

Grouped by 'Themes' for meeting at the Energy Institute

## Theme 1 – Climate change and security of supply Issues

1. To what extent do you believe that tackling climate change and ensuring the security of energy supplies are critical challenges for the UK that require significant action in the near term and a sustained strategy between now and 2050?

a) This question should refer to 'energy services', whereupon I agree.

b) Under 7, the text refers to 'using every unit of energy as efficiently as possible', but I see no reference to energy savings or increased energy efficiency through 'cascading', notably by large-scale CHP.

The document also sets out the evidence and information that we have considered and the preliminary conclusions that we have reached following our assessment of this evidence. We invite respondents to consider the evidence we have presented, and to comment on the following questions:

2. Do you agree or disagree with the Government's views on carbon emissions from new nuclear power stations? Disagree.

What are your reasons?

a) The lifecycle carbon emissions cited fail to take account of the effect of uranium depletion during the lifetime of the NPP. Even at the present rate of uranium use (gross, after the weapons-grade stock is exhausted), this may increase the carbon emissions to those of gas-fired plant and beyond within the lifetime of the NPP. At any increased rate of use, this effect will be aggravated.

b) Nuclear power is not sustainable, so will need replacing sooner or later. (See my reply to Question 12).

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

3. Do you agree or disagree with the Government's views on the security of supply impact of new nuclear power stations? Disagree.

What are your reasons?

a) Any major radioactive release - accidental or deliberate – in the 400-odd NPPs, most of which are very old - would mean nuclear shutdown.

b) Nuclear power is so expensive as to preclude other options – as in France. Depending on such a fragile and unsustainable option increases the risks.

c) Uranium will soon be effectively exhausted, whereupon all NPPs will have to be replaced. (See my reply to Question 12).

Conversely, hydro and wind are indigenous, robust and sustainable, and increase security of supply.

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

10. What do you think are the ethical considerations related to a decision to allow new nuclear power stations to be built?

See my reply to Question 9.

And how should these be balanced against the need to address climate change?

The true cost of nuclear power is infinite and it is the least effective. (See my reply to Question 4).

Hence this is a false dichotomy.

12. Do you agree or disagree with the Government's views on the supply of nuclear fuel? Disagree.

What are your reasons?

- a) The money cost of uranium and its part in the cost of electricity is irrelevant. What matters is the carbon (strictly the GHG) intensity of uranium, including the effect of depletion, over the planned life of the NPP. The 'point of futility' depends mainly on the available ore grade, and about 0.01% has been shown to be when the carbon intensity of nuclear power exceeds that of gas-fired generation. (See <http://www.stormsmith.nl>). Moreover, at the present rate of use an ore grade of about 0.01% would be reached in less than 50 years from now – i.e. less than 40 years from 2020. Furthermore, any increased rate of use would shorten this period. (See <http://www.energywatchgroup.org/files/Uraniumreport.pdf>). Of course, the 'point of futility' would be reached at a higher ore grade when compared with measures having lower carbon intensities, such as energy savings and renewables.
- b) Under 111, although '...the Government believes that there should be sufficient reserves to fuel any new nuclear power stations constructed in the UK', this has not been shown to 'due diligence' standard. 'Believes' and 'should be' is not a sufficient basis for energy policy.
- c) On the GHG intensity criterion, uranium may well be insufficient for the planned life of the NPP. Moreover, fossil energy would then be far more costly than today, making the necessary transition to a sustainable energy economy far more difficult. The only prudent 'no regrets' policy would be to deploy energy savings and renewables – so furthering the necessary transition to a sustainable energy economy. (See [http://www.energypolicy.co.uk/Gordon\\_Taylor8e.pdf](http://www.energypolicy.co.uk/Gordon_Taylor8e.pdf)).

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

13. Do you agree or disagree with the Government's views on the supply chain and skills capacity? Agree.

What are your reasons?

- a) For nuclear power, there is no supply chain or sufficient skills in the UK, nor is there any prospect of adding them by 2020. Even if the present Government favoured nuclear power, it would always be at risk of cancellation – especially in the event of another major radioactive release anywhere. Businesses and individuals would not invest money or careers in such a risky venture. Hence nuclear power hardware and builders would certainly have to be imported, and the UK would be even more dependent upon overseas suppliers.
- b) Conversely, for energy savings and renewables, there are many opportunities for businesses and individuals, both in the UK and overseas. A supply chain and skills capacity already exists for wind turbines. Moreover, they would not be at risk of cancellation, since they are not liable to political or catastrophic events. Hence energy savings and renewables could be increasingly indigenous, making the UK less dependent on overseas suppliers.

