DECC SCIENCE ADVISORY GROUP 07TH DECEMBER 2012

MINUTES

Agenda

1. **Introduction**
2. **CSA's Update**
3. **DECC Statistics**
4. **DECC Strategy & Carbon Plan**
5. **DECC Energy and Emissions projections models**
6. **Lunch**
7. **Horizon Scanning**
8. **AOB**

Present:	Apologies:
John Shepherd (Chair)	Tadj Oreszczyn
David MacKay (DECC Chief Scientific Advisor)	
Jon Gibbins	
Stuart Haszeldine	
Sue Ion	
Paul Watkiss	
Peter Cox	
Nick Jenkins	
Chris Mottershead	
Nick Pidgeon	
Harshal Mehta (DECC Evidence Team)	
Jane- Dennett- Thorpe(DECC Head of Evidence Team)	
James Davey(DECC Evidence Team)	
Katherine Hill (DECC CSA's Office)	
Duncan Millard (Head of Statistics) (present for items 1-5)	
Ben Golding (Deputy Head of Strategy)(present for items 1-4)	
Sanchia Bailey (DECC Operational Research)(present for items 1-5)	
Craig Lucas (Director of SIG) (present for item 5)	

1) Introduction

John Shepherd summarised the agenda for the day, noting that a major part of it would be devoted to the "light touch" horizon scanning activity.

2) CSA's Update

1) A business case put forward to invest in the Jules Horowitz Reactor (JHR) has been submitted and the CSA is hopeful this will go through. JHR[1] will provide a modern experimental capability for studying materials and fuels behaviours under irradiation for applications such as:
    - Support to nuclear power plants of generations II and III
    - Development for future generations of reactors
    - Radioisotope production for medical applications.

    A Business Case for the establishment of a National Nuclear user facility has been proposed. DECC are looking to invest five million pounds into this project.

2) DECC held a successful workshop on heating controls last month. The workshop[2] highlighted the difficulties in doing a technically sound trial on smart controls due to the huge number of variables. Never the less the CSA feels that good domestic heating controls can make a big difference to energy bills and energy savings, more than suggested by some of the commonly used literature. He would like to carry out a research project to prove that they can have significant impact.

3) The CSA is engaging MPs on the Environmental Audit Committee, and Energy & Climate Change Select Committee on the 2050 Calculator, encouraging them to come up with their own decarbonisation pathways. DfID is providing further support to roll-out 2050 Calculator to a further 10 countries and development of a global calculator is being considered.

4) As part of the roll-out of Green Deal the CSA has been working with the Green Deal team to understand the uncertainty in estimates of energy savings provided by the Green Deal Assessment 'doorstep tool'. In particular he would like to review the current points estimate system to see whether some indication of uncertainties could be retro-fitted.

    Action – The CSA to circulate this analysis to the SAG.

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[1] http://www.ncnr.nist.gov/trtr2005/Proceedings/Gaillot%20-%20JHR%20Experimental%20Capabilities%20text.pdf

[2] https://www.gov.uk/government/policy-advisory-groups/112#advice-to-the-chief-scientific-advisor

5) Engagement with the Renewable Heat Incentive (RHI) Team have highlighted an error in a statement the CSA had previously made to the SAG (that the *entire* heat output of a Heat Pump counted as 'renewable' for the purposes of the EU 2020 renewables target). The correct formulation is that the portion of output from a heat pump that counts as 'renewable' under the EU target is the total output of the heat pump, minus the energy (electricity) input into the heat pump.

   Nick Jenkins noted that the UK Energy Research Centre (UKERC) has provided a response to the Domestic RHI consultation DECC has been running.

   Action – Nick to forward the UKERC response to the SAG.

6) Moira Wallace (previous Permanent Secretary) has left DECC. Phil Wynn Owen will be filling the role until a permanent replacement is found. [Note: Stephen Lovegrove (formerly with Deutsche Bank) has subsequently been appointed]

7) An update on Business Planning was provided. Science and Innovation will be cut by 10% in 2014 – 2015. A plan is in place to manage this cut. Additional cuts arising from the Autumn statement have yet to be factored in to Business Planning.

