

This appendix responds to that part of the application (NIA 2) which addresses Security of Supply and Climate Change Benefits (of the proposed new practices).

These are covered on pages 13-20 (security of supply) and pages 21-25 (Carbon reduction).

Greenpeace does not view that nuclear power is necessary for security of supply (electricity) and certainly not to achieve and maintain major reductions in CO2 emissions across the whole energy sector. With regard to this we refer you to the following reports.

Implications of the UK meeting its 2020 Renewable Energy target – A report to WWF-UK and Greenpeace UK August 2008.ⁱ

This report by Poyry, Europe's leading energy experts, found that, if the UK Government is able to achieve its commitments to meet EU renewable energy targets and its own ambitious action plan to reduce demand through energy efficiency, then major new power stations (burning either nuclear, coal or gas) would not be needed to ensure that Britain can meet its electricity requirements up to at least 2020. Moreover, the report finds that this strategy would reduce the UK's CO2 emissions by up to 37% by 2020.

Securing Power: Potential for CCGT CHP Generation at Industrial Sites in the UK. A report to Greenpeace June 2008.ⁱⁱ

Analysts from Pöyry Energy Consulting identified just nine industrial sites where the installation of combined heat and power (CHP) plants and have calculated that there could be up to 16GW of power generation, with 13GW from just nine major industrial sites around the UK. 13GW is the same capacity as eight nuclear power stations, but could be delivered much more quickly and more cheaply than nuclear, with the potential to provide enough electricity to power two-thirds of UK households in a move that could also halve gas imports and reduce carbon dioxide emissions by 10 million tonnes.

The report has drawn support from a wide range of organisations including RWEpower, Greenpeace, the Liberal Democrats and the Combined Heat and Power Association.

Decentralising Scottish energyⁱⁱⁱ

Published in Mar 2007 this report, *Cleaner, cheaper, more secure energy for the 21st Century. Application of the WADE economic model to Scotland*, shows that new nuclear is not necessary.

The reports findings have a lasting relevance to the energy pathway that Scotland and the UK take together. It discusses that whether Scotland chooses to follow, centralised or decentralised systems this will have a lasting impact on energy security, fuel consumption, carbon emissions and the impact of renewable technology development. The report shows that the decentralised approach combined with large scale renewables delivers the best outcomes across the board. It is an example the UK Government as a whole should be following.

Specific comments

On NIA 2, 2.16, the application states

New nuclear construction would not impact on the significant increase envisaged by Government in the UK's renewable capacity. Renewables would continue to be supported by the Renewables Obligation (RO) arrangements, under which remuneration is based on the market value of the electricity plus the value of Renewable Obligation Certificates (ROC). Since the market value of the ROC increases if installed renewable capacity falls behind target, they should remain an attractive investment proposition. In addition the European Commission has

recently proposed that the UK should source 15% of its total energy consumption from renewables by 2020.

Although the application records the view given above, key supporters of it do not necessarily hold with the view that nuclear power and renewables are compatible. As the Guardian reported on 17th March 2009^{iv}, there is growing concern that in fact nuclear power would impact on expanding the UK's renewable capacity. Two of Europe's largest utilities EDF and E.ON have warned the government they may be forced to drop plans to build a new generation of nuclear power plants unless the government scales back its targets for wind power. The demands – contained in submissions to the government's renewable energy consultation – reinforce the concerns of wind developers, and indeed the public, that the two sectors cannot thrive simultaneously. Moreover, the Government's push on new build - as evidenced by the establishment of the Office of Nuclear Development without the progress on the promised Office for Renewable Energy Development,^v is beginning to lead many to suspect that the processes are being engineered so the renewables will not thrive alongside nuclear power.

The expose on EDF and E.On's views on renewables as a block to nuclear power comes 12 months after the CEO of EDF gave a speech to the Adam Smith Institute Institute (March 2008). He is reported as saying:

“If you provide incentives for renewables, you accelerate the growth of renewable capacity,” and “But that will displace some of the incentives built into the carbon market. In effect, carbon gets cheaper. And if carbon gets cheaper, you depress the returns for all the other low-carbon technologies.” “Some of those low-carbon projects will be cancelled, or will fail.”^{vi}

Mr De Rivaz appears to be concerned about the UK meeting its target of obtaining 15% of its energy from renewables – electricity, heat and transport – by 2020 as heating and transport are harder to convert, which means the UK would need to provide around 40% of its electricity from renewables. This would result in a massive expansion, for example, in wind farms which would dent the already questionable economic viability of the new generation of nuclear power plants (recognising that the recession will hit many low-carbon projects as investment becomes more difficult to obtain and the fall in the price of carbon impacts on returns. This is true not only for renewable projects but nuclear power also). However, over the longer term we believe renewables are a much less risky form of investment, and more likely to 'bounce back' following the recession than nuclear power which carries so many additional risks (see main part of the submission).

On uranium reserves (NIA 2, 2.18) notes:

There are sufficient uranium reserves to fuel both the existing and contemplated new nuclear stations, both in the UK and internationally. Volume requirements are small and there is the potential to acquire and stockpile fuel easily if required; (for instance, if the UK were to construct a fleet of ten new stations, the total annual fuel requirements could be housed in one modest-sized building). A modern reactor requires only a few tens of tonnes of fuel per annum.

Again, we refer you to one of the most recent, succinct discussions on this issue, found in the report from IPPR Commission for National Security for the 21st Century.^{vii} This states:

According to the International Atomic Energy Agency (IAEA) and the Organisation

for Economic Cooperation and Development, the known recoverable uranium resources are 4.7 millions tones (IAEA & OECD 2008). This figure includes uranium ores that are of relatively low grade, occur at great depths, involve lengthy transportation and are harder to mine.