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

16. In the context of tackling climate change and ensuring energy security, do you agree or disagree that it would be in the public interest to give energy companies the option of investing in new nuclear power stations? Disagree, because it is the least effective and cost-effective option for tackling climate change and actually reduces energy security. Moreover, it would increase the risks to the public purse and to people and property in the UK and overseas. Since it is not sustainable, it could only delay the necessary transition to a sustainable energy economy, making this much more difficult. (See my replies to the other Questions).

## Theme 2 – Environmental and Waste Issues

8. Do you agree or disagree with the Government's views on waste and decommissioning? Disagree.

What are your reasons?

- a) Under 86, nuclear waste can never be 'disposed of', but only put in long-term storage. This should be designed to keep it from the biosphere for ever, but cannot be assumed to do so.

- b) Under 91, the 'solutions' cannot be termed 'robust' since they cannot be proved to be so. Because the consequences are unacceptable, 'reasonably foreseeable' is not good enough.
  - c) Under 93, nuclear power is not 'likely to be more cost-effective than alternative forms of low-carbon generation'. Indeed, the opposite has been demonstrated both analytically and empirically. (See my reply to Question 4).
  - d) Under 94, to say that 'as with all radioactive substances the activity would decline over time' is grossly misleading when the half-lives range up to billions of years.
  - e) Under 95, while 'it could technically be accommodated in the same disposal facilities ... as the existing legacy', this has still not been done even after more than 50 years.
  - f) Under 99, the store can be described as 'interim', but not as 'safe and secure', since this has not been demonstrated. Indeed, since it can only be demonstrated in retrospect, this is misleading.
  - g) Under 101, 'not allowing nuclear power to play a role' has the implication of not adding to a problem that we have not addressed adequately in over 50 years, yet will threaten the biosphere for ever. Moreover, nuclear power has been shown to be less effective and less cost-effective than options that pose no comparable ethical implications. (See my reply to Question 4).
- Are there any significant considerations that you believe are missing? Yes.
- If so, what are they? See above.

9. What are the implications for the management of existing nuclear waste of taking a decision to allow energy companies to build new nuclear power stations?

Since the problem has not been addressed adequately in over 50 years, it should certainly not be added to. Therefore there should be no new nuclear.

11. Do you agree or disagree with the Government's views on environmental issues?

Disagree.

What are your reasons?

- a) Under 105, 'Industry has indicated that the most viable sites are likely to be adjacent to existing nuclear power stations'. Yet almost all are coastal and therefore vulnerable to storm surges and sea level rise. This would increase the probability of radioactive releases to the biosphere. Moreover, any releases to the sea would be carried worldwide and affect all marine life, including those in the human food chain. Since such a consequence cannot be allowed, nor can nuclear power. Indeed, in the light of climate change and sea level rise, existing nuclear plants on rivers or sea coasts must be phased out.
  - b) Under 107, 'The Government believes that the environmental impacts of new nuclear power stations would not be significantly different from other forms of electricity generation...'. Since uranium is depletable, whereas hydro, wind and biomass are renewable, this cannot be true. (See my reply to Question 4). Moreover, the environmental impacts of nuclear include those of major radioactive releases which differ by very many orders of magnitude from those of all other forms of generation.
  - c) Under 107, the proposition mentions 'generation'. Yet energy savings must also save any environmental impacts, and are the most cost-effective measures for GHG reduction. (See my reply to Question 4). Why are energy savings not considered in this consultation?
- Are there any significant considerations that you believe are missing? Yes.
- If so, what are they? See above.

14. Do you agree or disagree with the Government's views on reprocessing? Agree.

What are your reasons?

- a) Reprocessing leads to increased amounts of 'pure' plutonium, which is an even more dangerous bomb material than uranium 235. In the age of terrorism, this is plain foolhardy.
- b) Reprocessing leads to increased radioactive emissions to ground, air and water – as shown at Windscale/Sellafield and Dounreay (See <http://www.zetnet.co.uk/oigs/n-base/dounreay.htm>).

Are there any significant considerations that you believe are missing?

If so, what are they?

### Theme 3 – Safety and Implementation Issues

4. Do you agree or disagree with the Government's views on the economics of new nuclear power stations? Disagree.

What are your reasons?

a) The costs cited are 'levelised' with current fuel prices, which is misleading for any depletable fuel, such as uranium.

