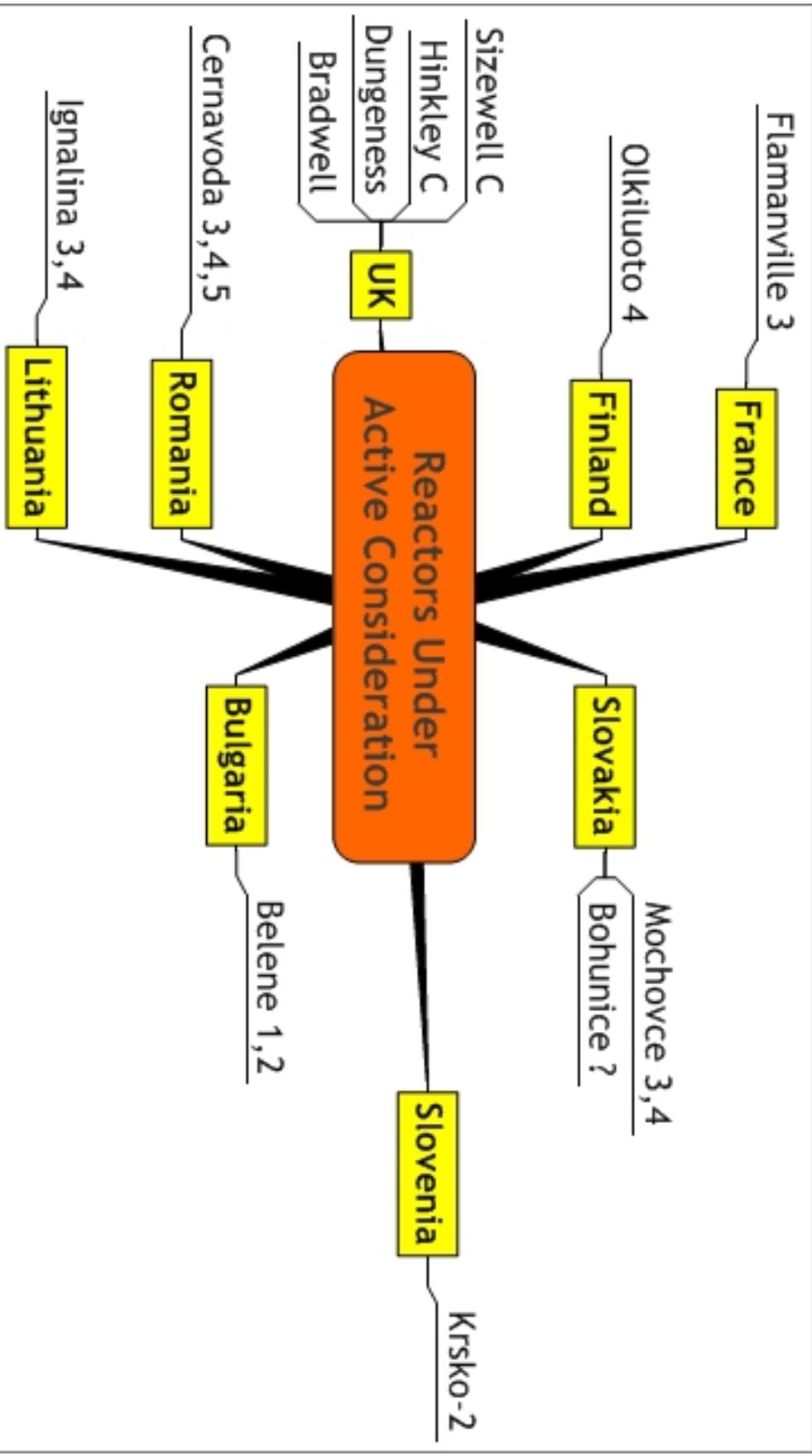


Source: A Technology Roadmap for Generation IV Nuclear Energy Systems (NERAC 2002)

Status of Nuclear Power in Europe

- Difficult balance to judge when new reactor proposals are real
- This may depend on
 - Who says it, nuclear industry, Government, opposition party etc.
 - Are there really details with timelines
 - Who will pay for construction and how?





