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Annex 1 for the Nuclear Illustrative Programme

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Annex 1 for the Nuclear Illustrative Programme

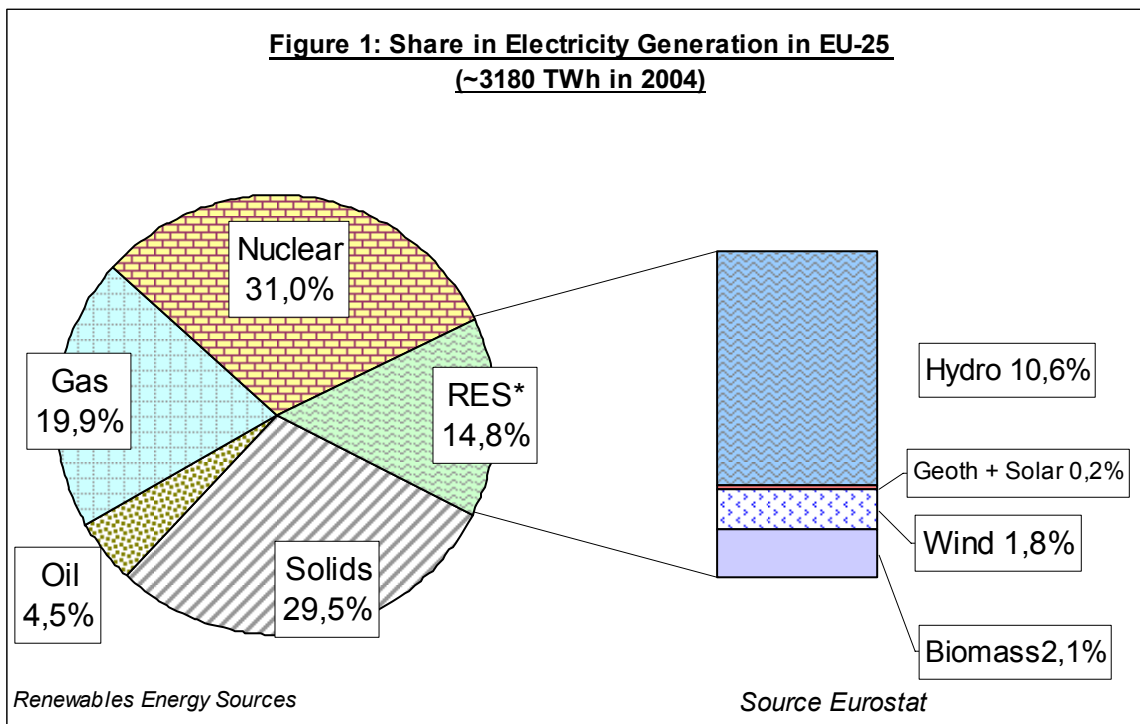


Fig 1: Relative share for generation of electricity by various sources

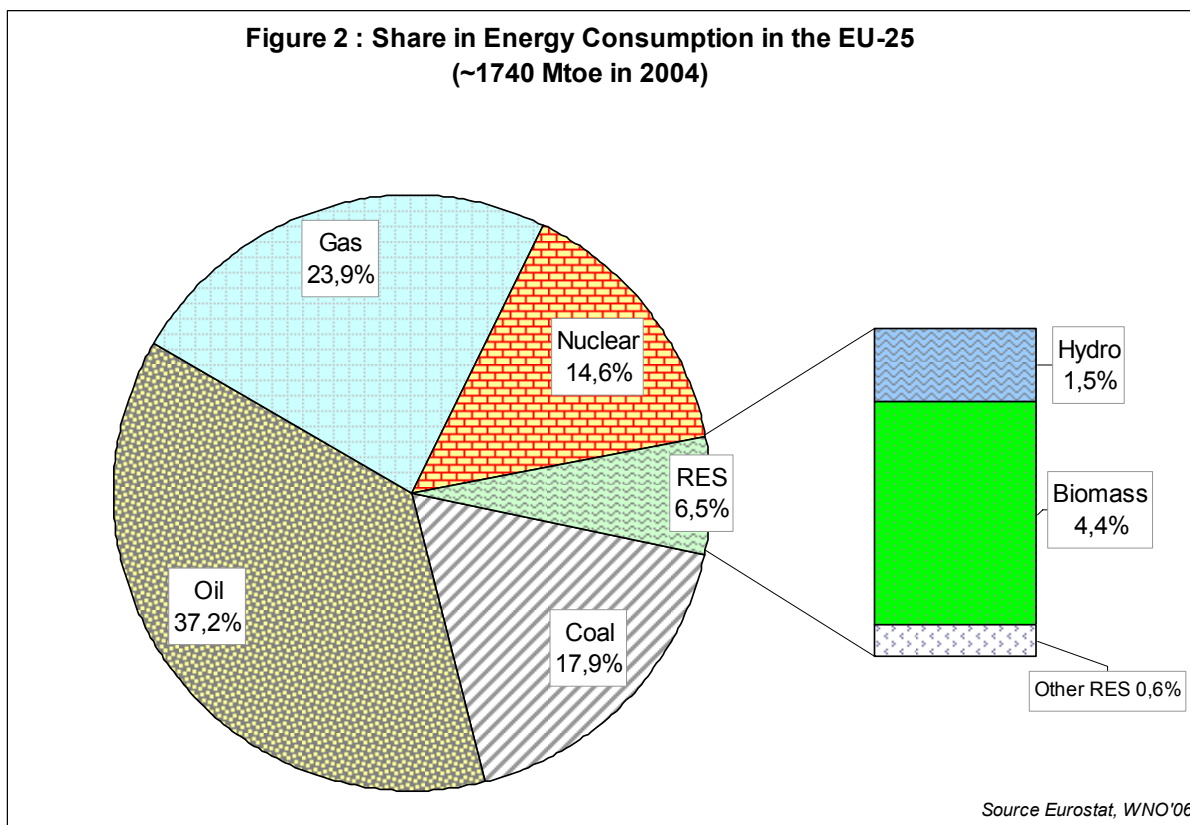


Fig 2: Relative share of sources used to accommodate energy consumption.