8) The AVOID Project has produced some useful new results in the form of blob diagrams. The SAG noted that some existing AVOID scenarios already involve negative emissions, and future AVOID work should include the possibility of solar radiation management (SRM) as it is possible that one or more countries might unilaterally seek to pursue this course of action.

   Action – CSA to circulate AVOID slides

9) The Energy Bill was regarded as a good result for DECC. The Levy Control Framework will generate £7.6 billion p.a. by 2020 for support of low-carbon technology, and require DECC to make trade-offs between Renewables, CCS and Nuclear power to ensure appropriate levels of support for each technology.

10) The Science and Innovation Group are running a project on the cost of balancing electricity supplied by wind. Craig Lucas, Head of Engineering, is SRO for this work. RA Eng. work in a similar space is being factored in to this project.

11) Nuclear Research and Development and Advisory Board (NRDAB) chaired by Sir John Beddington is close to completing its work and will report soon.

12) The CSA is seeking to understand the way in which high hazard facilities at Sellafield are monitored, following consultation with Mike Wakeman (HSE). The SAG noted

that there had been an OCNS Review (possibly chaired by Sir David King) on this subject that reported some time ago.
Action – CSA office to locate OCNS review and share with CSA.

13) A review by the CSA of the GHG impacts of shale gas (including those arising from fugitive emissions) is being considered and SAG assistance may be helpful [Note: this review has subsequently been requested and will be led by the CSA and Dr Tim Stone].

14) The CSA is considering the possible adverse impact of recent announcements on electricity tariffs on the ability of energy companies to offer time-of-use tariffs that take advantage of Smart Meter capabilities.

15) The CSA is in contact with the Ground Source Heat Pump Association, in order to determine how best to accelerate take-up of Heat Pumps in an effective way.

16) The CSA has met several times with both new DECC Ministers (John Hayes (MoS) & Baroness Verma) recently. Energy from waste is a priority for our new Minister of State. The SAG are keen to meet with the new DECC SoS & Ministers.

Action – SAG Secretariat to arrange when mutually convenient.

3) DECC Energy Statistics (Duncan Millard)

The presentation covered key statistical information on large areas of DECC's work; including Energy Security, Climate Change and Fuel Poverty.

On Energy Security the presentation covered figures ranging from our current energy production in the UK to our dependency on imports. This highlighted the incorrect perception that the UK's gas supply is from Russia (it is actually heavily dependent on LNG from Qatar). There has also been a fairly steady 3% p.a. reduction of domestic energy consumption (over the past seven years) but little reduction for transport.

On Climate Change, Duncan Millard pointed out that emissions may be higher than initially expected at the end of this year as there was an influx in electricity produced from coal in the second quarter of 2012. This prompted the SAG to take particular interest in the variation of energy prices; the quarterly figures can be found at:
http://www.decc.gov.uk/en/content/cms/statistics/publications/prices/prices.aspx

On fuel poverty Duncan Millard highlighted the work carried by Professor Hill which has changed the method for assessing and prioritising Fuel Poverty, and a recently published series of interactive maps; one of which illustrates fuel poverty around the UK by local

authority. More information can be found at:
http://www.decc.gov.uk/en/content/cms/statistics/local_auth/interactive/interactive.aspx

Duncan also spoke about some new work being carried out by the statistical team on National Energy Efficiency Data (NEED) framework to enable detailed statistical analysis of energy efficiency. This indicates actual observed savings of approximately 10% from condensing boilers and cavity wall insulation. More information can be found at:
http://www.decc.gov.uk/en/content/cms/statistics/energy_stats/en_effic_stats/need/need.aspx

All the statistics from the presentation can be at:
http://www.decc.gov.uk/en/content/cms/statistics/statistics.aspx

Further information on Energy sector indicators and Energy consumption in the UK at:

http://www.decc.gov.uk/en/content/cms/statistics/publications/indicators/indicators.aspx

http://www.decc.gov.uk/en/content/cms/statistics/publications/ecuk/ecuk.aspx

Action: Duncan Millard to provide the SAG with a link to the NEED report.

