C02 EMISSIONS ACCRUING FROM FORGONE NUCLEAR POWER GENERATION

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The rise in annual electricity generation from the world's nuclear power plants has varied inconsistently over the period 1980 - 2004 as is shown in the figure below. A major reason for this has been the rise in political influence of the anti-nuclear movement during the early 1970s assisted by the accident at Three Mile Island 2 in 1979, Chernobyl 4 in 1986 and Fukushima Daiichi in 2011. This has led to a significant decrease in the rate of nuclear generation increases that had been the trend from 1980 to 1990.*

In 1980 the net annual nuclear generation was 684 billion kWh and by 1990 this had increased to 1908 billion kWh - for an average rate of increase of 122.4 billion kWh/y. Then from 1990 to 2004 the generation rose only another 711 billion kWh, producing an average rate of increase of 50.8 billion kWh/y [ref 1]. Extrapolation of these rates to 2006 gives a difference of 1145 billion kWh, or a total loss of approximately 0.5x16xl145 = 9160 billion kWh.

The lifetime average amount of CO2 generated by nuclear is about 20 g/kWh while that of coal is about 950 g/kWh for a difference of 930 g/kWh [ref 2]. Assuming that the lost nuclear generation was compensated by building more coal fired power plants (the only other base load option)and/or the absence of such nuclear generation prevented the closure of equivalent coal-fired generation, then the extra amount of CO2 generated was about: (9160 billion kWh)x(0.00093 tonnes CO2/kWh) = 8.5 billion tonnes of CO2. This would be more than the total CO2 emissions during 2004 from burning coal in the USA, EU, China and India (i.e. 2.2, 2.3, 3.8, 0.7 = 8 billion tonnes) and about 40 times that emitted by Australia (216 million tonnes) .

As a final note, it could be claimed that thermal gas-fired generation took the place of the lost nuclear generation. Such a situation would reduce the 8.5 billion tonnes of C02 to about 5.5 billion tonnes C02. However, neither outcome hardly seems to be a commendable one for those in the anti-nuclear movement who also claim to be protectors of the environment - whereas in fact they have, by lobbying against nuclear power, substantially contributed to the problem of global warming.

References:

1. US EIA International Energy Annual, 2004.
2. "Introducing Nuclear Power to Australia - an economic comparison", J.H. Gittus, March 2006.

