DECC Science Advisory Group
Meeting 7 March 2012: Minutes

Main topics discussed:
• **ERP nuclear roadmap and its implications for DECC** • **Nuclear Power – Alternative technologies** • **Nuclear power – public and political opinion** • **Possible information note on Nuclear dose scales** • **Climate Change Risk Assessment**

Present:	Apologies:
John Shepherd (Chair)	Jon Gibbins
David MacKay (DECC Chief Scientist)	Tadj Oreszczyn
Nick Jenkins	
Nicholas Pidgeon	
Stuart Haszeldine	
Sue Ion	
Paul Watkiss	
Peter Cox	
Chris Mottershead	
James Davey, Katie Black (DECC Evidence Team)	
Si Dilks (DECC Office of Nuclear Development)	
Rob Arnold (DECC Engineering Team)	

Opening Introduction – John Shepherd

It was agreed that the Oil & Gas Regulatory regime agenda item is "for information" and did not require discussion as the review report speaks for itself[1]. Some of the recommendations may be relevant to fracking for shale gas on land.

It was noted that the GO Science "Science Assurance Exercise" for DECC is nearly complete.

Action – James to circulate final report to SAG when available.

The minutes of the previous meeting were approved.

Matters arising

It was agreed that those SAG members interested in Green Deal, and associated technical and behavioural issues related to the reduction of energy use in buildings, should meet with relevant analysts in DECC to discuss outstanding difficult issues. The CSA would particularly like SAG advice on

- Potential for new materials, interventions (including controls) or business models to deliver energy demand reductions, and *what DECC should do, if anything*, in supporting these.

[1] http://www.decc.gov.uk/assets/decc/11/meeting-energy-demand/oil-gas/3875-offshore-oil-gas-uk-ind-rev.pdf

- Where DECC should focus strategic research and evidence collection activities in order to improve our understanding of reducing energy use in buildings, and hence strengthen policy development and delivery, in the medium term

On the EMR the CSA suggested that it would be helpful if the SAG could provide him with advice on how different sorts of generation mix (as set out in the Carbon Plan) would impact on the electricity system, in terms of cost, reliability and deliverability, and therefore what the broad implications of these different mixes are. The CSA would also like guidance on the feasibility of energy storage (in particular compressed air) as a major contributor to security of electricity supply in the UK and guidance on whether any other storage technologies, or approaches, including seasonal heat storage, offer potential.

Report from Chief Scientific Advisor (CSA)– David MacKay

The *Carbon Plan*[2] has been published. This sets out a number of different possible pathways to the 2050 decarbonisation goal, and how the 4th Carbon Budget (2022 – 2027) could be met. The Plan recognises that more measures are needed to deliver the 4th Carbon Budget. It sets out sectors in which additional mitigation can be delivered but *does not* specify where this effort *will* be delivered.

The *2050 calculator*[3] is now available with costs.

The House of Lords report into the role of Departmental CSAs has now been published[4].

The House of Lords paper on nuclear Research and Development has been published and government is considering what its role in nuclear R&D should be. John Beddington, Government CSA, is establishing a Nuclear Research and Development Advisory Board to advise on a cross-government response to the report. It is expected that DECC will be represented on this group.

DECC will shortly publish a "Bioenergy Strategy" and a "Heat Strategy". RAEng has published "Heat – Degrees of comfort" which is a useful document to look at in the context of Heat Strategy.

Action – James to check whether strategy teams would welcome SAG comment on the strategy documents.

DECC is seeking to improve its evidence base on the benefits of Demand Side Response and Smart Meters. There was discussion of the functionality that Smart Meters would need in order to deliver DSR benefits.

Action – SAG to write to DECC CSA to advise whether the current technical specification for Smart Meters, and the supporting communication architecture is sufficient to deliver DSR and 'Smart grid' benefits.

The CSA had appeared before the House of Lords committee on risk perception.
http://www.parliament.uk/business/committees/committees-a-z/commons-select/science-and-technology-committee/inquiries/parliament-2010/risk-perception/

[2] http://www.decc.gov.uk/en/content/cms/tackling/carbon_plan/carbon_plan.aspx
[3] 2050-calculator-tool.decc.gov.uk
[4] http://www.parliament.uk/business/committees/committees-a-z/lords-select/science-and-technology-committee/news/csa-report-press-notice/

Energy Research Partnership nuclear roadmap and Nuclear Power – Alternative technologies discussion *(Presentations by Sue Ion)*

ERP Roadmap

SAG members were issued with a copy of the full ERP Roadmap document and Sue Ion summarised the findings. These had been picked up by the House of Lords in their recent Enquiry and in the Government's response. DECC CSA pointed out the importance of the review being Chaired by Sir John Beddington, Government CSA which formed part of the Government response and would pick up on many of the ERP recommendations for study and further work. The ERP report provided a strategic outline of issues which need to be addressed in developing a UK Nuclear R&D Roadmap, some of which required urgent attention. It also highlighted that a range of technology pathways could be needed each with significantly different R&D requirements and opportunities for the development of UK industry and the supply chain depending on how much nuclear energy was expected to be in the UK energy mix by 2050 and beyond. These included, *inter alia*, ensuring maximum opportunity for the UK supply chain, long term uranium supply issues driving requirements for alternative fuel cycles, increased challenges in spent fuel management and disposal, ongoing requirements to reprocess fuel from the UK's Gen III fleet, the development of Gen IV systems for deployment in the UK along with future fuel cycles, appropriate early investment in assets for R&D and technology demonstrators, availability of a qualified and expert skill base.