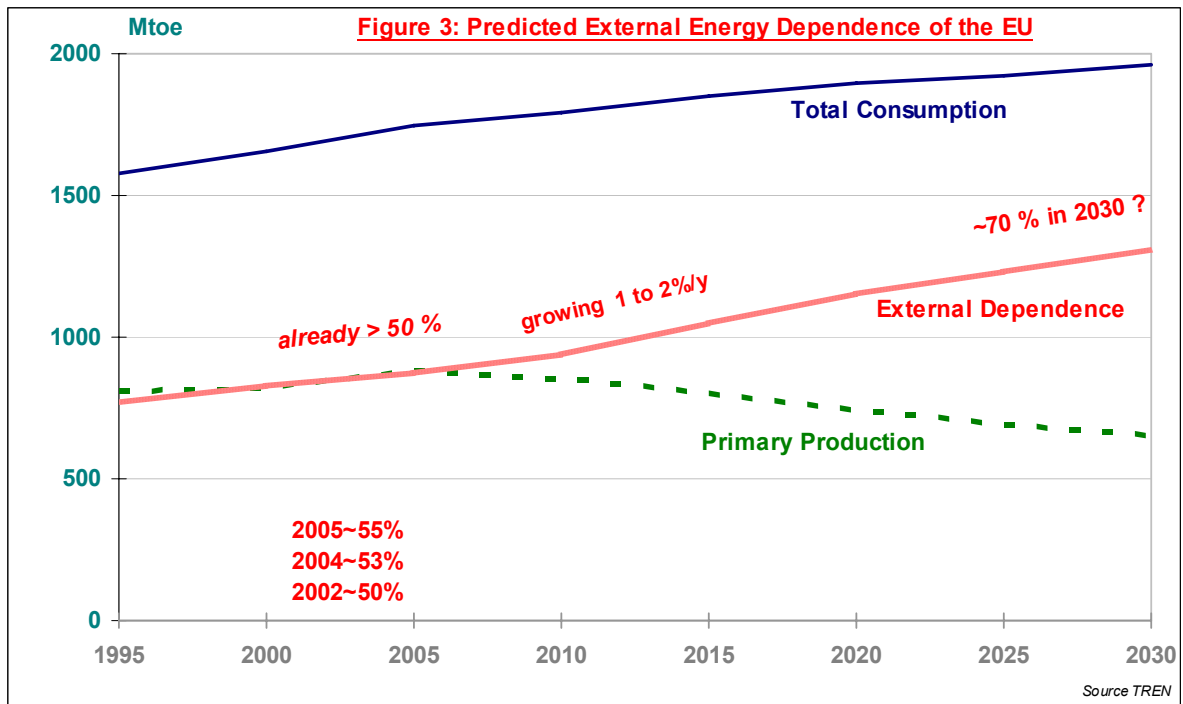


Fig 3: Comparison of forecast for energy consumption and production (EU-25).

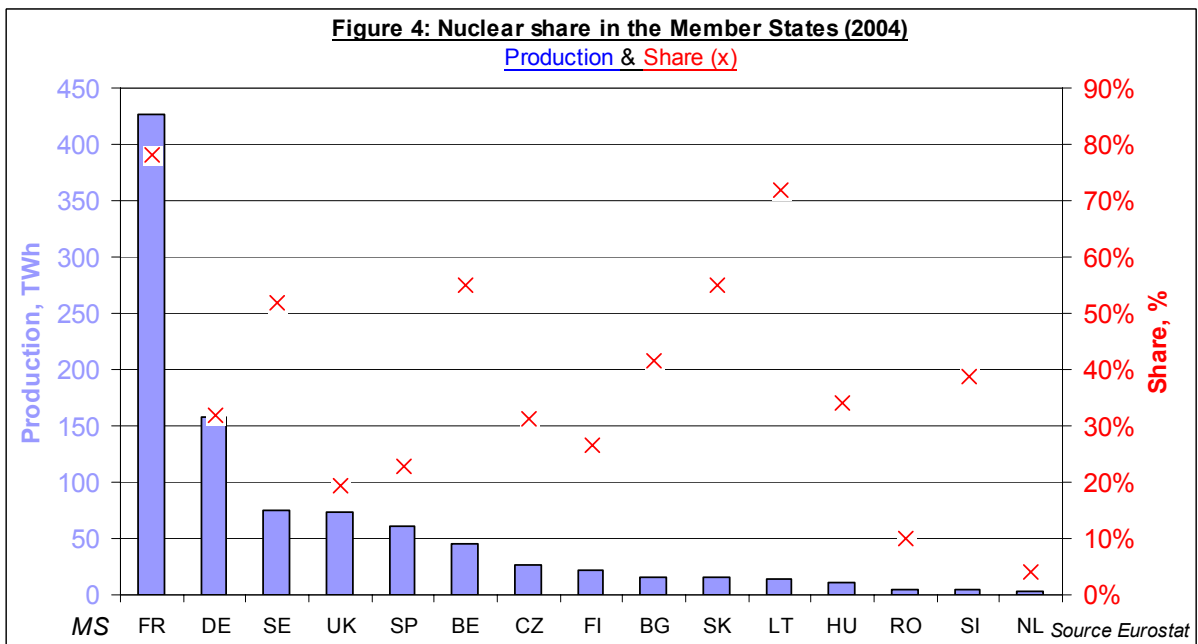


Fig 4: Number of NPP units in the EU nuclear Member States along with their contribution to the nuclear share for electricity generation and production figures.

