Consultation on 'Planning for a Sustainable Future' **Gordon Taylor** **2007-08-16**

'the principle objective of UK planning policy must be to effect a smooth transition to a sustainable future – especially for energy services'

Q1: The Proposed Package of Reforms
Q1a: Yes
Q1b: Yes
Q1c: NA

Q2: Introduction of National Policy Statements
Q2a: Yes
Q2b: NA

Q3: Content of National Policy Statements
Q3a: Yes
Q3b: Yes. There is a linkage: Planning – Energy – Climate – Sustainability. All infrastructure proposals have energy impacts – for both the initial investment (embodied or 'grey' energy) and the recurrent outlays (operating energy). Some proposals may also have significant energy impacts for decommissioning and the long term storage of wastes. Moreover, all infrastructure proposals also have climate (greenhouse gas emissions) and sustainability impacts.

In the White Paper, P 8, Para 1.1, the emphasis is on 'clean and affordable energy'. However, it should be on 'sustainable energy services'. This means mostly energy savings with some renewable energy. As a guide, the Swiss '2000 Watt' (per capita) documents mention that the current value for Switzerland is about 6000 Watts per capita. They outline how some 4000 Watts per capita would come from energy savings (in all sectors), while - of the remaining 2000 Watts per capita – 1500 Watts per capita would come from renewable supply and only about 500 Watts per capita of fossil carbon or equivalent in greenhouse gas emissions. (See Jochem E. (ed), 2004, 'Steps towards a sustainable development'.
http://www.cepe.ethz.ch/publications/Jochem_WhiteBook_on_RD_energyefficient_technologies.pdf).

Peak Oil, Gas, and Coal are all imminent, and greenhouse gas emissions are far above the sustainable level. For the UK, targets of 60% reduction in greenhouse gas emissions by 2050 and 80% by 2100 were specified in 'Energy: The Changing Climate', Royal Commission on Environmental Pollution, Report 22, 2000. (See http://www.rcep.org.uk/newenergy.htm). Moreover, even greater reductions may yet be required. Thus we are now in the end-game for cheap fossil energy, climate change and sustainability. Hence the principle objective of UK planning policy must be to effect a smooth transition to a sustainable future. In particular, a significant share of the remaining fossil energy must be invested in infrastructure projects that deliver more sustainable energy services. These include energy saving and efficiency measures applied to the existing building stock, industry and transport systems. Only after this has been done should any net expansions be considered, and they should be sustainable. This means using the least amount of energy, with the balance from renewables, usually off-site. (See Q33a). Moreover, to be sustainable, all new energy supply projects should be renewable. There is insufficient time and fossil energy left for interim solutions. Only those infrastructure projects that reduce greenhouse gas emissions and increase sustainability should be permitted. (See http://www.energypolicy.co.uk/sustainpres.htm and http://www.energypolicy.co.uk/epolicy.htm).

Hence to meet national targets and international obligations, all infrastructure proposals must be assessed for energy, climate change, and sustainability impacts. This includes those projected over the lifetimes relative to the applicable targets at these future times. This is done by Life Cycle Analyses.

Reference may be made to a recognised database of 'elemental' Life Cycle Analyses, preferably that being developed by the EU. (See http://lca.jrc.ec.europa.eu/)

No proposal should be exempted from this requirement on grounds of 'commercial confidentiality' or similar. Energy and material resource depletion, climate change and sustainability are so important that everyone is entitled to such information. Also, the open publication of such data would encourage convergence on 'best practice'.

Also, it is essential to have a national (as distinct from sectoral) policy. Thus the policy statements for the separate sectors must be consistent with the national totals. Put simply 'the sums must add up'. To ensure that this is so, there should be a statutory requirement for the Infrastructure Planning Commission to make periodic reports - quantitative in energy, greenhouse gas emissions and sustainability - to Parliament. These should be based on the Life Cycle Analyses of the proposals permitted in the period. They should be shown for each proposal and in sufficient detail to enable peer review. In addition, fossil energy inputs and and greenhouse gas emissions from all existing and new infrastructure projects should be monitored by the Sustainable Development Commission. (See Q14b).

