Nuclear Energy Risks and Benefits in Perspective

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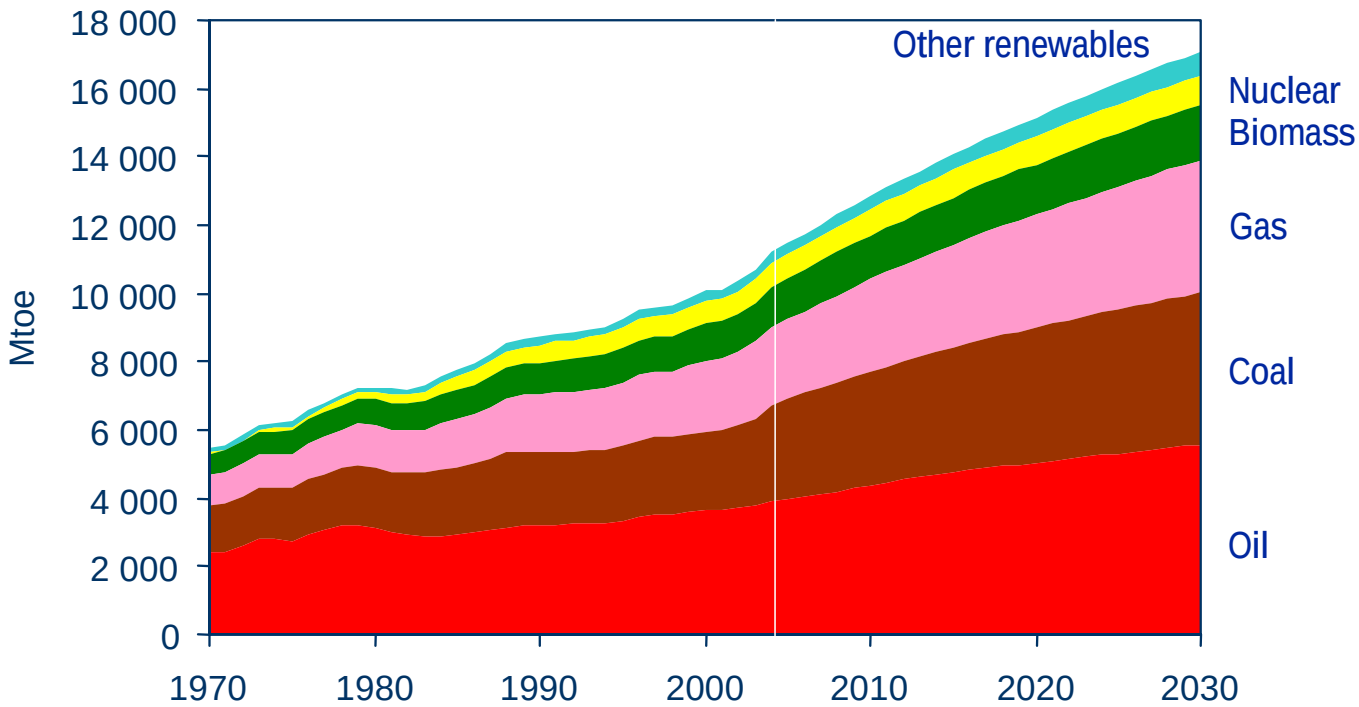
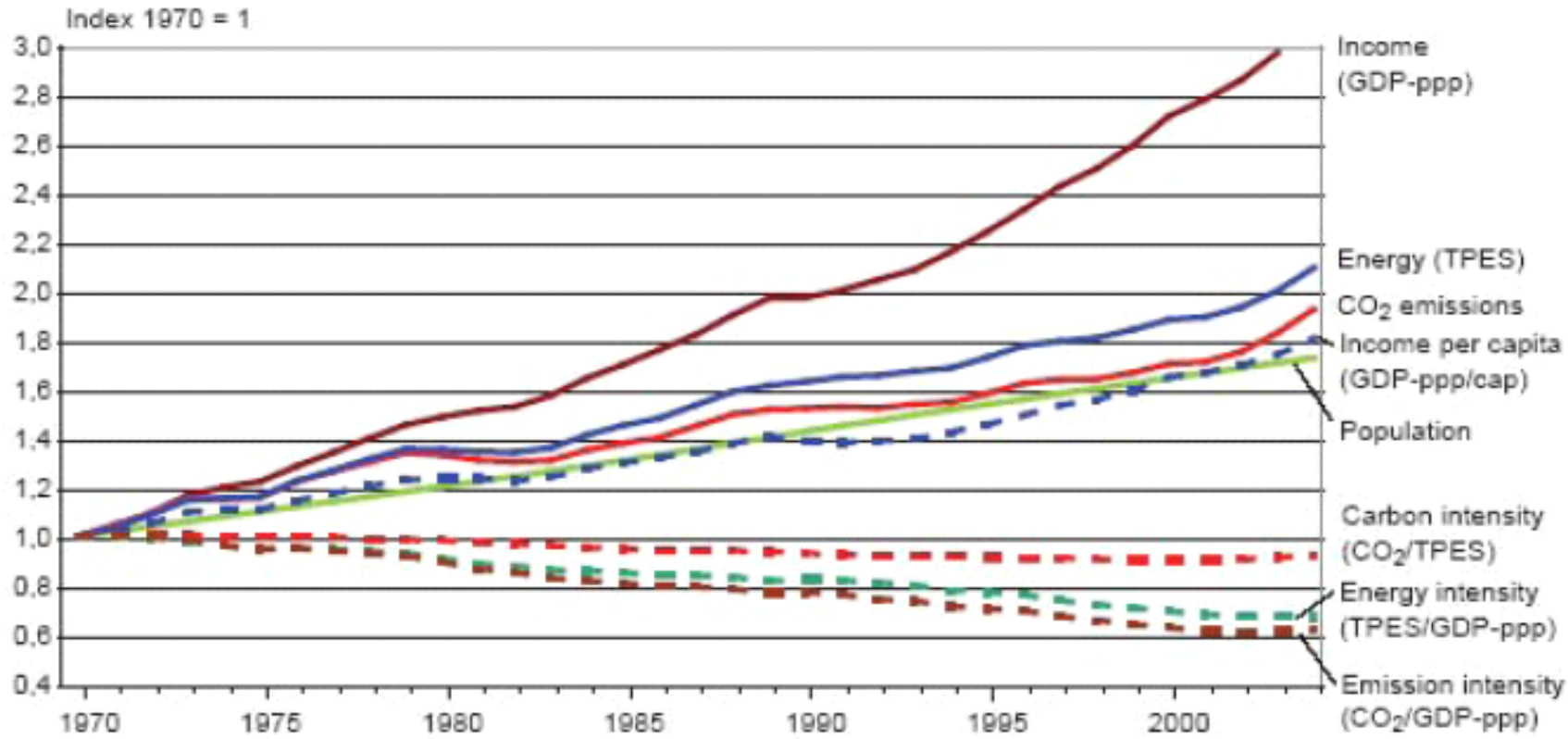
Figure 1.1 - Reference Scenario: World Primary Energy Demand