Table 1: List of Reactors, Electricity Generation and U Requirements in the EU-27 (15 August 2006)

| Sources WNA-PRIS | Power Reactors | | | | | Electricity Produced in 2005 | | 2006 Uranium Requirement Tonnes U |
|---------------------------------|----------------------------------|------------------------------|--------------------|--------------------------------|-----------------------------------|---------------------------------|----------------------------------|--|
| Country | Operational in Aug 2006 Nr | Installed Capacity MWe | Shut Down Nr | Under Const. Nr / MWe | Planned + Proposed Nr / MWe | Total, TWh | Nuclear, TWh (<i>share</i>) | |
| BE | 7 | 5728 | 1 | - | 0 | 81.5 | 45.3 (56%) | 1075 |
| CZ | 6 | 3472 | - | - | 2 / 1900 | 76.2 | 23.3 (31%) | 540 |
| FI | 4 | 2676 | - | 1 / 1600 | 0 | 67.9 | 22.3 (26%) | 473 |
| FR | 59 | 63473 | 11 | - | 2* / 3230 | 549.2 | 426.8 (78%) | 10146 |
| DE | 17 | 20303 | 19 | - | 0 | 499.0 | 154.6 (32%) | 3458 |
| HU | 4 | 1755 | - | - | 0 | 35.1 | 11.2 (34%) | 251 |
| LT | 1 | 1185 | 1 | - | 1 / 1000 | 14.8 | 9.5 (70%) | 134 |
| IT | 0 | - | 4 | - | - | - | - | - |
| NL | 1 | 452 | 1 | - | 0 | 96.4 | 3.6 (3.8%) | 112 |
| SK | 6 | 2472 | 1 | - | 2 / 840 | 29.1 | 16.3 (56%) | 356 |
| SI | 1 | 676 | - | - | 0 | 13.2 | 5.6 (42%) | 144 |
| SP | 8* | 7442 | 2* | - | 0 | 279.6 | 54.7 (20%) | 1505 |
| SE | 10 | 8975 | 3 | - | 0 | 154.7 | 69.5 (45%) | 1435 |
| UK | 23 | 11852 | 22 | - | 0 | 378.4 | 75.2 (20%) | 2158 |
| | | | | | | | | |
| BG | 4 | 2722 | 2 | - | 2 / 1900 | 39.3 | 17.3 (44%) | 253 |
| RO | 1 | 700 | - | 1 / 700 | 2 / 2800 | 59.4 | 5.5 (9.3%) | 100 |
| EU-27 | 152 | 133883 | 67 | 2 / 2300 | 11 / 11670 | 2373.8 | 940.7 | 22140 |
| <i>Changes* since 04/06</i> | <i>-1</i> | <i>=</i> | <i>+1</i> | <i>=</i> | <i>+1 / +1600</i> | <i>-</i> | <i>-</i> | <i>=</i> |
| USA | 103 | 98054 | 24 | 1 / 1065 | 23* / 26716 | 4037.4 | 780.4 (19%) | 19715 |
| Japan | 55 | 47700 | 4 | 1 / 899 | 12 / 14782 | 957.0 | 280.7 (29%) | 8169 |
| Russia | 31 | 21743 | 5 | 5* / 4550 | 10* / 11225 | 869.8 | 137.3 (16%) | 3439 |
| Canada | 18 | 12595 | 7 | 2* / 1540 | 2* / 2000 | 593.6 | 86.8 (15%) | 1635 |
| Ukraine | 15 | 13168 | 4 | | 2 / 1900 | 171.8 | 83.3 (49%) | 1988 |
| China | 10* | 7587 | - | 5 / 4170 | 63* / 48800 | 2475 | 50.3 (2%) | 1294 |
| India | 16* | 3577 | - | 7 / 3088 | 24 / 13160 | 555 | 15.7 (2.8%) | 1334 |
| South Korea | 20 | 16840 | - | - | 8 | 311.8 | 139.3 (45%) | 3037 |
| Switzerland | 5 | 3220 | - | - | 0 | 68.9 | 22.1 (32%) | 575 |
| World | 442 | 368496 | 107 | 28 | 204 | 16400 | 2626 (16%) | 65478 |
| <i>Changes* since 04/06</i> | <i>+1</i> | <i>-</i> | <i>n/a</i> | <i>+1</i> | <i>+53 / +45000</i> | <i>-</i> | <i>-</i> | <i>-</i> |

Data sources: WNA, PRIS. **Remark:** These values may slightly differ from equivalent data presented in annex 2, which have been validated the individual Member States concerned.

* Note changes between March 2006 and 1st of January 20076:

- EU: 1 shutdown in Spain; including possible second EPR proposed in FR; as of 31.12.2006, 4 old closed in UK, 2 closed in BG.
- USA: 10 new proposed/planned
- Russia : 1 newly operational; 1 started construction
- Canada: 2 started constructions; 2 additional proposed/planned
- China: 1 newly operational; 1 started construction; 38 additional proposed/planned
- India: 1 newly operational;