Certain depletable energy supply proposals – notably nuclear and Liquefied Natural Gas - involve unusual safety risks. However, there should be no continuation of exemptions from insurance of risks to the public – for example, under the Nuclear Installations Act 1965 and later. This would amount to an infinite subsidy, and hence distort the market and thus the allocation of resources. Moreover, the consequences of any major radioactive releases would bear extremely heavily on both the current and future generations, and thus be unsustainable - as for Chernobyl. (See http://www.greenpeace.org.uk/files/pdfs/migrated/MultimediaFiles/Live/FullReport/7578.pdf).

Nor should any such insurance exemptions apply to Liquefied Natural Gas facilities – terminals, pipelines, and rail and road tankers. Explosions and conflagrations have already occurred by accident and could be caused by terrorists. (See http://timrileylaw.com/LNG.htm). Hence such vulnerable facilities would be 'hostages to fortune', so should carry full insurance cover. In any case, as pointed out above, Peak Gas is imminent, so they would be unsustainable. (See Q22a).

Q4: Status of National Policy Statements
Q4a: Yes provided that they recognise the linkage Planning–Energy–Climate-Sustainability. Thus they should embody the national targets and international obligations – now and in the future – for greenhouse gas emissions and sustainability. (See Q3b).
Q4b: NA.

Q5: Consultation on National Policy Statements
Q5a: Necessary but not sufficient.
Q5b: Publication of the evidence of the energy, greenhouse gas, and sustainability impacts – both initial and recurrent - of the proposal. (See Q3b). This would involve a Life Cycle Analysis and should include sufficient detail to enable peer review. Reference may be made to a recognised database of 'elemental' Life Cycle Analyses, preferably that being developed by the EU. (See http://lca.jrc.ec.europa.eu/)

Q6: Parliamentary Scrutiny
Q6a: Yes
Q6b: 1) Advisers who are numerate and literate in the laws of physics and thermodynamics. These skills are essential for a proper understanding of infrastructure proposals, which all involve energy, greenhouse gas emissions and sustainability. (See Q3b).

2) There should be a statutory requirement for the Infrastructure Planning Commission to make periodic reports - quantitative in energy, greenhouse gas emissions and sustainability - to Parliament. These should be based on the Life Cycle Analyses of the proposals permitted. They should be shown for all permitted proposals – including those below the indicative thresholds - and in sufficient detail to enable peer review. The national totals of the quantitative data should include that projected over the project lifetimes, and compared with the declining national targets and international obligations.

Q7: Timescale of National Policy Statements
Q7a: No.
Q7b: 100 years - in line with the targets of 60% reduction in greenhouse gas emissions by 2050 and 80% by 2100, as specified in 'Energy: The Changing Climate', Royal Commission on Environmental Pollution, Report 22, 2000. (See http://www.rcep.org.uk/newenergy.htm).

The lifetimes of infrastructure projects are e.g. 40 years for power stations and 60-100 years for the built environment. A document with a 100-year view has recently been published by Vattenfall, a major European energy company. (See http://www.vattenfall.com/www/ccc/ccc/Gemeinsame_Inhalte/DOCUMENT/360168vatt/386340ceox/P02.pdf). This describes a global and long-term adaptive burden-sharing model to address the climate change challenge.

Furthermore, it takes more than a century for the atmospheric concentration of the longest-lived of greenhouse gas emissions – carbon dioxide – to stabilise. (See http://ipcc-wg1.ucar.edu/wg1/Report/AR4WG1_Pub_FAQs.pdf Page 32). Also, it takes a comparable period for the resulting global temperature to stabilise.

Q8: Review of National Policy Statements
Q8a: Yes
Q8b: 1) Failure to achieve the national and international energy climate (greenhouse gas emissions) and sustainability targets.

2) Unanticipated climate change and consequences.