Source: IEA (2006), *World Energy Outlook*, OECD/IEA, Paris.

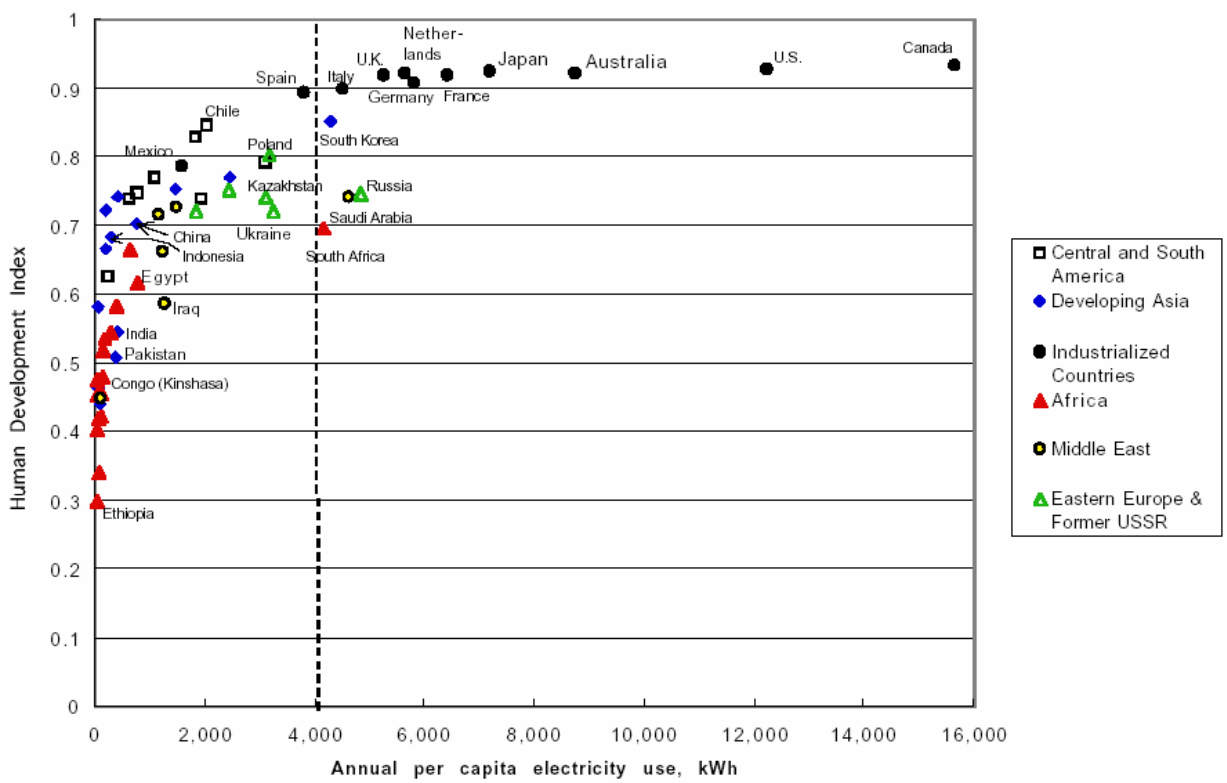
Global demand grows by more than half over the next quarter of a century, with coal use rising most in absolute terms

Figure 1.2 - Intensities of energy use and CO_2 emissions (1970-2004)



Source: *IPCC Working Group III Fourth Assessment Report*, Chapter 1 – taken from IEA data

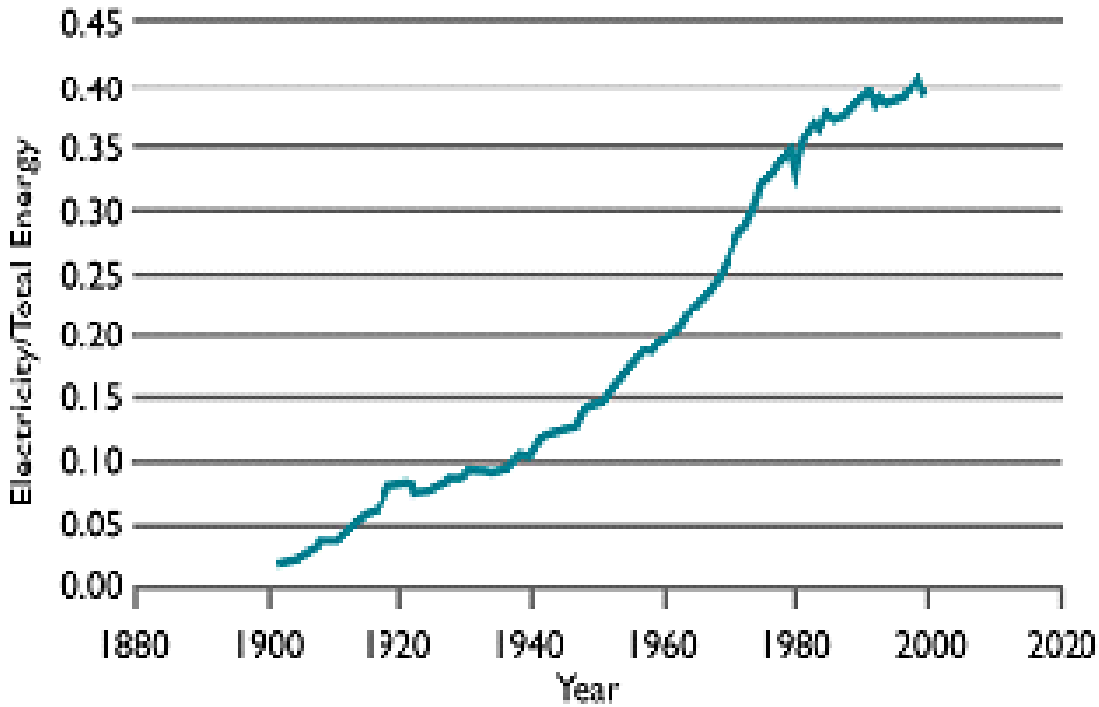
Figure 1.3 - Correlation between electricity use and HDI*



