



JPP White Paper:

## A Suggested Re-Titling Of Energy Sources With Reference To Carbon Emissions

*A contribution to the nuclear debate from The Joan Pye Project  
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The Climate Change Programme, as it has emerged into public perception, has at its core the role played by carbon dioxide in the atmosphere. It has become overwhelmingly accepted by both the scientific and lay communities that it is the steadily increasing concentration of this gas in the atmosphere that is in the process of bringing about seriously large terrestrial heating effects, and thus radical changes in the climate in all areas of the Earth.

In order to minimise, and eventually halt, this effect, much attention has been focussed on alternative forms of energy production; those whose reliance upon carbon based fuels is minimised.

It has become common usage to refer to these new methods of energy production as “Renewables”, as to a large extent they utilise energy sources such as wind, solar, and oceanic flows as the energy sources; and these are not noticeably affected by this energy abstraction, and thus seem to be self renewing.

The use of this title, “RENEWABLES”, was further emphasised by the EC when the central administration adopted it in the pursuit of minimal carbon technology. At an early stage in their deliberations, the EU Committee responsible for these matters, made a clear distinction between nuclear energy and “renewables”, instead of regarding both as low carbon means of electrical generation, and then accepted it as official nomenclature of the technology to be pursued. This literal adoption thus prohibited the inclusion of the lowest of the carbon technologies, namely nuclear power, amongst the technologies which the EC required. The origin of the problem which, like Topsy “just growed”, would appear to be the lack of a scientific and technical background, and thus understanding, by those

drafting the European-wide Renewables Obligation, and the emotional attraction of “something for nothing”, the wind is free. In the UK this was compounded by a similar non-comprehension of the consequences of the lack of such technical knowledge.

This accentuation on these technologies has detracted in very great measure from the primary objective of aiming to produce energy from a source as low as possible in the production of carbon dioxide. It is thus much more objectively sound to refer to the new technologies as “minimised carbon” technologies, since this is their primary purpose.

Such a move allows a quantitative scale to be introduced which would reflect the amount of carbon dioxide with which each system was associated, when generating a specific amount of energy. A relevant measure could be the amount of incidental carbon dioxide, in grams, (or the weight of the carbon in the carbon dioxide), generated for each kilowatt-hour of energy produced.

Such a change in nomenclature would refocus the process on the real objective of the exercise; to enhance the reduction in carbon emission during energy production processes.

A suggested overall new title for such technologies, truly reflecting the real objective, could be:

### “MINIMISED CARBON ENERGY”

The following table has been drawn up by the British Nuclear Energy Society using data from the Government’s Energy Technology Support Unit, and confirmed by the OECD. The figures are taken over a complete life cycle of the relevant technology.

<b><u>Energy Source</u></b>	<b><u>Grammes of Carbon per KWh of electricity</u></b>
<i>NUCLEAR FISSION</i>	<i>4 (14.7g of CO<sub>2</sub>)</i>
<i>WIND</i>	<i>8 (29.4 g of CO<sub>2</sub>)</i>
<i>HYDRO ELECTRICITY</i>	<i>8/9 (29.4 - 33.0 g of CO<sub>2</sub>)</i>
<i>ENERGY CROPS</i>	<i>17 (62.4 g of CO<sub>2</sub>)</i>
<i>GEO THERMAL</i>	<i>70 (256.9 g of CO<sub>2</sub>)</i>
<i>SOLAR</i>	<i>133 (488.1 g of CO<sub>2</sub>)</i>
<i>GAS</i>	<i>430 (1578 g of CO<sub>2</sub>)</i>
<i>DIESEL</i>	<i>772 (2833 g of CO<sub>2</sub>)</i>
<i>OIL</i>	<i>828 (3039 g of CO<sub>2</sub>)</i>
<i>COAL</i>	<i>955 (3505 g of CO<sub>2</sub>)</i>

The following table of the costs of generating electricity was drawn up by the Royal Academy of engineering in association with PB Power.

<b><u>Cost of Electricity Generation</u></b>	
<b><u>Energy source</u></b>	<b><u>Pence per KWh. of electricity</u></b>
GAS FIRED CCGT	2.2
<b>NUCLEAR FISSION</b>	<b>2.3</b>
COAL (PF) STEAM PLANT	2.5
COAL, FLUIDISED BED, STEAM PLANT	2.6
GAS FIRED OCGT	3.1
COAL, IGCC,	3.2
POULTRY LITTER, STEAM	6.8
ON-SHORE WIND	3.7    6.8    with stand-by generation
OFF-SHORE WIND	5.5    7.2    With stand-by generation
MARINE SOURCES	6.6

<b><u>Cost of Electricity Generation</u></b> <b><u>with the inclusion of CO2 at £30 per tonne</u></b>	
<b><u>Energy source</u></b>	<b><u>Pence per KWh. of electricity</u></b>
<b>NUCLEAR FISSION</b>	<b>2.3</b>
GAS FIRED CCGT	3.4
GAS FIRED OCGT	4.7
COAL (PF) STEAM PLANT	5.0
COAL, FLUIDISED BED, STEAM PLANT	5.1
COAL, IGCC,	5.2
POULTRY LITTER, STEAM	6.8
ON-SHORE WIND	3.7    6.8    with stand-by generation
OFF-SHORE WIND	5.5    7.2    With stand-by generation
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**Note:**

- OCGT — open cycle gas turbine
- CCGT — closed cycle gas turbine
- ICGT — integrated gasification combined cycle
- PF — pulverised fuel.

As of the end of January 2008, the situation has become more critical as the European Commission has increased the target for renewable energy. The error of this process needs, therefore, more than ever to be brought to public attention, and reversed.

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### About The Joan Pye Project

*The Joan Pye Project was initiated by Joan M Pye, FINucE(Hon) in December, 2004 with the purpose of bringing the views of experienced professionals to bear on the public debate concerning the future of nuclear energy in the United Kingdom.*

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