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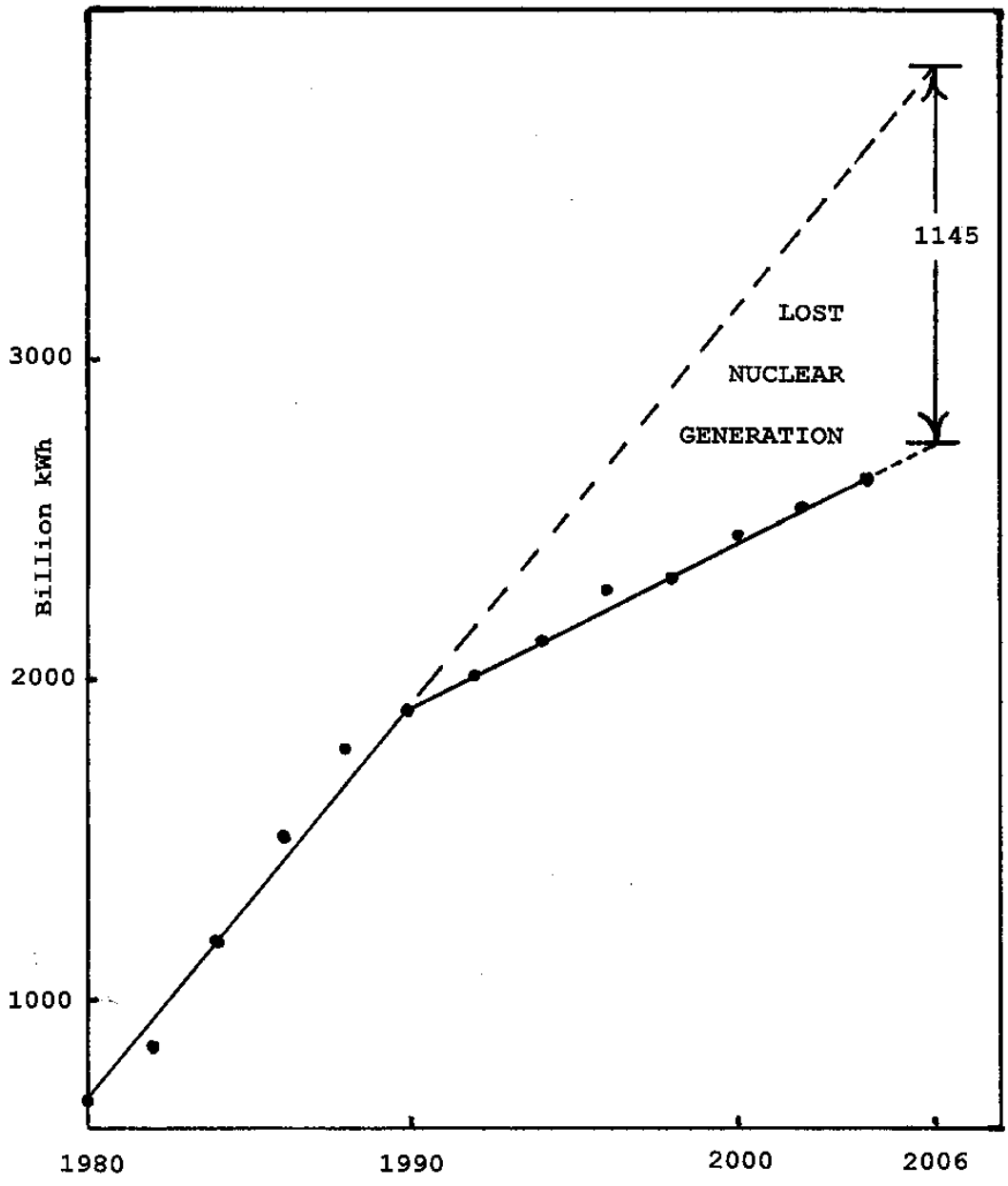
*Note: it has been suggested that Chernobyl itself led to a general belief that nuclear reactors were unsafe. However, responsible people knew at the time that the USSR RBMK design was unique and, that western LWRs could not have the same type of accident, but this was effectively countered by political pressure from the anti-nuclear movement.

FIGURE SHOWING NUCLEAR GENERATION LOST 1990-2006



INFORMATION UPDATE 23/8/2012

World annual electricity generation projections
(trillion Kilowatthours)

Fuels	Year					
	2008	2015	2020	2025	2030	2035
Liquids	1.0	0.9	0.9	0.9	0.8	0.8
Nat Gas	4.2	4.9	5.6	6.5	7.5	8.4
Coal	7.7	8.5	8.9	10.2	11.5	12.9
Nuclear	2.6	3.2	3.7	4.2	4.5	4.9
Renewables	3.7	5.1	6.3	7.0	7.6	8.2
Totals	19.1	22.7	25.5	28.7	31.9	35.2

Ref: US Energy Information Administration, International Energy Outlook 2011

The above projections indicate that the use of these various methods of generating electricity will continue to contribute about the same fractions of the total from 2008 up to 2035. Natural gas use will rise slightly from 22.0% to 23.9%; coal will drop from 40.2% to 36.6%; nuclear will stay constant at 13.6% and 13.9%; and renewables will rise from 19.4% to 23.3%.

As far as CO2 emissions go over the 2008 to 2035 period the predicted increase in natural gas consumption is 100% and for coal the increase is 67.5%. This indicates that the combined CO2 emissions from these two sources will increase about 76%.

As noted previously the rate of increase in annual nuclear generation from 1980 to 1990 was 122.4 billion kWh/y, and if this rate had been allowed to continue to 2006 the annual figure would have been 3865 billion kWh. In addition, if this rate of increase were continued until 2035 (**) the annual nuclear contribution would be 3865+122.4x(2035-2006)=7415 billion kWh or 2.5 trillion kWh higher than that predicted for the year 2035 in the above table. Furthermore, if this added nuclear generation were offset against that of coal, the increase in coal generation between 2008 and 2035 would be halved.

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** Note: The rate of increase of annual nuclear generation beyond 2008 would certainly be greater than the 1980-1990 rate had the industry been allowed to develop to help meet demand.