Source: In [3] taken from Pasternak, A. D. (2000), *Global Energy Futures and Human Development: A Framework for Analysis*, Lawrence Livermore National Laboratory Report UCRL-ID-140773, Los Alamos, United States.

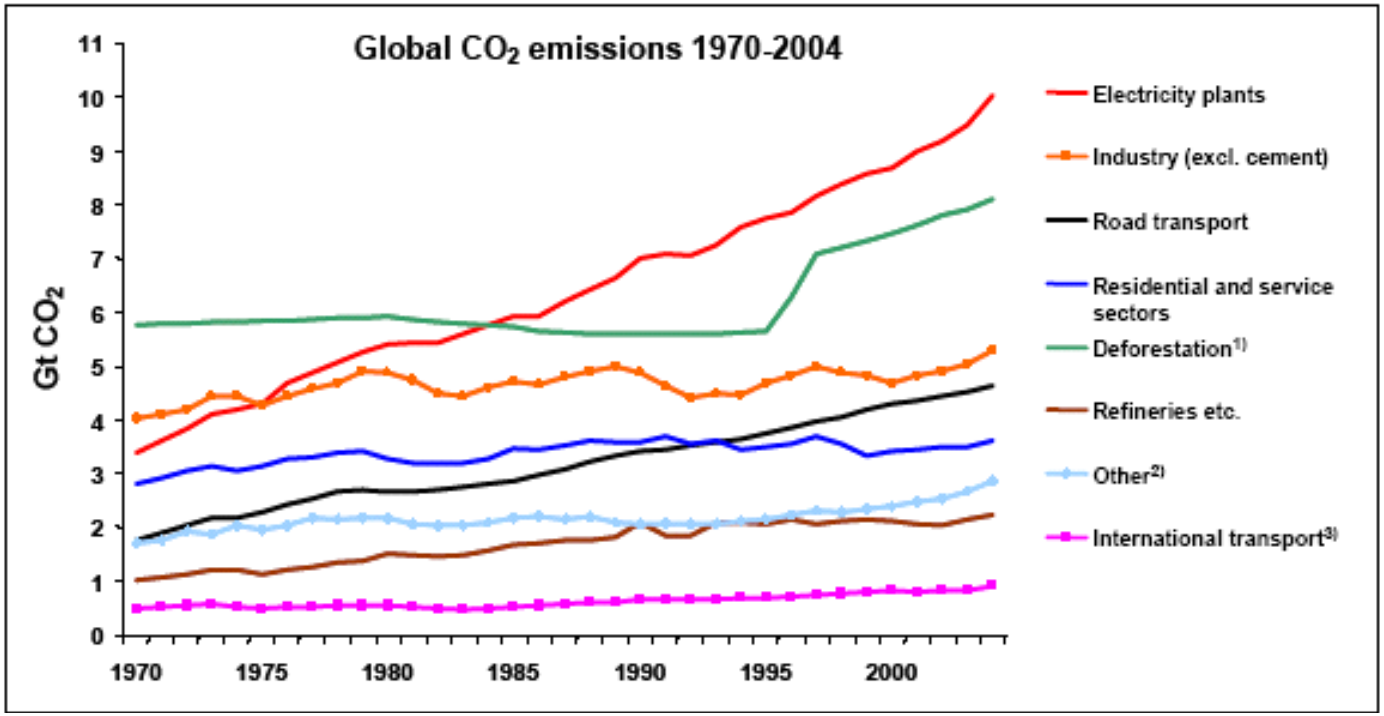
***The UN Development Index (UNDP, 2000) combines measures of infant mortality, life expectancy, food supply, literacy rate, educational opportunities and political freedom.**

Figure 1.4 - Ratio of electricity to total primary energy in the US since 1900



Source: IPCC Working Group III Fourth Assessment Report, Chapter 4
[taken from EPRI 2003]

Figure 1.5 – Sources of global CO_2 emissions (1974-2004 / only direct emissions by sector)



Source: IPCC Working Group III Fourth Assessment Report, Chapter 1.

1. Including fuelwood at 10% net contribution.
2. Other domestic surface transport, non-energetic use of fuels, cement production, and venting/flaring of gas from oil production.
3. Including aviation and marine transport.