Cost Escalations

- The most recent UK reactor, a PWR at Sizewell B, experienced increases in capital costs from £1,691m to £3,700m.
- The only reactor ordered in the EU for 10 years is in Finland. In December 2006, Areva announced the reactor was 18 months behind schedule and Le Monde said that the losses had reached €700m
- In early 2007, Finnish State Technical Research Institute suggested project was now 2.5 years behind schedule and would cost electricity consumers €3 billion

Subsidies or Not ?

- **UK Government:** *'There will be no subsidies, direct or indirect. We are not in the business of subsidising nuclear energy. No cheques will be written, there will be no sweetheart deals'*.
- **International Energy Agency:** *'Nuclear power **will only** become more important if the governments of countries where nuclear power is acceptable play a stronger role in **facilitating private investment**, especially in liberalised markets'*

Industry Seeking Guarantees

- Waste
- **Eon:** *Investors would need to be assured that a secure route will exist for the safe disposal of all radioactive waste and in particular that **Government will accept ownership and responsibility for spent fuel and intermediate level waste by the end of a plant's life.***
- Carbon price:
- **Edf:** *'To make a commitment of billions of pounds to a project with a time-scale of half a century, investors above all need predictability about price. They must know the **value society will place on carbon reduction not just tomorrow, but 10, 20, 30, 40 years from now**'.*
- Planning:
- **British Energy:** *If the Government wishes the private sector to finance and construct new nuclear power stations, there will need to be a high level of confidence in the timescale **and outcome** of the consent process.*

Financial Community

- Standard and Poors
 - *'If new construction of nuclear power is to become a reality in the U.K., Standard & Poor's has significant concerns over the future structure of the generating industry. In particular, the potential for increased regulation of the liberalized generating industry, a higher level of political interference in the market structure, and the ongoing prospects for nuclear power in a competitive power market. **Standard & Poor's expects that investment in nuclear power will rely on the long-term sustainability of high electricity prices in the U.K. energy market***
 - *Developing new nuclear generation in the deregulated European market environment is a high-risk venture, given the long construction times and high capital costs. Siting issues are likely to be more sensitive today than in the 1970s and 1980s when most reactors were built. Furthermore, political support will remain fragile to nuclear safety performance worldwide. Another Chernobyl-like accident can rapidly cool the current cordial sentiments. **Fundamental issues, such as the final storage of nuclear waste and far-reaching social consensus, are still likely to be required before a potential large-scale renaissance can happen***

- Moody

- From a credit perspective, business and operating risk profiles will increase for companies that pursue new nuclear generation. This increase in risk is attributable to the size and complexity of the project, the long-term nature of the construction cycle, the uncertainties associated with all-in costs, regulatory oversight and the ultimate rate impact to end-use consumers and the ability for a utility to recover costs and earn an appropriate return.
- While a constructive regulatory relationship will help mitigate near-term credit pressures, Moodys will remain concerned over the prospects of construction delays, cost over-runs, the implications for rate-shock and future disallowances.