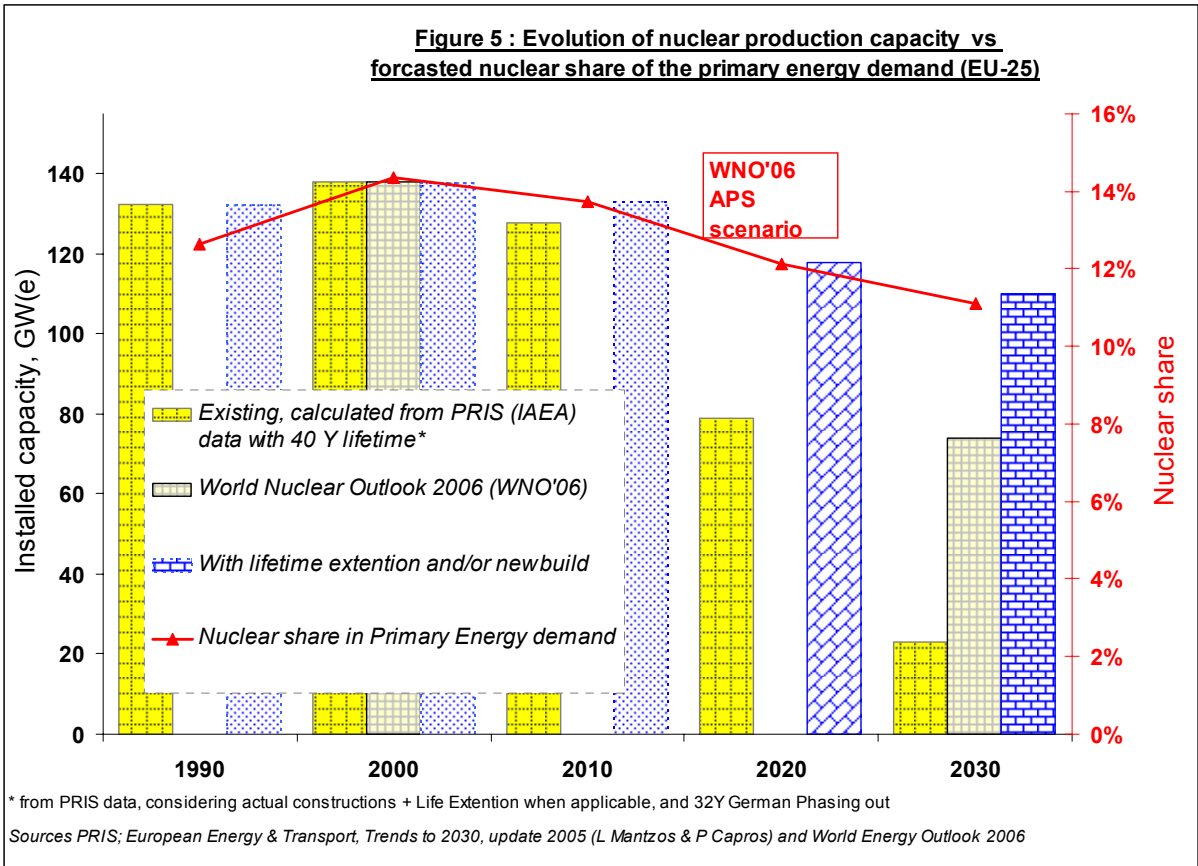


Fig. 5: Projection of the expected nuclear capacity to provide the nuclear share of electricity generation in the EU assuming planned closedown of reactors and potential lifetime extension or/and new build.

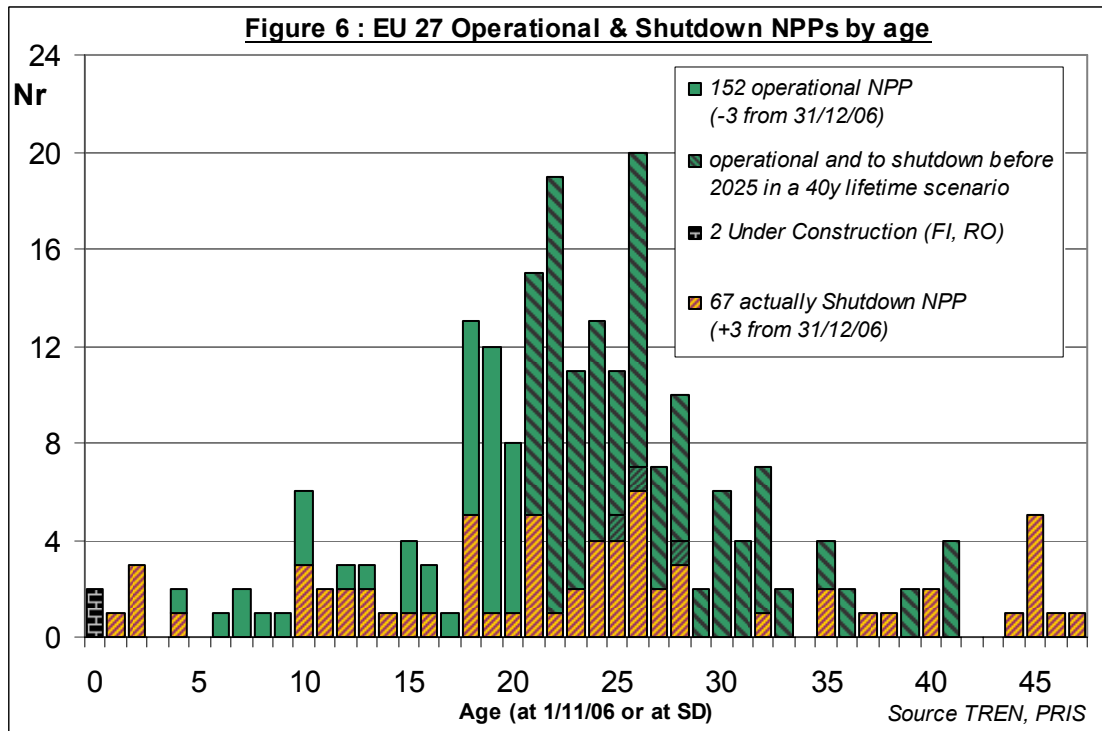


Fig 6: Distribution of operational and planned shutdown for NPPs in the enlarged EU as well as potential new build.