Q9: Opportunities for Legal Challenge
Q9a: Necessary but not sufficient.
Q9b: The grounds for challenge on the basis of 'irrationality' should expressly include any contravention of the laws of physics and thermodynamics.

Q10: Transitional Arrangements
Q10a: No.
Q10b: They must nevertheless further the national targets and international obligations – and thus government policy - on energy, climate (greenhouse gas emissions) and sustainability. (See Q3b).

Q11: The Preparation of Applications
Q11a: Yes, that is as set out in Q3b.

Q12: Consultation by Promoters
Q12a: Yes.
Q12b: Yes, as for the submission to the infrastructure planning commission. Anything less would be incomplete, and therefore much more liable to legal challenge.

Q13: Consulting Local Authorities
Q13a: Yes.
Q13b: It should include a review of the quantitative evidence as Q3b, assisted by advisers who are numerate and literate in the laws of physics and thermodynamics. It should also include an 'open floor' stage – as proposed in Q1.

Q14: Consulting Other Organizations
Q14a: Necessary but not sufficient.
Q14b: 1) All major infrastructure proposals should require an external second opinion in respect of the evidence presented on energy, greenhouse gas emissions and sustainability. These are 'life-and-death' decisions, for which it is usual to seek a second opinion. This should be from a suitable organization within another EU member state, since the UK's international obligations in these regards are EU-wide in the first instance. (See Q32a).

2) The Sustainable Development Commission. This should continuously monitor all proposals and permitted proposals for furtherance and achievement of the national targets and international obligations in respect of energy, greenhouse gas emissions and sustainability. This should include those projected over the lifetimes relative to the applicable targets at these future times. (See Q3b). It should also include the proposals and permitted proposals below the indicative thresholds. (See Q20). This would serve as a check against abuses of the system, such as multiple proposals below the indicative thresholds. All have energy, greenhouse gas and sustainability impacts, and contribute to the national totals. Including the proposals before any permitting would give the Sustainable Development Commission more time to evaluate the evidence, and enable it to warn the Infrastructure Planning Commission - or the Local Authority for those below the indicative thresholds - if the proposal threatened the achievement of the national targets and international obligations for energy, greenhouse gas emissions, and sustainability – now and in the future.

Q15: Statutory Consultees' Responsibilities
Q15a: Yes.
Q15b: Three months, provided that the proposal includes the quantitative evidence set out in Q3b.

Q16: The Infrastructure Planning Commission's Guidance Role
Q16a: Yes.
Q16b: The requirement for quantitative evidence in respect of the energy, greenhouse gas and sustainability impacts over its lifetime, as set out in Q3b.

Q17: The Infrastructure Planning Commission's Advisory Role
Q17a: Yes.
Q17b: In advising promoters, they should liase with the Sustainable Development Commission regarding the national targets and international obligations for energy, greenhouse gas emissions, and sustainability criteria, including those projected over the lifetimes. (See Q14b).

Q18: Rules Governing Propriety
Q18a: The Infrastructure Planning Commission should seek independent advice – notably to check the promoters' evidence on energy, greenhouse gas and sustainability impacts. (See Q14b). Therefore this evidence must never be deemed 'proprietary' or 'commercially confidential'. If the promoter does not accept these terms, then the proposal should be refused. The societal interest must prevail. (See Q3b).

Q19: The Commission's Role at the Point of Application
Q19a: Necessary but not sufficient.

Q19b: The proposal must include the quantitative evidence in respect of the energy, greenhouse gas and sustainability impacts over its lifetime. (See Q3b).