Figure 3.1 – Greenhouse gas emissions of selected energy chains

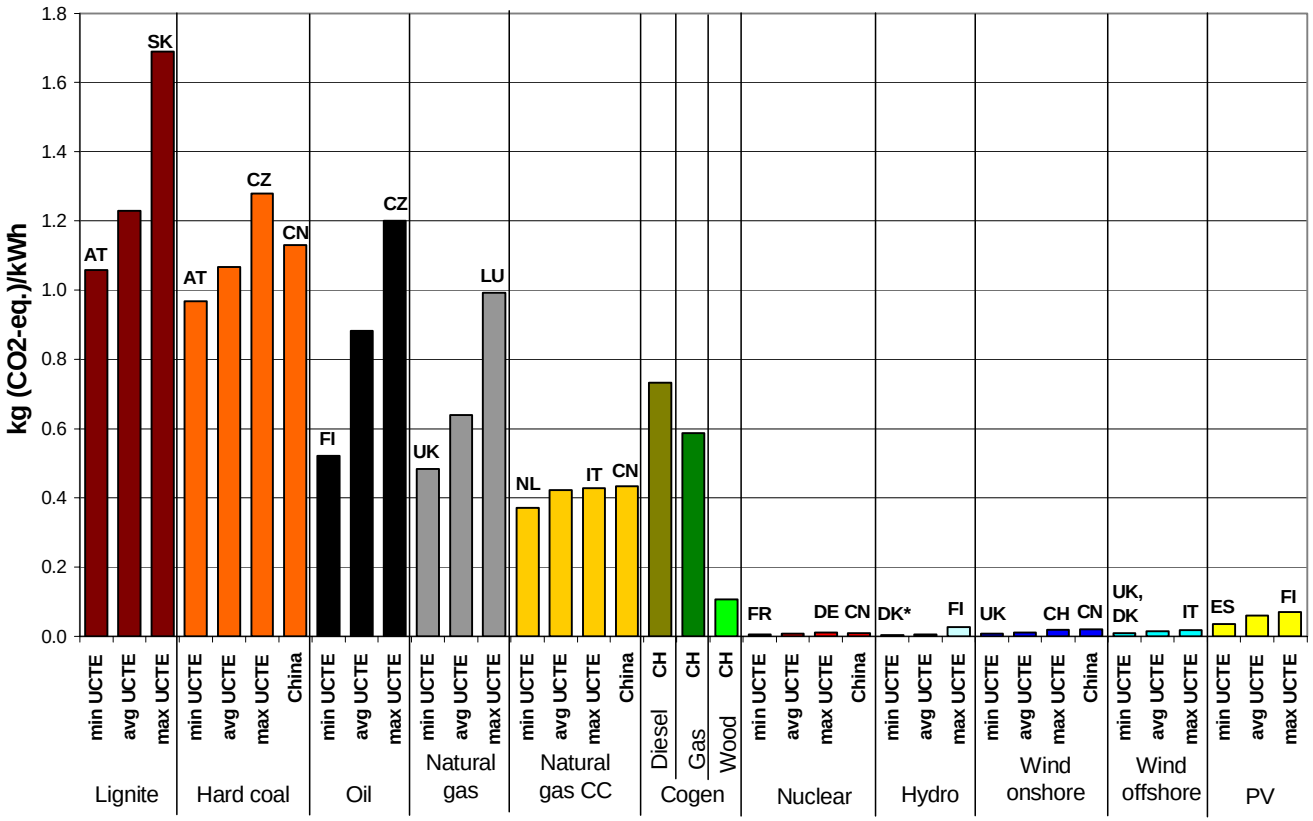
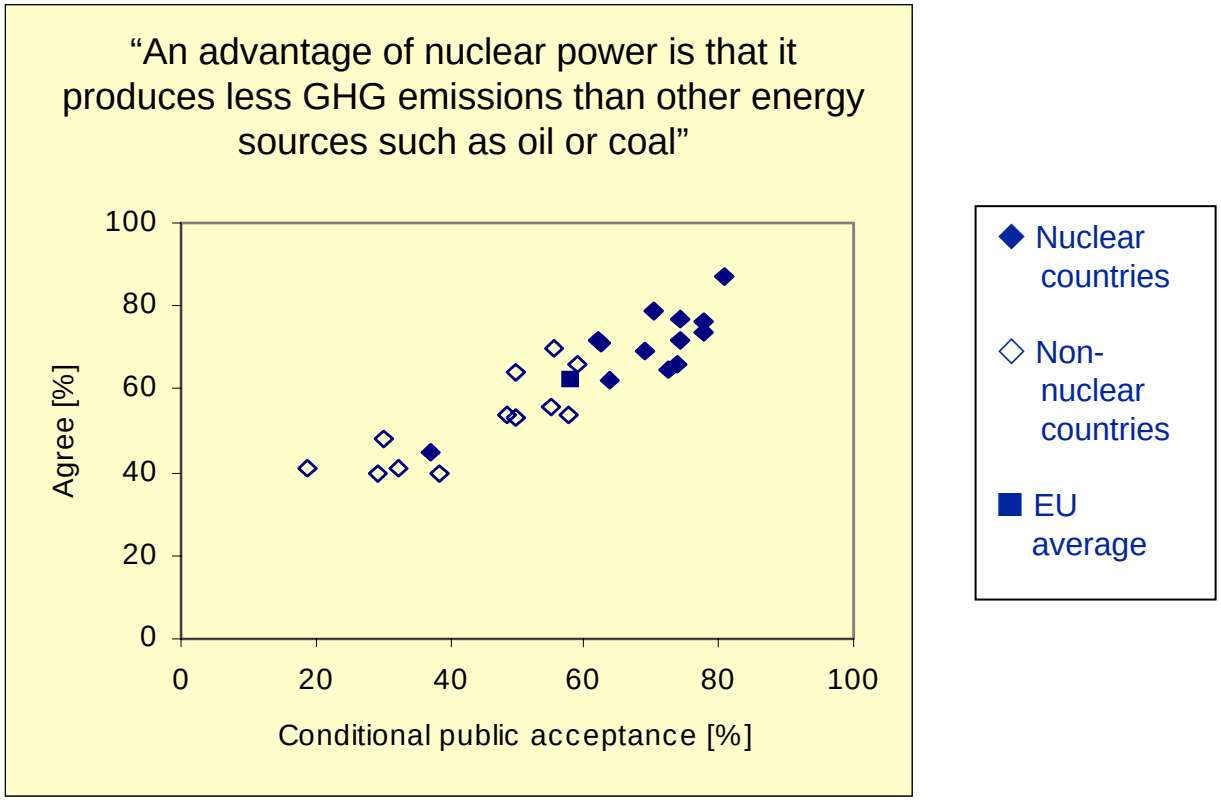
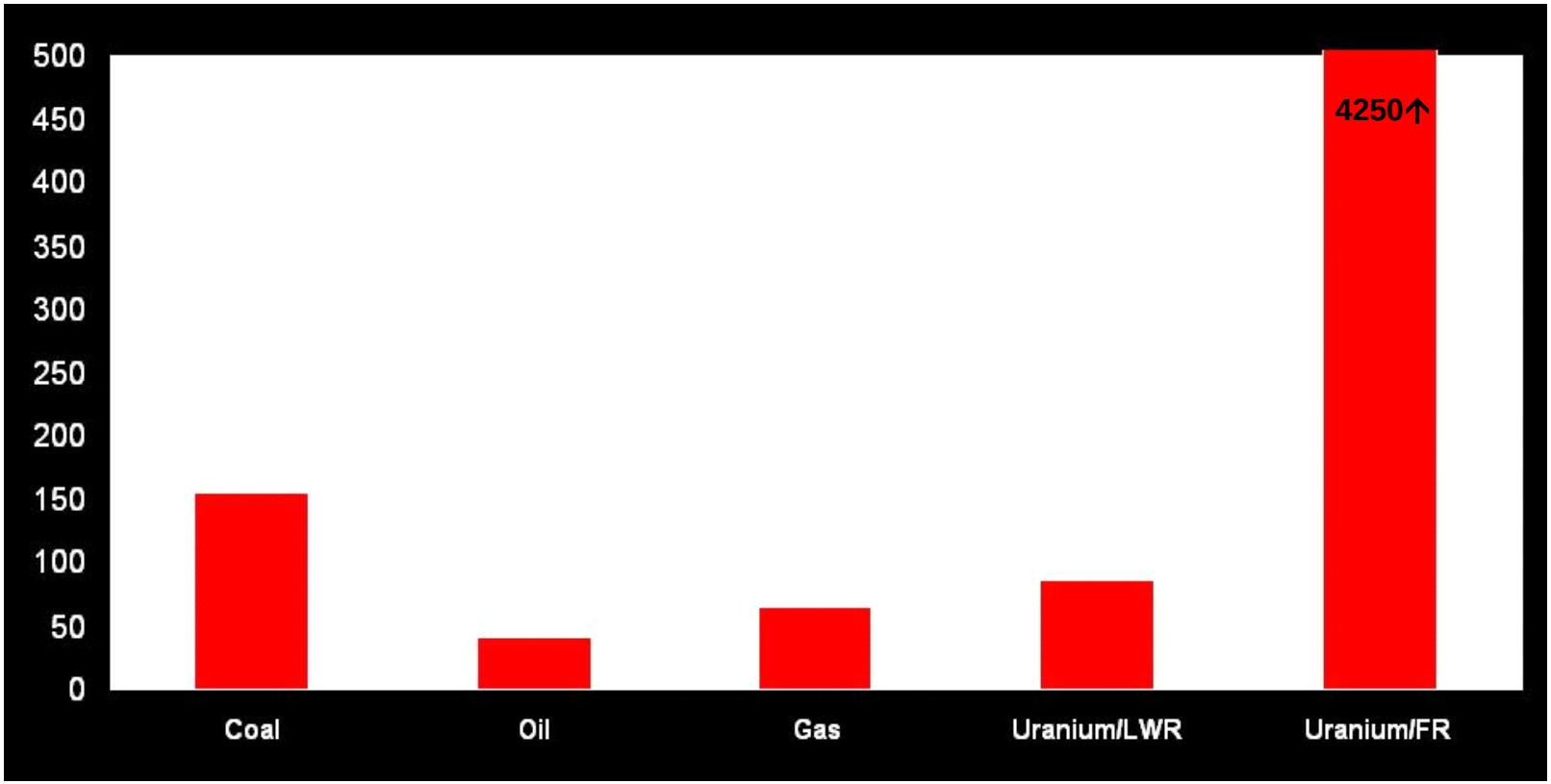