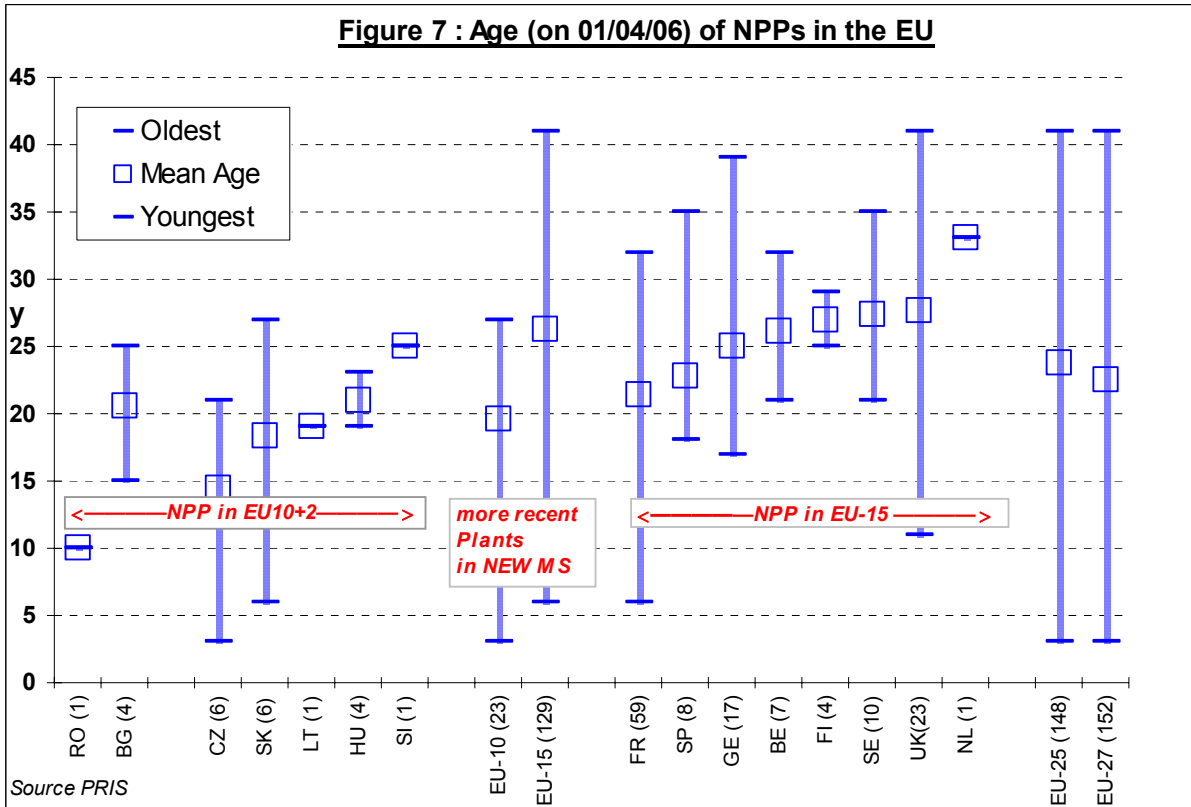


Fig 7: Distribution of age of NPPs in the EU

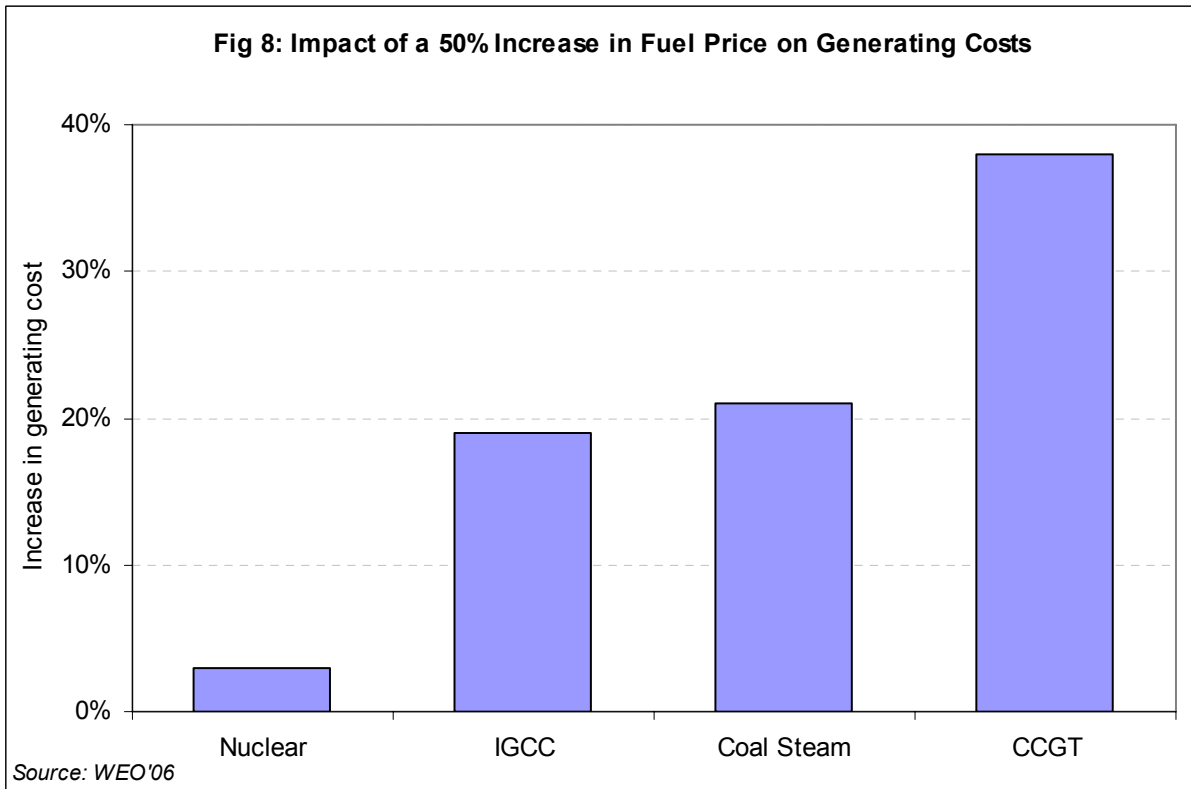


Figure 8: A 50% increase in uranium, coal and gas prices compared (with the base assumption) would increase generating costs by 3% for nuclear, 20% with coal and about 38% with gas (CCGT)