Q20: Scope of the Infrastructure Planning Commission
Q20a: Yes.
Q20b: NA

Q21: Electricity System
Q21a: Yes. Moreover, the Commission must consider the effect of Peak Gas, Coal and Uranium (declining supplies at ever-higher cost) and how dependence on these fuels will be replaced (by energy saving and efficiency and renewable supply) – to meet the national targets and international obligations for energy, greenhouse gas emissions and sustainability. If the proposal is not consistent with the declining targets over its lifetime, then it should be refused. Furthermore, the proposal must not be exempted from full insurance cover. (See Q3b).
Q21b: NA

Q22: Gas Infrastructure
Q22a: Yes. Moreover, the Commission must consider the effect of Peak Gas (declining supplies at ever-higher cost) and how dependence on natural gas will be replaced (by energy saving and efficiency and renewable supply) – to meet the national targets and international obligations for energy, greenhouse gas emissions and sustainability. If the proposal is not consistent with the declining targets over its lifetime, then it should be refused. Furthermore, the proposal must not be exempted from full insurance cover. (See Q3b).

Q23: Other Routes to the Infrastructure Planning Commission
Q23a: Yes.
Q23b: NA.

Q24: Rationalization of Consent Regimes
Q24a: Yes.
Q24b: No.

Q25: The Commission's Mode of Operation
Q25a: Yes, provided that the expertise is numerate and literate in the laws of physics and thermodynamics. This is essential to a proper understanding of energy, greenhouse gas emissions and sustainability, which are involved in all infrastructure proposals. Also, all major infrastructure proposals should require an external second opinion in respect of the evidence presented on energy, greenhouse gas emissions and sustainability. These are 'life-and-death' decisions, for which it is usual to seek a second opinion. This should be from a suitable organization within another EU member state, since the UK's international obligations in these regards are EU-wide in the first instance. (See Q14b).
Q25b: None.

Q26: Preliminary Stages
Q26a: Necessary but not sufficient.
Q26b: 1) The Sustainable Development Commission. (See Q14b and Q17b).

2) The Foreign and Commonwealth Office – for compliance with international obligations on greenhouse gas emissions and climate change mitigation, and regarding the risk of radioactive releases falling outside the UK.

Q27: Examination

Q27a: Necessary but not sufficient.
Q27b: The proposals should be tested as set out in Q3b.

Q28: Hard to Reach Groups
Q28a: NA.
Q28b: NA.

Q29: Decision
Q29a: No.
Q29b: The national targets and international obligations on energy, greenhouse gas emissions and sustainability must prevail. Account must be taken of those of the proposal, including those projected over the lifetimes relative to the applicable targets at these future times. (See Q3b).

Q30: Conditions
Q30a: No. The targets and obligations are national and international. Also, the suppliers of fossil fuels and the promoters of (national) infrastructure projects are national or international. Therefore enforcement should be national. The Sustainable Development Commission should have a continuous monitoring role. (See Q14b).

Moreover, rather than the Infrastructure Planning Commission applying conditions, the promoter should modify the proposal and re-submit with new evidence. (See Q3b). This is because for complex infrastructure projects, individual changes (conditions) are rarely sufficient for the new proposal to be 'optimal'.

The requirements to be 'precise and enforceable' rule out offsets via e.g. the Clean Development Mechanism and Joint Implementation or similar.

Q31: Rights of Challenge
Q31a: Yes.
Q31b: NA.

Q32: Commission's Skill Set
Q32a: Numerate and literate in the laws of physics and thermodynamics. This is essential to a proper understanding of energy, greenhouse gas emissions and sustainability, which are involved in all infrastructure proposals. Also all major infrastructure proposals should require an external second opinion in respect of the evidence presented on energy, greenhouse gas emissions and sustainability. This should be from another EU member state, since the UK's international obligations in these regards are EU-wide in the first instance. (See Q14b).

Q33: Delivering More Renewable Energy
Q33a: This seems an afterthought. For sustainability, all depletable fuels must eventually be supplanted by energy savings and efficiency measures – along with renewable energy. (See Q21a and Q22a).