Figure 3.2 – Public Knowledge on the CO_2 free nature of nuclear energy



Note: Conditional Public Acceptance is the percentage of the population which would support nuclear power if they considered the waste disposal issue resolved.

Figure 3.3 – Lifetime of fuel resources* (years)



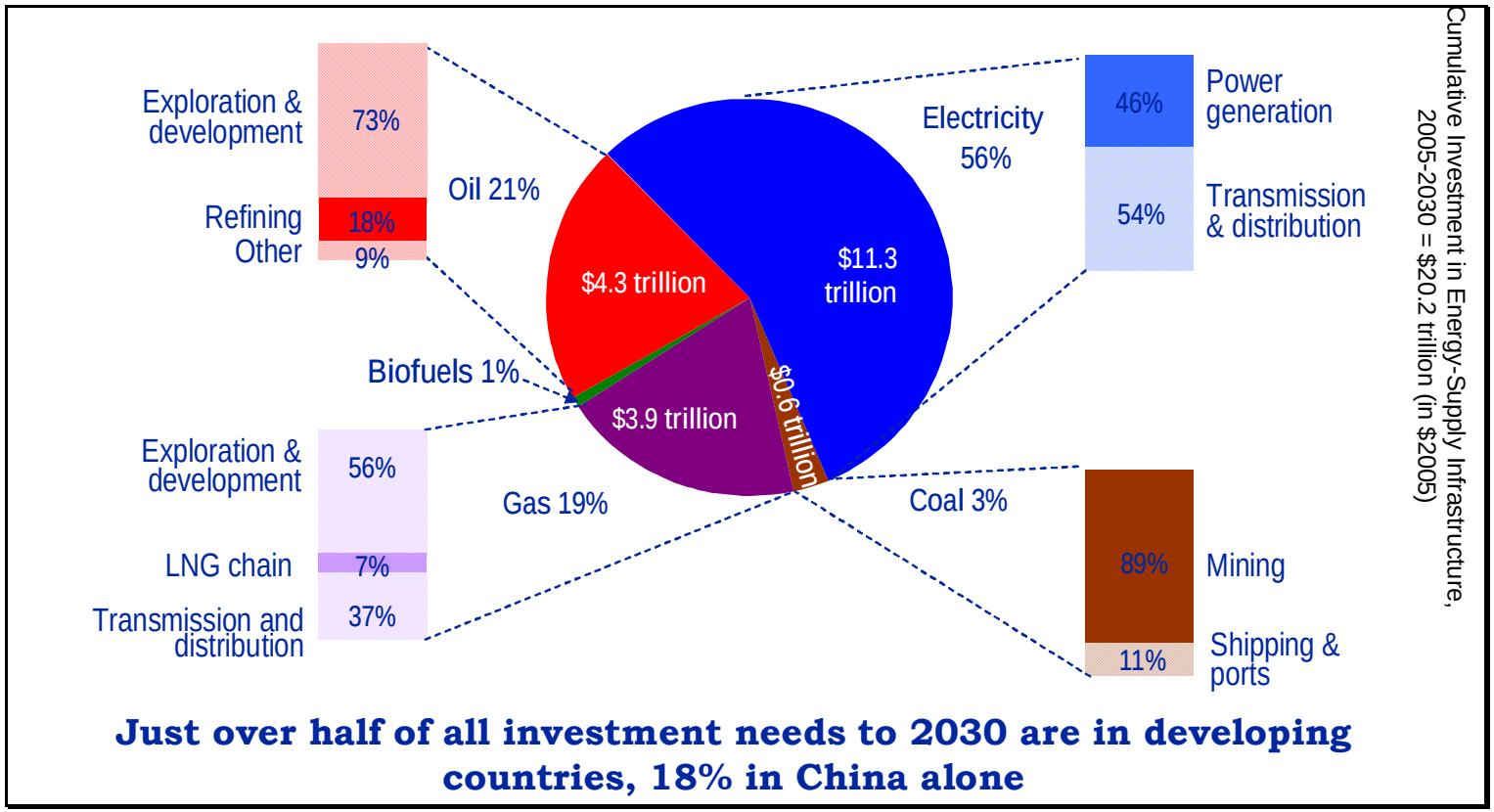
*** Identified resources i.e. these resources for which there is already confidence that they are exploitable at reasonable price.**