Figure 9 : Geopolitical distribution of imported resources in the EU

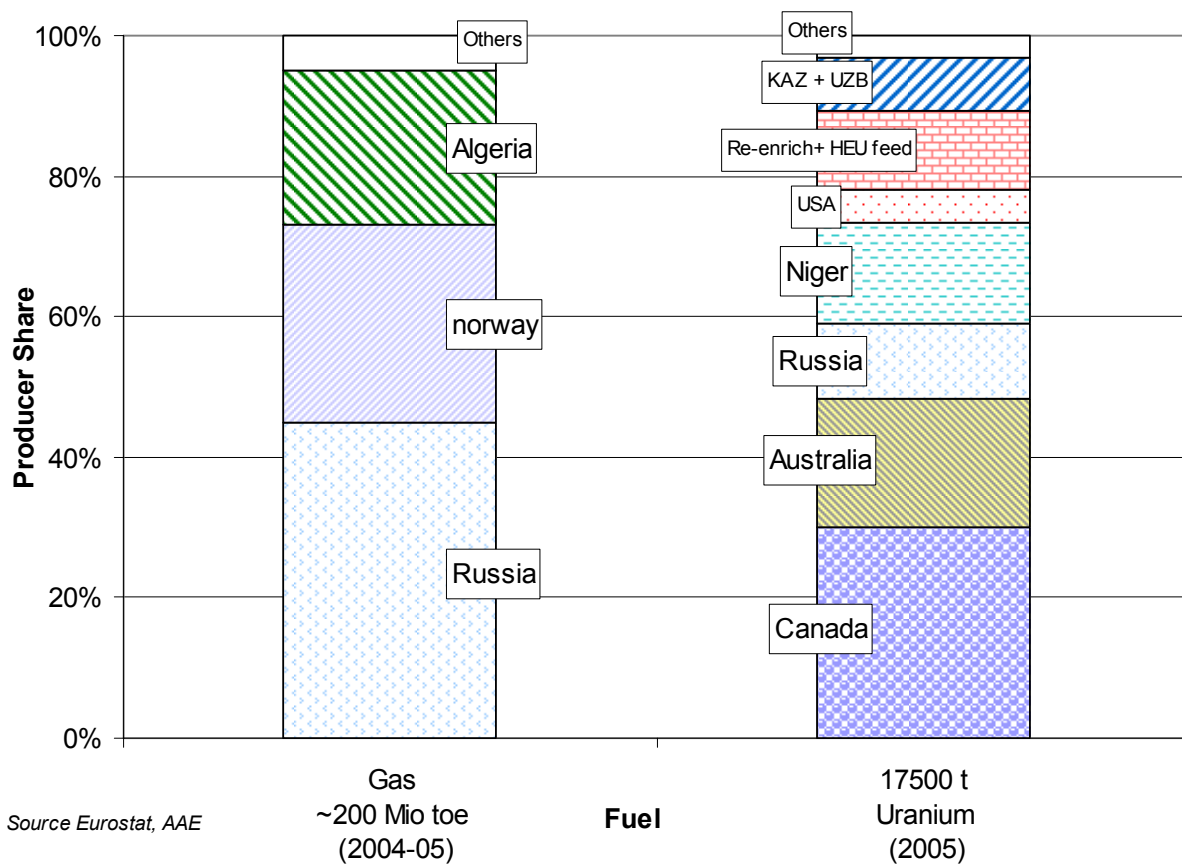


Fig. 9: Comparison of the Geopolitical distribution of imports of uranium and gas into the EU.

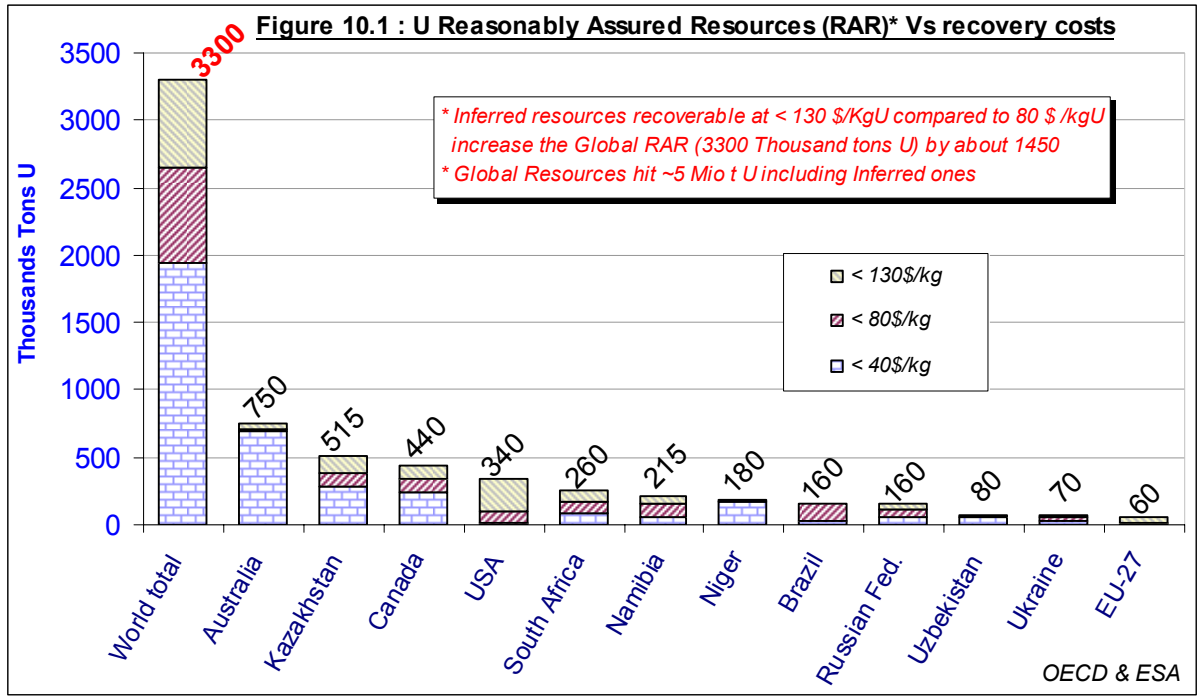


Fig. 10.1: Geopolitical distribution of uranium sources.