Alternative nuclear technologies

SAG members received a summary of work ongoing globally and were appraised of the relatively weak position now held by the UK in terms of R&D in nuclear technologies compared with 30 years ago where the UK was a world leader. The Generation IV systems being progressed internationally were highlighted and discussed and the increasing roles of China and India emphasised. The emerging interest internationally, especially Small Modular Reactors, especially the 4 US led LWR systems was highlighted as this area of technology development could present opportunities for UK engagement given the skill base and expertise extant within the UK. SMR's may offer advantages of scaleability by multiple deployment, and deployment on smaller existing nuclear sites.

SAG discussed the approaches made recently by GE with respect to deployment of their PRISM Fast reactor technology as an alternative means to deal with the UK's Pu inventory compared with the otherwise expected thermal Mox technology which would require both an interested and willing utility to deploy it in a Generation III LWR and a new Mox fuel plant. It was noted that while the commercial offer made could be perceived as attractive but as with all Gen IV systems issues associated with licensing and demonstrating the overall system would need to be understood in much more detail, especially the accompanying fuel manufacture and fuel cycle which would need to be developed in parallel. Secondary waste arisings and overall waste management issues were highlighted by SAG which would need in depth understanding

SAG noted overall that the current EMR package was unlikely to lead to commercial interest in Generation IV reactors as it was clear that the extent of Government support would need to be much greater and a more likely avenue would be for the UK be part of some form of international collaboration until the technology is much closer to market.

Nuclear power – public and political opinion

Nicholas Pidgeon spoke to the SAG about public perceptions of nuclear power (still negatively linked to weapons, waste and cancer). He described the general public attitude towards nuclear in the UK as "reluctant acceptance", with general distrust of both industry and government (so independence of advice is crucial). Nevertheless, there is still stronger support for nuclear power in the UK than in many other countries. However, he warned that getting agreement to build new nuclear facilities is likely to be extremely difficult and emphasised that public engagement is vitally important at all stages of the process. The key issue is trust. In discussion it was noted that there are still likely to be problems in getting both community engagement and geological suitability for waste repositories.

Action – David MacKay to speak with CoRWM on this issue

Possible information note on radiation dose levels

David MacKay presented a paper describing a proposed graphical representation of a radiation dose scale in a similar way to the current air quality scale used by Defra to inform the public on air quality exposure. The SAG thought this was a good idea, but cautioned that this would need to be tested to see what public response was likely to be before publication. There are still problems in displaying the different effects of chronic and acute doses in a single diagram.

Climate Change Risk Assessment

The UK CCRA was discussed. There was some concern that presentation within this document is focused on median impacts of the middle scenario, when good practice for communication of risks suggests that one should emphasise the range of possible outcomes including extreme events. The attempt to simultaneously display confidence levels was worthwhile, but the resulting diagrams remain quite difficult to understand.

The water sector (especially flooding) had been well handled. The power sector analysis was felt to be useful, but could have been done in more detail. There was insufficient attention to future demand for cooling, and the analysis does not include future socio-economic change. The estimated benefits for agriculture are very uncertain (and do not adequately deal with changes of precipitation). The estimated impacts are modest (c.f. Stern) but this is largely because the largest impacts are likely to occur later (i.e after 2040). Such short/medium term analyses inevitably miss the "turning the supertanker" problem. Changes in the future power mix are also likely to be considerable. It needs to be clearly understood that such analyses are useful tools for planning adaptation measures, but are not suitable for assessing the appropriate levels of effort on mitigation. The Foresight study on the International Dimensions of Climate Change (http://www.bis.gov.uk/assets/foresight/docs/international-dimensions/11-1042-international-dimensions-of-climate-change.pdf) is highly relevant to this issue.

Shale Gas

Stuart Haszeldine presented a briefing note on geological aspects of fracking for shale gas extraction https://www.decc.gov.uk/en/content/cms/about/science/sag/docs/docs.aspx .This reaches very similar conclusions to the DECC commissioned report (http://og.decc.gov.uk/en/olgs/cms/explorationpro/onshore/cuadrilla_decc/cuadrilla_decc.aspx)

The disposal of recovered water may prove to be the most significant environmental issue. Substantial monitoring of fracking activities is needed as well as effective regulation. The SAG noted that the benefits of

a "joint competent authority" approach noted in the Offshore Oil & Gas regulatory regime review would apply equally to shale gas exploration onshore.

Action - The SAG briefing note will be submitted to the Royal Society/RA Eng. study on this issue.

Future agenda

Energy and electricity storage was raised as an issue on which the CSA would welcome advice.

The agenda for the next meeting should therefore include

- A discussion on possible future UK electricity mix (fossil, nuclear, renewables, other) and the implications of these different mixes
- Energy storage – Technical and economic potential of different technologies

AOB

There was discussion of whether SAG membership should be expanded to include more engineering and socio-economic expertise as suggested by the GO Science review.

Action – David MacKay to consider whether he wants new SAG members.

Meeting closed at 1700