CSD Centre for Sustainable Development

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The Carbon Reduction Agenda and UK Nuclear Energy Policy

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1. What is a Carbon Footprint?

'A methodology to estimate the total emission of greenhouse gases in carbon equivalents from a product across its life cycle from the production of raw material used in its manufacture, to disposal of the finished product.' (Carbon Trust)

'The carbon footprint is a measure of the exclusive total amount of carbon dioxide emissions that is directly and indirectly caused by an activity or is accumulated over the life stages of a product.' (Wiedmann & Minx)

'The demand biocapacity required to sequester (through photosynthesis) the carbon dioxide emissions from fossil fuel combustion.' (Global Footprint Network)

Contentions:
Just carbon dioxide or all greenhouse gases?
Which parts of the process are measured?

2. UK Nuclear Energy Policy Overview

2003 Energy White Paper: no support for nuclear new build due to unattractive economics and unresolved issues surrounding radioactive waste disposal.

2006 SDC Position Paper: no justification in bringing forward plans for a new fleet of nuclear reactors.

2007: Consultation on nuclear futures.

2008 Nuclear Energy White Paper: the development of new nuclear power stations would help the government to meet its objectives on CO_2 emissions reduction and energy security and it would be in the public interest to allow energy companies to invest in nuclear power.

2009 Siting Consultation: applications submitted to build new nuclear reactors at 11 sites across the country.

2010 Coalition Government: nuclear new build programme to go ahead but with no public subsidy. Further consultation on National Policy Statement for nuclear energy.

3. What is the Carbon Footprint of Nuclear Energy?

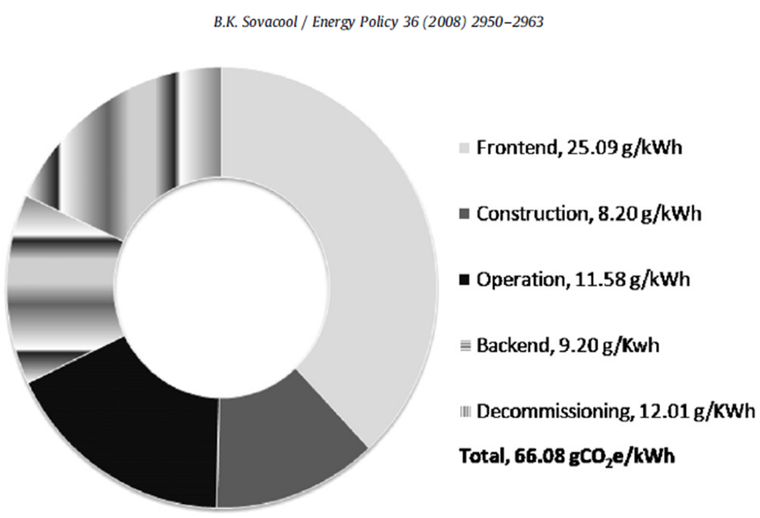
'Role of Nuclear Energy in a Low Carbon Economy', Sustainable Development Commission, 2006:
2 - 20 g/kWh.

'Nuclear Energy White Paper', UK Government, 2008:
7 - 22 g/kWh.

Review of 100 international studies, Sovacool, 2009:
1.4 - 288 g/ kWh, Mean = 66.08 g/kWh.

CARBON TRUST STANDARD
REDUCING CO2 YEAR ON YEAR

4. Nuclear Fuel Cycle CO_2 Sources



5. The Carbon Reduction Agenda

The UK has one of the most rigorous carbon reduction targets in the world. The Climate Change Act (2008) enshrined in law an obligation to reduce the country's greenhouse gas emissions by 80% of 1990 baseline levels by 2050. The Committee on Climate Change was given its powers by this Act of Parliament and was established to report to Parliament on progress in carbon emissions reduction. At its inception, the Committee published guidance on the UK's transition to a low carbon economy and in spring 2009 the government set an interim target to reduce emissions by 34% by 2020. Further to this, the Committee on Climate Change released its strategy for actions required to meet this target and made it clear that government should clear the way for a streamlined planning process by the establishment of the Infrastructure Planning Commission (IPC) in order to speed up the development of infrastructure necessary to reduce carbon emissions, including nuclear energy expansion. The IPC was abolished after the 2010 general election and was replaced by the Major Infrastructure Planning Unit, in which ministers will take final decisions.

It is interesting to note that the Sustainable Development Commission continued to oppose the government's reviewed policy on nuclear expansion based on the findings of its own review published in 2006. With the establishment of the Committee on Climate Change in late 2008, however, and this body's contradictory advice that nuclear expansion is in the best interests of carbon reduction, the influence of the CCC on government carbon reduction policy seemed to be increasing at the expense of the SDC. The Coalition government finally announced its intention to withdraw funding from the SDC in July 2010.

Further, the government published a range of scenarios to meet the commitment to 80% carbon reduction by 2050 in its low carbon transition plan in the summer of 2009. Each of these scenarios outlined in this strategic document presumed that maximum nuclear expansion would occur and 'large expansion of nuclear power would be the least cost option' when compared to investment into renewables or carbon capture and storage for fossil fuel generation per unit of energy produced. It is evident, therefore, that in the space of less than a year the UK has committed itself to significant carbon reductions over the next four decades and has planned out the way forward to achieving its goal.

6. Carbon Accountancy in UK Nuclear Energy Policy

The carbon footprint of energy generation has been considered in UK nuclear energy policy for some years but with widely varying effects on decision making. Parliamentary figures released in 2006 set the carbon footprint of nuclear generation at 5 – 6.8 gCO_2/kWh. The Sustainable Development Commission's report *The Role of Nuclear Power in a Low Carbon Economy* highlights a wider range of 2 – 20 gCO_2/kWh and, using a baseline of 16 gCO_2/kWh, concluded that the carbon reduction potential was insufficient to justify increasing generation. The consultation on the future of nuclear power released in the following year, however, used a range of 7 – 22 gCO_2/kWh and a baseline figure of 10 gCO_2/kWh when it posed its questions on the government's views of the carbon emissions of nuclear power stations. The resultant white paper acknowledges the views of two camps of consultees. On the one hand, a number of consultees felt that the government's figures were too high quoting life cycle assessment studies carried out at Torness in Scotland and Forsmark in Sweden which estimated the carbon footprint of the nuclear fuel cycle as 3.1 gCO_2/kWh and 5.05 gCO_2/kWh respectively. Such figures are much closer to the 2006 Parliamentary figures than those used by the Sustainable Development Commission and by the government in its consultation. On the other hand, an opposing camp of consultees felt that the figures used were an underestimate and quoted an Australian Government-commissioned study that puts the figure in the range of 10 – 130 gCO_2/kWh with an average at 60 gCO_2/kWh and another study which uses an even higher range of 84 – 122 gCO_2/kWh due to the theory that uranium extraction will become more carbon intensive in future as resources begin to dwindle.

7. Conclusions

The varying figures used by governments in informing their decisions pose a significant barrier to the carbon reduction agenda in nuclear energy policy. The most recent worldwide studies place the carbon footprint of nuclear energy in the range of 1.4 – 288 gCO_2/kWh. Such a widely ranging estimate is essentially useless to policy makers. Nuclear energy, by its very nature as a highly regulated industry, is one of the most internationally homogenous processes: only relatively small differences between reactors exist between countries and, as such, it would be expected that a narrower range for the nuclear carbon footprint could be derived. Because of the contentions which exist in the atomic energy arena though, bias is rife and carbon footprint data have the potential to be manipulated in order to further the aims of the various organisations which report them.

Research in Sustainability