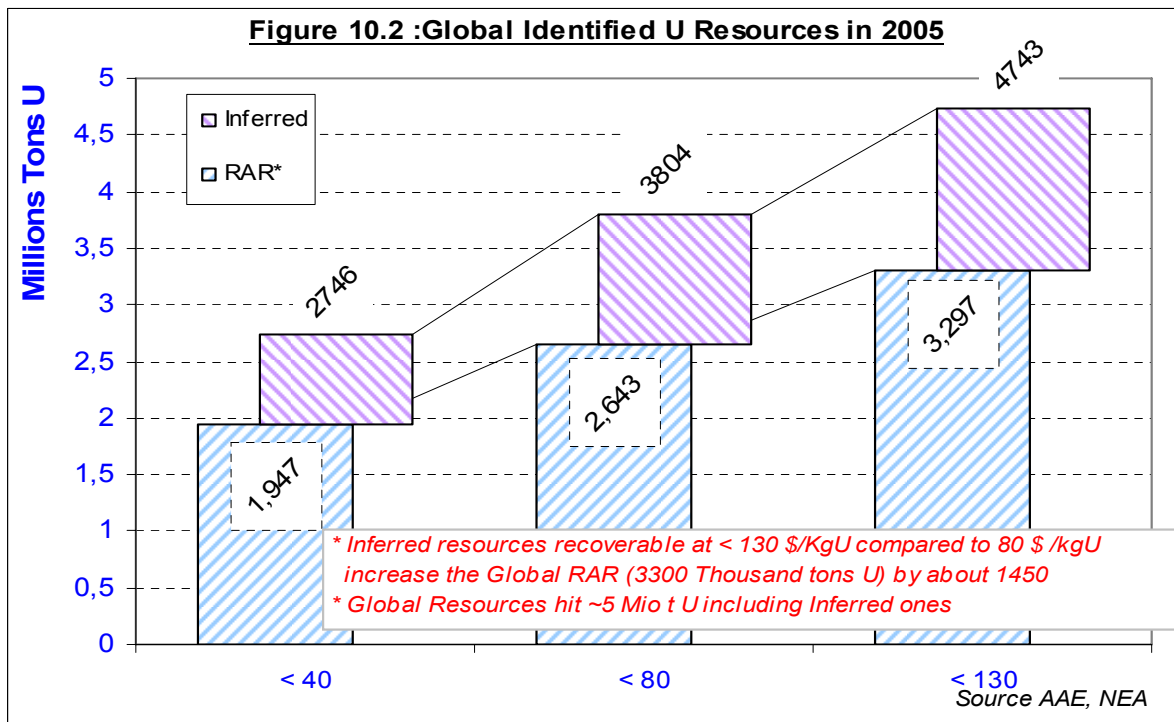


Fig. 10.2: Uranium sources available by price range.