Table 1 – Lifetime of uranium resources (years)

Technology	Identified resources ~4.7 MtU	Total conventional resources ~14.8 MtU	Total conventional resources plus phosphates ~36.8 MtU
LWRs once through	85	270	675
Progressive introduction of FBRs*	4 250	13 500	33 750

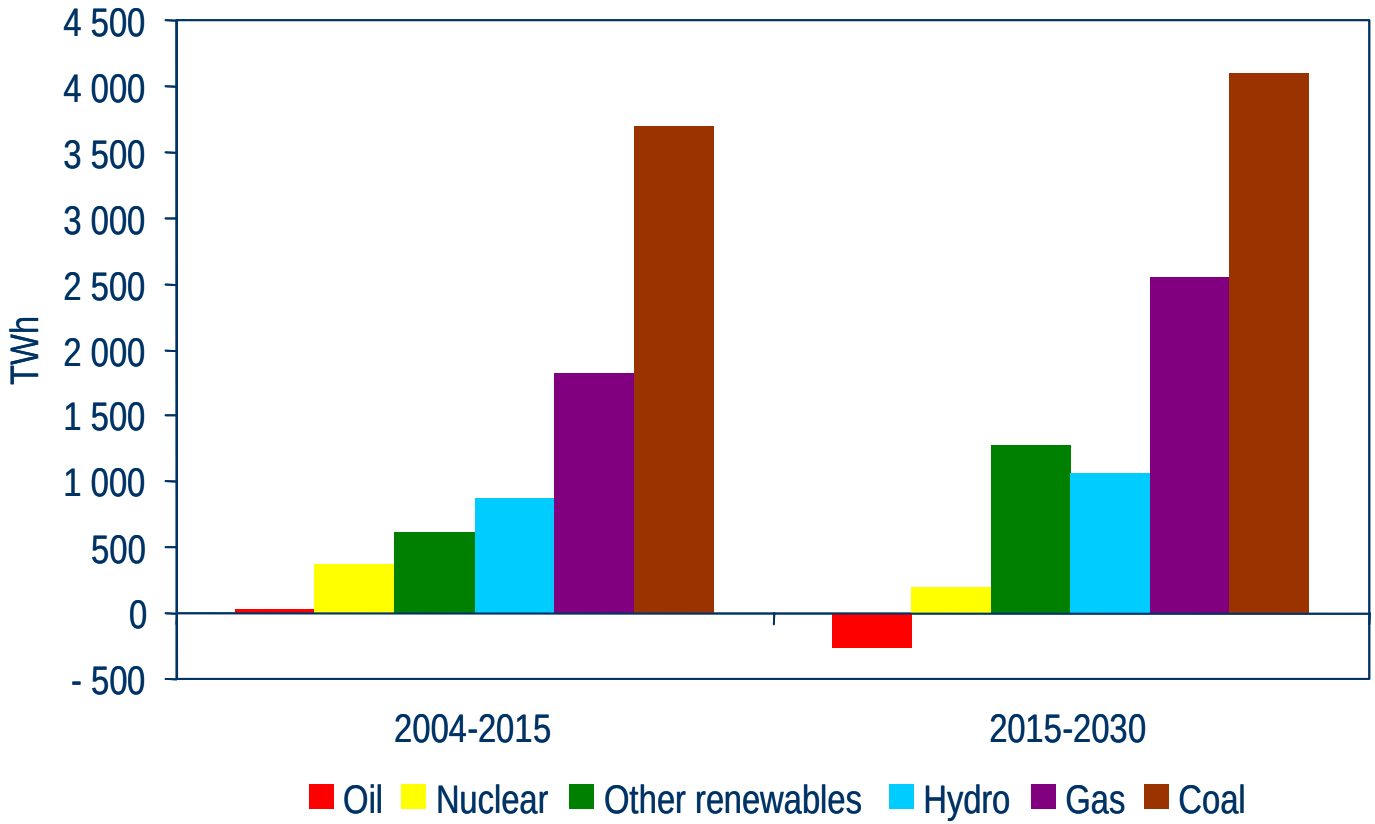
*** Here it is assumed that the progressive introduction of fast breeder reactors (FBRs) multiplies by 50 the amount of electricity generated by 1 tonne of uranium.**

Figure 4.1 – Investment needs in energy systems up to 2030



Just over half of all investment needs to 2030 are in developing countries, 18% in China alone

Figure 4.2 – IEA Reference Scenario: World Incremental Electricity Generation by Fuel



Most of the additional demand for electricity is expected to be met by coal, which remains the world's largest source of electricity to 2030.