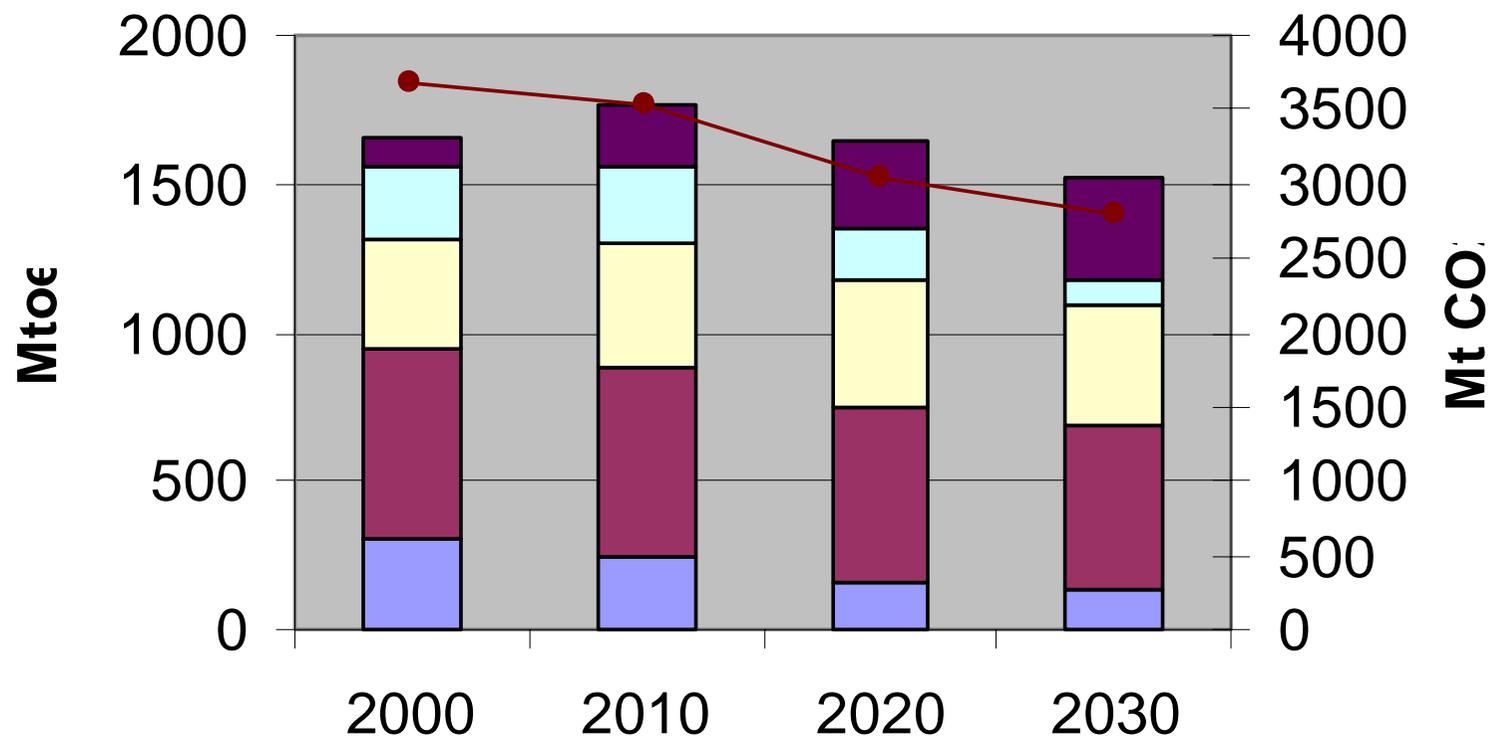
The US Nuclear Support Programme

- In the US the 2005 energy Act allocated around \$12 billion for nuclear new build, through, production tax credits, loan guarantees, research and development, decommissioning support and framework against regulatory delays. – the nuclear industry dream package.
- NRC estimate 31 reactors seeking licenses.
- Mood estimate 1 or 2 will be on line by 2015

Targeting of Public Funds

- Analysis undertaken by Amory Lovins in US suggests:
 - Every \$0.10 spent on a new nuclear kWh could have resulted in:
 - 1.2-1.7kWh of Wind power
 - 0.9-1.7 kWh of gas fired
 - 2.2-6.5 kWh of co-generation
 - Several to 10+kWh of energy efficiency.
- There is an opportunity cost of different support schemes.

EU 20% Renewable: 20% Efficiency Target



In conclusion

- It is important to recognise that the global energy situation has changed and that all energy technologies will be considered again
- In this context nuclear power is being promoted once again
- However, it fails to deliver on key issues, such as cost, availability and security
- Investing in new nuclear is a dangerous and unnecessary diversion away from the real solution to climate change, namely energy efficiency and renewables