Figure 11a: Electricity Generation Costs in Low Discount rate Case

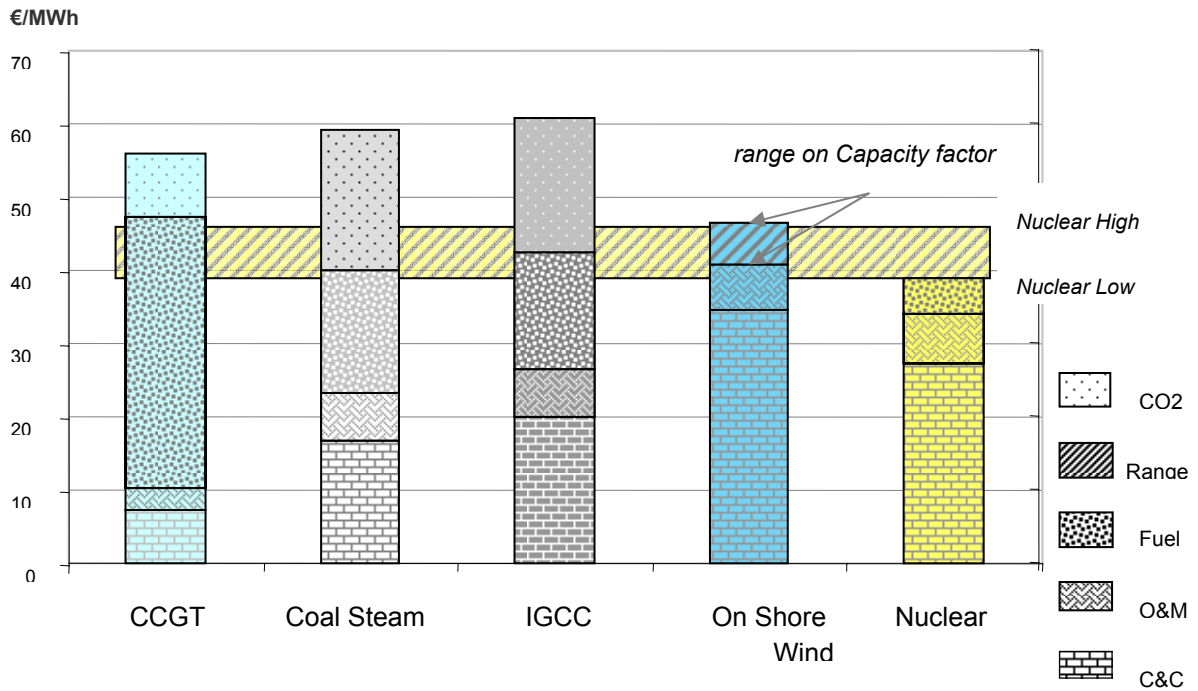


Figure 11b: Electricity Generation Costs in High Discount rate Case

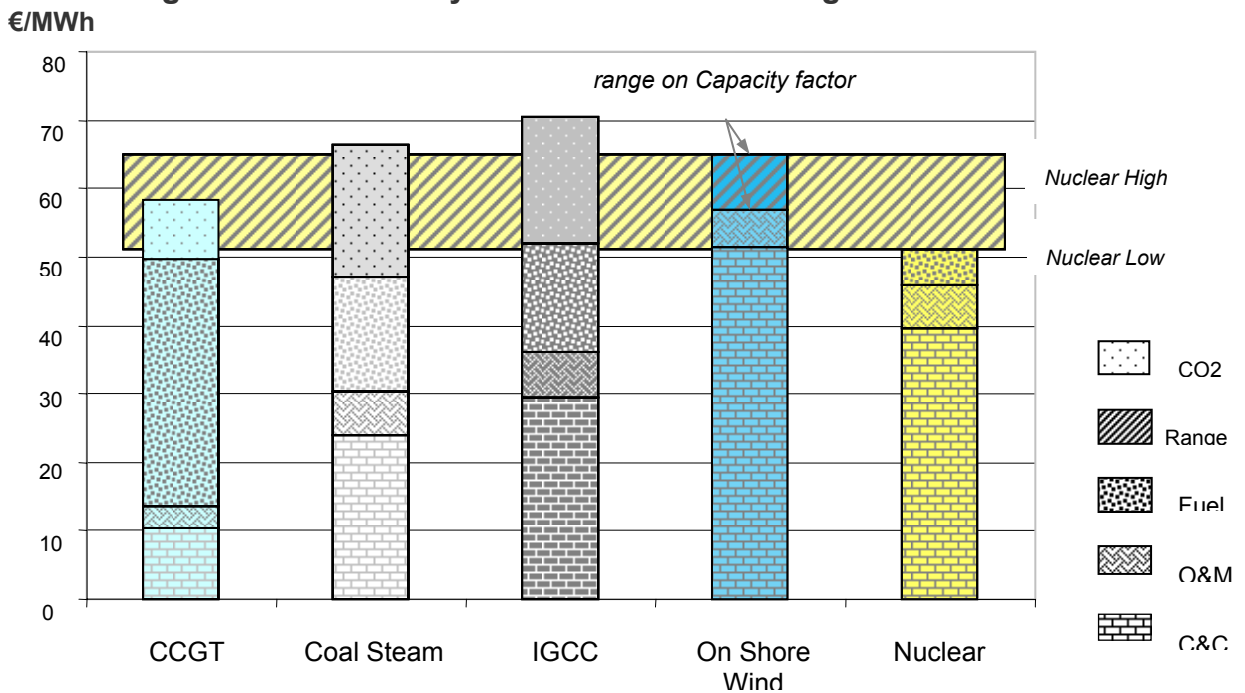


Figure 11 : range of levelised costs of generating electricity, with 5% and 10% discount rates and C costs at 30\$/tCO2 (1€ = 1.25 \$)

Source World Energy Outlook 2006

CCGT: Gas Fired Combined Cycle Turbine; IGCC: Integrated Gasification Combined Cycle Plant

List of Abbreviations

| | |
|-----------------|--|
| AGR | Advanced Gas Cooled Reactor |
| ALARA | As Low As Reasonably Achievable |
| BSS | Basic Safety Standards |
| BWR | Boiling Water Reactor |
| CANDU | CANada Deuterium Uranium |
| CEA | Commissariat a l'Energie Atomique |
| CIS | Community of Independent States |
| CO ₂ | Carbon Dioxide |
| CCGT | Combined Cycle Gas Turbines |
| FP | Framework Programme |
| GCR | Gas Cooled Reactor |
| GEN IV | Generation IV Reactors are a set of theoretical nuclear reactor designs currently being researched. |
| GFR | Gas Fast Reactor |
| GHG | Green House Gases |
| EPR | European Pressurised Reactors |
| ERA | European research Area |
| HEU | Highly Enriched Uranium |
| HLW | High Level Waste |
| IEA | International Energy Agency |
| IAEA | International Atomic Energy Agency |
| ITER | International Thermonuclear Experimental reactor |
| LEU | Low Enriched Uranium |
| LILW | Low Intermediate Level Waste |
| Magnox | Type of British designed nuclear reactor |
| MOX | Mixed Oxide Fuel |
| NEA | Nuclear Energy Agency |
| NPP | Nuclear Power Plant |
| OECD | Organisation for Economic Cooperation and Development |
| P&T | Partitioning and Transmutation |
| PWR | Pressurised Water Reactors |
| TACIS | Technical Aid to the Commonwealth of Independent States |
| VVER or WWER | The Russian abbreviation VVER stands for water-cooled, water-moderated energy reactor. Russian version of PWR reactor. |
| VHTR | Very High Temperature Reactor |
| VLLW | Very Low Level Waste |
| WEO | World Energy Outlook |
| WNA | World Nuclear Association |

Index of Figures

Fig 1: Relative share for generation of electricity by various sources.

Fig 2: Relative share of sources used to accommodate energy consumption.

Fig 3: Comparison of trend for the energy consumption and production.

Fig 4: Number of NPPs in the EU nuclear Member States.

Fig. 5: Projection of the expected nuclear capacity in the EU

Fig 6: Distribution of operational and planned shutdown for NPPs in the enlarged EU.

Fig 7: Distribution of age of NPPs in the EU.

Fig. 8: Impact of 50% increase in costs of fuels

Fig. 9: Comparison of the Geopolitical distribution of imports of uranium and gas into the EU.

Fig. 10.1: Geopolitical distribution of uranium sources.

Fig. 10.2: Uranium sources available by price range.

Figure 11: Range of levelised costs of electricity generation.