Figure 5.1 – Comparison of frequency-consequence curves for full energy chains in OECD countries for the period 1969-2000

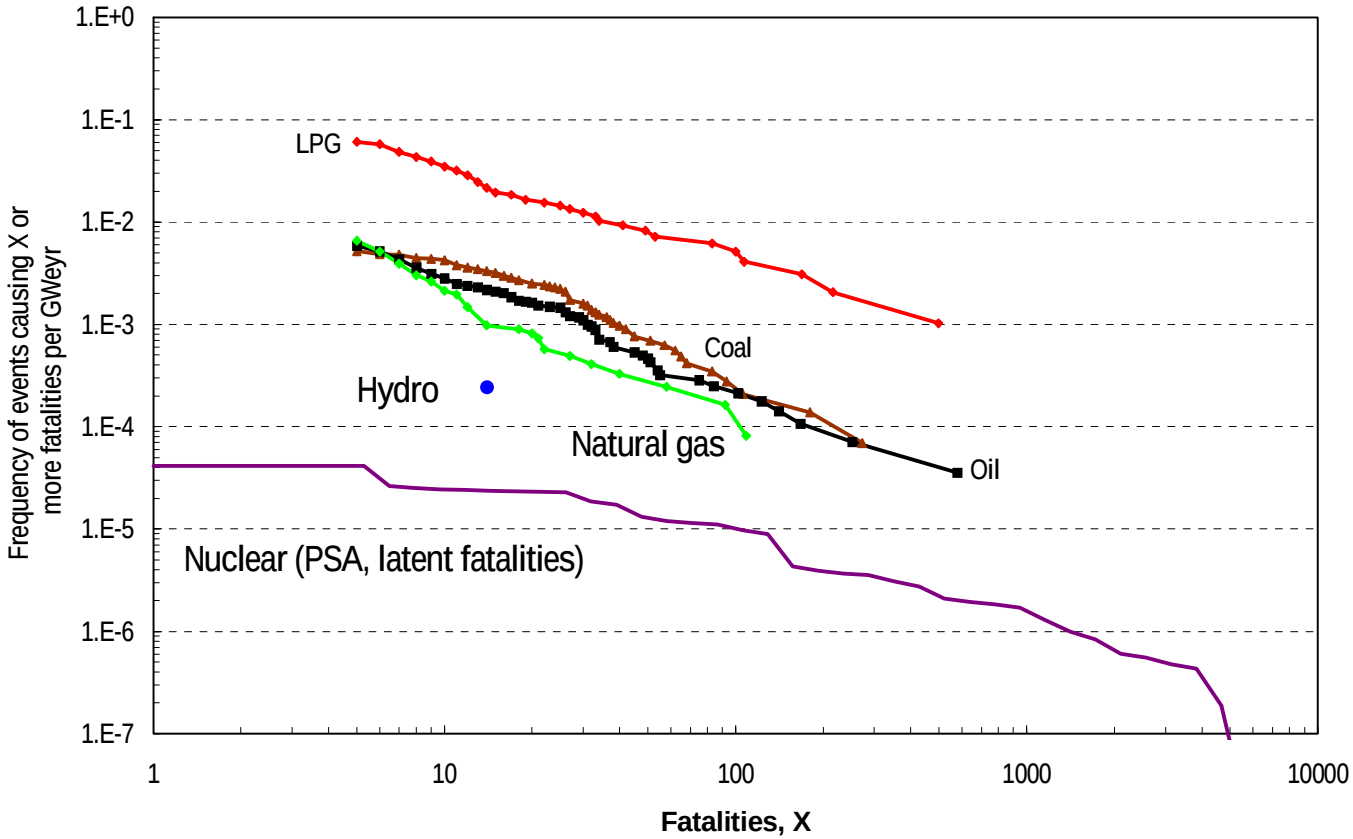


Figure 5.2 – Mortality associated with normal operation of German energy chains in the year 2000