They fail to take full account of two major externalities – safety risk and waste storage.

b) The cost of the safety risk must be taken as infinite (expressed as 'unquantifiable' in the Government accounts), since the insurance industry will not cover it, and so put a finite value on it.

c) The cost of the waste storage must also be taken as infinite, since the present and proposed arrangements are ineffective. No long term waste storage yet exists, so it cannot be costed with certainty. The operator can simply declare - or even just threaten - bankruptcy, and walk away from the liability. Since the state is the provider of last resort, the state must make an estimate of the cost of long term storage and the operator must pay into a fund managed by the state – as in Sweden. Since both subsidies are infinite, they are gross distortions of the market.

d) The availability under the Euratom treaty of low-cost funds for nuclear power is another market distortion. Moreover, although the fund is limited, when exhausted it is topped up again. The UK should require that it be closed, since it contravenes the European rules on competition.

e) The text cites the IEA World Energy Outlook 2006 in support of the cost analysis prepared for the Energy Review 2006. However, the WEO also said that nuclear energy is the least effective measure for combating greenhouse gas emissions. In the 'Alternative Policy Scenario', the projected reduction of 6 billion tonnes of CO<sub>2</sub> equivalent is 65% from improved energy efficiency, 13% from fuel switching, 12% from increased renewables and only 10% from increased nuclear. (See <http://www.energywatchgroup.org/files/Uraniumreport.pdf> Page 6).

f) An assessment of the costs of GHG abatement opportunities beyond business as usual was made recently by Vattenfall. (See <http://www.vattenfall.com/www/cac/cac/569512nextx/573859globa/574118cost/index.jsp?origin=search>). This showed that 5 billion tonnes of CO<sub>2</sub>e could be saved at negative cost. This study – like most others – understates the cost of nuclear power as in a), b), c), d) above. Since b) and c) are infinite subsidies, the true cost is infinite. However, this distortion affects only nuclear power.

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

5. Do you agree or disagree with the Government's views on the value of having nuclear power as an option? Disagree.

What are your reasons?

a) National energy systems should be modelled first for energy and carbon, since these are fundamental. The known science and technologies minimise the uncertainties. No such study is cited, even though I submitted one to Government for the Energy Review of 2003. It may be downloaded from <http://www.energypolicy.co.uk> Entitled 'Energy Solutions for 60% Carbon Reduction', this shows that solutions are available without nuclear power or carbon sequestration, using current technologies for energy saving and efficiency and increased biomass and wind turbines – as widely and increasingly deployed elsewhere, especially in Europe.

b) Modelling is only as good as the input data. The MARKAL family lacks – or is inadequate – in respect of many current options for energy saving and increased energy efficiency.

c) The costs assumed for nuclear power are invalid, since they neglect the effects of depletion, the infinite subsidies of safety risk and long term storage, and the finite subsidy of the Euratom funds.

d) Some of the suggested technological developments make no sense. Hydrogen is a very poor energy carrier, especially for transport. This has been demonstrated analytically. (See <http://www.energypolicy.co.uk/hydrogen.htm>). It has also been demonstrated empirically by Daimler, who have suspended their NECAR programme, and Toyota, who have shown that an engine-electric hybrid, the 2004 Prius, has a higher well-to-wheel efficiency than their hydrogen

fuel cell vehicle (FCHV-5). (See

[http://www.toyota.co.jp/en/tech/environment/ths2/SpecialReports\\_12.pdf](http://www.toyota.co.jp/en/tech/environment/ths2/SpecialReports_12.pdf) Page 19).

The use of electricity for the provision of heat (for significant amounts of space and water heating) makes no sense thermodynamically. The exergy loss would be huge. (See the Second Law of Thermodynamics). Such electrical energy is capital intensive, so it also makes no sense economically.

These developments would reduce energy efficiency and accelerate depletion and increase dependence on an option that is unsustainable. This would be wholly counter-productive.

e) Markets – and therefore economic modelling – never address depletion and sustainability. They always assume ‘trends continued’ and discount the future, whereas depletion implies a fundamental discontinuity and it cannot be discounted, since energy is indestructible. (See the First Law of Thermodynamics).

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

6. Do you agree or disagree with the Government's views on the safety, security, health and non-proliferation issues? Disagree.