The world's current nuclear-power reactors consume uranium at the rate of 65,000 tonnes a year (World Nuclear Association 2008c). If this rate stays constant, known uranium reserves will last for less than 70 years. Given that the richest uranium ores are depleted first (because they usually generate the largest profits for the mining companies) the net energy extracted from uranium ore will also decrease over time. At the current rate of consumption, the highest quality uranium ores will be depleted within a decade and the average grade will fall below 0.1 percent.

According to calculations mad by Jan Willem Storm van Leeuwen, an expert of uranium resources, assuming that world nuclear capacity remains constant at 372GW, the net energy from uranium will fall to zero by about the year 2070 (Storm Van Leeuwen 2007 and 2008). Assuming that the world nuclear share remains constant at 2.2 per cent of world energy supply, and that energy demand will increase to meet the needs of a rapidly growing human population, the net benefit will fall to about zero by about 2050.

Most importantly, as noted in the main submission, the report from IPPR underlines wider risks of the UK pursuing a new build programme - in particular how this will encourage others to follow suit. As noted above, the report considers the impact of an expanded programme internationally and the impact this will have on recoverable reserves. It can be understood from this work that having new build may (to some) be a way to 'secure' electricity supplies for the UK, but a consequence of that will be that others will follow suit. This risks the UK being part of encouraging a spiral of nuclear proliferation through the spread of dual use technology and materials. Such concerns should be part of any 'justification' decision.

The application (NIA 2, 3.12) also notes:

Nuclear power generation has a relatively small carbon footprint, which is around 200 times less than coal at about 5g CO₂ eq/kWh. This is a level broadly comparable to that of wind power. As the POST note points out operational emissions from nuclear generation account for less than 1% of the total with most emissions occurring during mining, enrichment and fuel fabrication. Decommissioning accounts for 35% of lifetime CO₂ emissions.

The report "Valuing the greenhouse gas emissions from nuclear power: A critical survey" screens 103 lifecycle studies of greenhouse gas-equivalent emissions for nuclear power plants to identify a subset of the most current, original, and transparent studies.^{viii} The article notes:

Advocates of nuclear power have recently framed it as an important part of any solution aimed at fighting climate change and reducing greenhouse gas emissions. The Nuclear Energy Institute (2007) tells us, "it is important to build emission-free sources of energy like nuclear" and that nuclear power is a "carbon-free electricity source". The nuclear power company Areva (2007) claims that "one coal power station of 1GWe emits about 6 million tons of CO₂ per year while nuclear is quite CO₂ free".

The first conclusion is that the mean value of emissions over the course of the lifetime of a nuclear reactor (reported from qualified studies) is 66 g CO₂e/kWh, due to reliance on existing fossil-fuel infrastructure for plant construction, decommissioning, and fuel processing along with the energy intensity of uranium mining and enrichment. Thus, nuclear energy is in no way “carbon free” or “emissions free,” even though it is much better (from purely a carbon-equivalent emissions standpoint) than coal, oil, and natural gas electricity generators, but worse than renewable and small scale distributed generators (see Table 8). For example, Gagnon et al. (2002) found that coal, oil, diesel, and natural gas generators emitted between 443 and 1050 g CO₂e/kWh, far more than the 66 g CO₂e/kWh attributed to the nuclear lifecycle.

However, Pehnt (2006) conducted lifecycle analyses for 15 separate distributed generation and renewable energy technologies and found that all but one, solar photovoltaics (PV), emitted much less g CO₂e/kWh than the mean reported for nuclear plants. In an analysis using updated data on solar PV, Fthenakis et al. (2008) found that current estimates on the greenhouse gas emissions for typical solar PV systems range from 29 to 35 g CO₂e/kWh (based on insolation of 1700kWh/m²/yr and a performance ratio of 0.8).

In relation to the discussion on security of supply and CO₂ emissions, will the Government continue to rely solely on the work it commissioned or will it be reviewing that in the light of the total negative impacts (both here and overseas) of any nuclear programme alongside the claims made concerning the benefits?

i <http://www.ilenergy.com/?t=6Latest#ReportforWWFGreenpeace>

ii <http://www.greenpeace.org.uk/files/pdfs/climate/securingpower0708.pdf>

iii http://www.greenpeace.org.uk/files/pdfs/climate/wade_scotland.pdf
DECENTRALISING UK ENERGY: CLEANER, CHEAPER, MORE SECURE ENERGY FOR THE 21ST CENTURY APPLICATION OF THE WADE ECONOMIC MODEL TO THE UK. <http://www.greenspec.co.uk/documents/drivers/Decentralising.pdf>

iv <http://www.guardian.co.uk/business/2009/mar/16/nuclear-power-renewables-edf>

v <http://www.ethical-junction.org/ethicalpulse/index.php?/archives/1099-Office-for-Renewable-Energy-Deployment.html>

vi Platts POWER UK / ISSUE 169 / MARCH 2008, p.15.

vii press release IPPR <http://www.ippr.org.uk/publicationsandreports/publication.asp?id=650>. For full report see:
<http://www.ippr.org.uk/members/download.asp?f=%2Fecomm%2Ffiles%2Fnuclear%5Frenaissance%2Epdf>

viii Taken from Valuing the greenhouse gas emissions from nuclear power: A critical survey
Benjamin K. Sovacool www.elsevier.com/locate/enpol