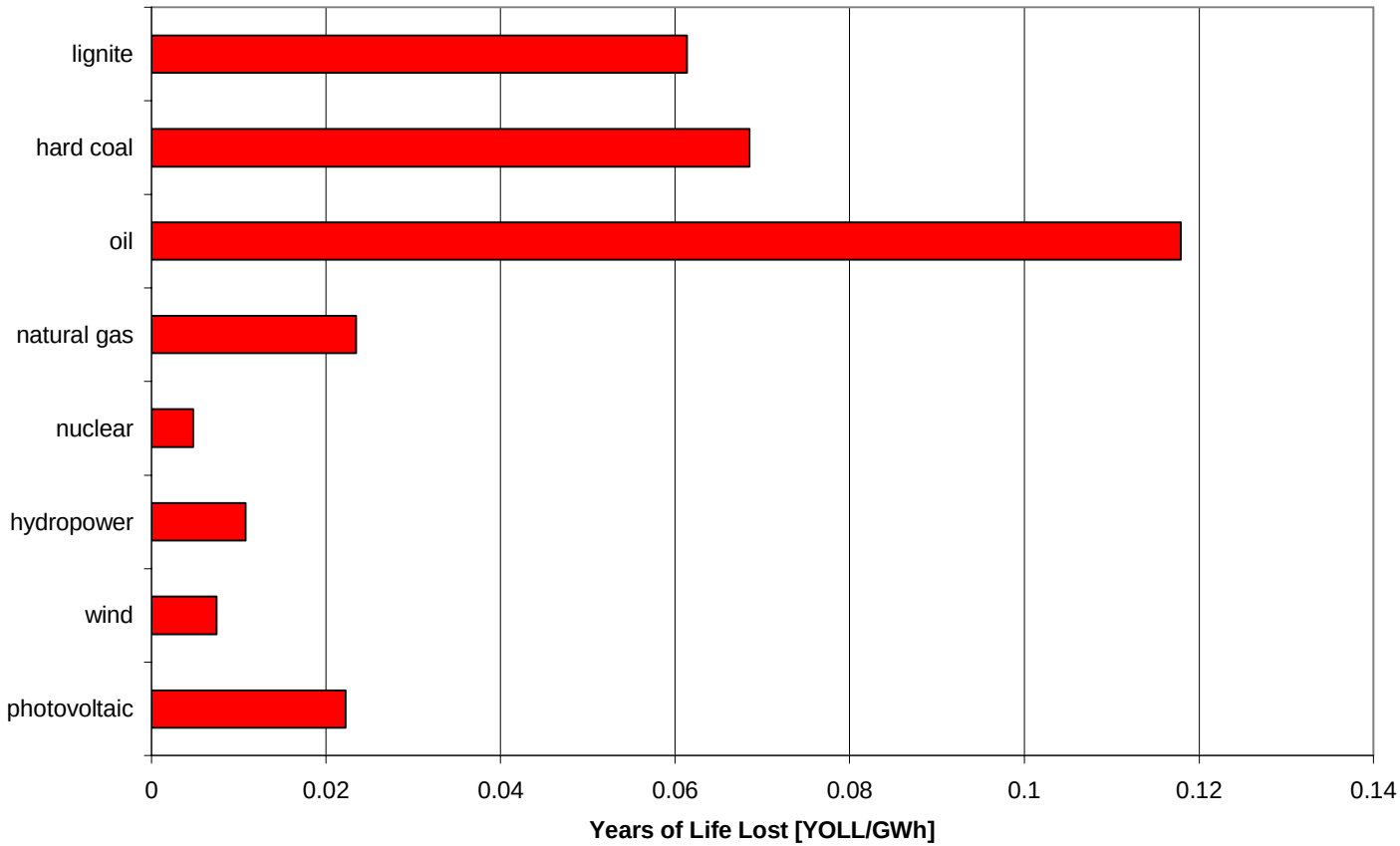
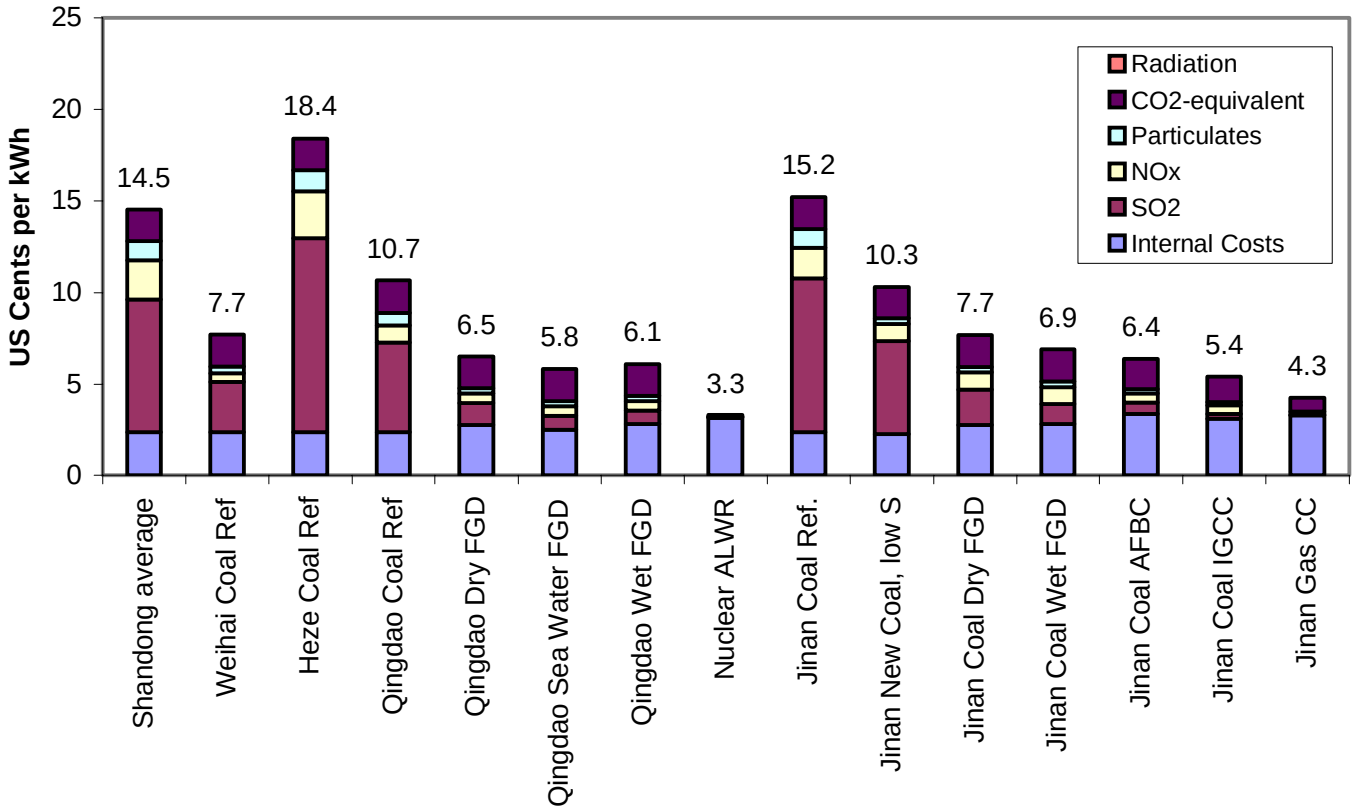


Figure 5.3 - Total costs of electricity generation in the Shandong Province of China



Conclusions

- Our energy problems are serious. Power plants are the biggest and fastest growing GHG contributor.
- USD 5 trillion of investment is needed in power plants. Most will go into coal unless governments act.
- Nuclear electricity is virtually CO_2 free.
- We already know of enough uranium to provide 2000 years worth of the current total primary energy supply (TPES).