The cost, performance and efficiency of all energy supply facilities is affected by scale (e.g. the output capacity in kW or MW). This includes the generation of heat by solar collectors or biomass boilers. However, the effects of scale are particularly strong for the micro-generation of electricity by small wind turbines, photovoltaic arrays and micro-chp units. (See http://www.energypolicy.co.uk/sustainpres.htm Slides 19 and 26). Consequently they are not attractive for meeting energy, greenhouse gas, and sustainability targets. Indeed, all the evidence – both in the UK and overseas - is to the contrary. (See below). This means that such installations should be discouraged as counter-productive. They have very high opportunity costs, in that the money and

energy would be far better invested in other options. Such options include large-scale Combined Heat and Power plants supplying industry and district heating, fuelling of such plants with waste and other biomass, and large-scale wind turbines sited in high-wind locations onshore and offshore. (See http://www.energypolicy.co.uk/epolicy.htm)

Small Wind Turbines:

The initial results for an Ampair 600 wind turbine were 14 kWh in 694 hours, giving a capacity factor of 3.4 %. (See 'The Warwick Urban Wind Trial Project', Interim Report, March 2007. **http://www.warwickwindtrials.org.uk/resources/Warwick+Wind+Trials+Interim+Report+Final+2.pdf** Page 11).

Assuming an initial cost of £ 3500, and no maintenance costs over a 20-year lifetime, this implies a 'cost-of-electricity' of about £ 1/kWh – i.e. about 100 p/kWh – over 10 times the current retail price.

The capacity factor for an Urban Wind Turbine would be between 1% and 5%. (See 'Predicting the yield of small wind turbines in the roof-top urban environment', Simon Watson et al., Loughborough University, presented at EWEC 2007.
http://www.ewec2007proceedings.info/allfiles/52_Ewec2007presentation.ppt Slide 13).
This comprehensive study thus confirms the initial findings of the limited field trial.
These results are fundamental and cannot be bettered by any other design of wind turbine. Although they are strictly site-specific, the results for other urban areas would be very similar.

(The capacity factor for a large (MWe) onshore wind turbine in a windy location would be about 30%).

Small Photovoltaic Arrays:

The average capacity factor measured for the PV arrays in the BRE Field Trial was about 8.6% and the best about 10%. (See http://www.bre.co.uk/filelibrary/rpts/pvdt/PVDFT_Final_Techn_Report.pdf).

Page 6 notes that 'based on a system lifetime of 25 years' and when 'known underperforming systems are removed, the average and maximum costs (of PV generated electricity) are 39.1 p/kWh and 77.8 p/kWh'. This was nearly 5 and 10 times the then current (domestic) electricity prices of about 8 p/kWh.

(The capacity factor for a large crystalline silicon PV array in the UK, with optimal fixed orientation and slope and no shading, would be about 13%).

Micro-chp Units

The electricity efficiency of the WhisperGen Stirling micro-chp unit has been measured as around 7.8% (HHV). (See http://www.micropower.co.uk/publications/eonfieldtrial260606.pdf Page 11).

The efficiency of the Enatec Stirling engine unit was reported in April 2006 as 13.5% (LHV) - i.e. 12.2% HHV. (See http://www.dgs.de/uploads/media/06_Ger_Beckers_ENATEC.pdf Slide 12).

It has been noted that: 'as no current Stirling Engine-based design is capable of meeting the electrical efficiency requirements of 20% (HHV), they cannot receive Good Quality CHP accreditation under the current rules'. (See 'MicroCHP - delivering a low carbon future: Report on the market for microCHP', prepared by the Domestic CHP Section of the SBGI, 8th September 2003.
http://www.sbgi.org.uk/index.php?fuseaction=sbgi.viewFile&id=8010979 Page 27).

Hence, after taking account of the low electricity efficiency, the 'Thermodynamic Heating Efficiency' of micro-chp units is no better than the efficiency of good condensing boilers. (See http://www.energypolicy.co.uk/sustainpres.htm Slide 26). In addition, micro-chp units depend on natural gas, and so are unsustainable.

(The electricity efficiency of large (300 MWe) Gas Turbine Combined Cycle (GTCC) Combined Heat and Power plants is about 50%, and the 'Thermodynamic Heating Efficiency' of the co-generated heat supplied via district heating is about 330%. Thus – compared with typical existing gas boilers - the fuel saving is about 80%). (See http://www.energypolicy.co.uk/epolicy.htm Section 3.9).

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