What are your reasons?

a) I see no mention of any Reactor Safety Study for the U.K. Yet following Chernobyl, ‘due diligence’ requires such to inform the citizens of both the UK and neighbouring countries regarding the safety risk, probability and consequences of the maximum possible release. However, any estimate of probability must be low, and by an amount that is not just unknown, but logically unknowable. Hence attention should be confined to the consequences. According to the Swedish Reactor Safety Study of 1978, these range up to 100,000 prompt fatalities and a contaminated area of 10,000 to 100,000 km<sup>2</sup>. The area of Belarus contaminated by Chernobyl was 144,000 km<sup>2</sup> while the area of the UK is 244,000 km<sup>2</sup>. With such consequences, the only safe probability is zero, which means no nuclear power. Most Western states either have none or are phasing out nuclear power.

b) The text mentions (at Section 6.19) that ‘The NII is not in a position to substantiate safety claims for reactor safety before it has a chance to carry out detailed assessments’. However, as shown above, this can be confined to the consequences, which are principally dependent on the reactor size and the fuel load and much less so on the plant design. The National Radiological Protection Board/Health Protection Agency should carry out such a study and publish the results openly before nuclear power is considered any further. They might make use of MARC (Methodology for Assessing the Radiological Consequences of Accidental Release of Radionuclides to Atmosphere) or CRAC2 (Calculation of Reactor Accident Consequences) program or one of its successors.

c) In the light of Chernobyl, a foreign policy of the U.K. should be to urge the rapid phase-out of nuclear power worldwide, due to the evident risk to its citizens. Moreover, rather than contributing to the refurbishing of overseas nuclear facilities, they should be shut down and replaced by energy saving and renewable options that are sustainable.

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

7. Do you agree or disagree with the Government's views on the transport of nuclear materials? Disagree.

What are your reasons?

The NPPs are on the coast, some distance from the major conurbations, but the transport arteries, both road and rail, pass through the major conurbations. Moreover, transport is inherently more vulnerable to accident or attack. Hence a given radioactive release may have greater consequences. Regarding the risk, the probability is unknowable, so only the consequences matter. These are ‘severe and wide-ranging’ and thus unacceptable, therefore nuclear power must be excluded.

Are there any significant considerations that you believe are missing? Yes.

If so, what are they? See above.

The purpose of this major consultation exercise is to provide interested parties with information on nuclear power, and to assist parties to reach an informed view on the future of nuclear power in the UK. Based on the responses and evidence gathered during this consultation, we will consider whether it is appropriate to confirm our preliminary view as Government policy, and to allow energy companies to invest in new nuclear power stations.

## Others

15. Are there any other issues or information that you believe need to be considered before taking a decision on giving energy companies the option of investing in nuclear power stations?

- a) All the omissions noted in my replies to the other Questions.
- b) Delivery of an energy and climate change policy can best be achieved by Energy Service Companies (ESCOs) operating under Carbon Emission Obligations. (See <http://www.energypolicy.co.uk/epolicy.htm> Part II).

And why? See my replies to the other Questions and above.

In their responses to the consultation, we encourage parties to include the reasoning behind their conclusions and any evidence that supports their views. In reaching a conclusion on the future of nuclear power, we will assess the responses to this consultation and the evidence and information that it brings forward.

17. Are there other conditions that you believe should be put in place before giving energy companies the option of investing in new nuclear power stations? (for example, restricting build to the vicinity of existing sites, or restricting build to approximately replacing the existing capacity)

- a) They should be required to eliminate all risks due to climate change, storm surge and sea level rise.
- b) They should be required to obtain and themselves pay for full insurance for all events, both operational and otherwise, with unlimited liability. After all, other energy options do so.

Alongside this in-principle consultation, there is a linked technical consultation on the details of running a Justification process and a Strategic Siting Assessment. Respondents to this consultation may wish to consider the information brought forward in these consultations<sup>61</sup>.

18. Do you think these are the right facilitative actions to reduce the regulatory and planning risks associated with such investments?

No. Nothing should be done to facilitate nuclear power. See my replies to other Questions. Moreover, rather than 'ensuring that private sector operators accumulate the funds needed to meet the full costs of decommissioning and full share of waste management costs', the state should collect such funds from the operators, since the operators may go bankrupt, leaving the state to pay. (See my reply to Question 4)

Are there any other measures that you think the Government should consider?

Comparable facilitative actions for energy savings (such as large-scale district heating from CHP and industrial 'waste' heat) and renewables (such as municipal waste, biomass and wind turbines, both onshore and offshore). Unlike nuclear power, these are sustainable, and would contribute to the necessary transition to a sustainable energy economy. (See my reply to Question 12).

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