4) DECC Strategy & Carbon Plan (Ben Golding)

The presentation gave a brief overview of the policies and plans in place (the "carbon plan") to meet the UKs legal obligation, and a three stage high level strategy to meet our requirements up 2030 and beyond. This is based on specific policies to 2023, likely scenarios for 2023 to 2027, and four plausible pathways for 2050 (specifically "core" Markal, high renewables plus efficiency, high nuclear, and high CCS and biofuels). The Carbon Plan set out a three stage strategy:

Phase 1: Complete and prepare – From now to 2020, focus on completing "quick wins" like cavity wall and loft insulation, and preparing for the future through innovation support and building markets.

Phase 2: Mass deployment – In the 2020s and 2030s, moving to large scale deployment of key technologies such as low carbon heating and electric vehicles.

Phase 3: Finalising – From 2030 onward, tackling "harder to decarbonise" sectors such as industry and aviation.

SAG Comments

This prompted a discussion of the technical feasibility of meeting the 2050 target to reduce UK GHG emissions by 80% on a 1990 baseline. The SAG felt that although these pathways could be hypothetically feasible, DECC has not yet clearly established the technological requirements or begun to develop the relevant policy framework required.

In addition, the plan envisages around 100 GW (e) installed of low carbon electricity by 2050. The SAG queried whether such ambitious targets were realistically achievable, given the decline in the UK's expertise and industrial capacity for energy generation technology since the demise of the CEGB, and suggested that a reality check on the UK technological capability to deliver the pathways in the Carbon Plan should be undertaken.

The SAG suggested that ministers should be looking more closely at embedded carbon and carbon allowances and the policies, incentives and technological developments needed to meet the Carbon budgets and Kyoto requirements.

There was considerable discussion surrounding possible new bases for international negotiations post-Kyoto, including alternatives to a global carbon cap and trading system, with SAG particularly interested in learning more about proposals for a game theoretic approach.

Action – A subgroup of SAG members to consider and evaluate the relevant 2050 pathways and highlight any elements, or pathways, they think stretch credibility.

5) DECC Energy and Emissions projections models (Sanchia Bailey)

Sanchia Bailey began the presentation by giving an overview of the basis of DECC energy & emissions models used to derive their projections of energy supply and demand. These are based on iteration to find a demand/dispatch balance, and incorporate an electricity emissions target of 100gCO2/kWh, and are subject to the following caveats:

- There are always uncertainties in the input assumptions e.g. GDP growth, fossil fuel prices, generation costs, policy impacts.
- Demand equations are based on past behaviour which may not be accurate predictor of future behaviour.
- They do not provide realistic projections for what we expect to happen in the long run (post 2023) because **only current policies are included**.

Sanchia then described the following projections; Territorial, traded and non traded emissions, Emission changes from 2011, Emissions by sector, Energy demand by fuel and sector.

SAG comments

The SAG drew attention to the fact that the current projections show that there is a major policy shortfall post 2023 compared to what is set out in the DECC Strategy and Carbon Plan. There will therefore be a major requirement for new policies, mechanisms and incentives to achieve these long-term goals.

Sue Ion pointed out the required switch from gas to electricity for domestic heat, and the decarbonisation of electricity generation from gas is going to be a huge challenge due the very large amount of "unabated" gas (i.e. gas without CCS) assumed as an interim measure up to 2023.

General points:

- Projections need to incorporate & evaluate possible policy options out to 2050, to establish a "feasible set in lever space" (DM).
- DECC needs to develop realistic post-2023 policy options for such evaluation and for long-term guidance to industry very soon.
- DECC must act early (and aim to set decarbonisation targets now rather than in 4 years time) to ensure that policies have enough time to take effect (given multi-decadal infrastructure construction times).
- Real improvements are required in non-traded emissions (especially domestic and transport) if we are to meet our targets going into the 4th Carbon Budget: the ETS is not enough.

Action- SAG members are invited to provide the CSA with their own suggested pathways in the 2050 calculator.

6) Lunch

Craig Lucas (acting Director of SIG) joined the SAG for lunch.

7) Horizon Scanning

DECC faces many uncertainties over the next decade involving technical, financial, political and environmental issues. These involve both threats that DECC could mitigate and opportunities that DECC could exploit.

Over lunch the SAG prioritised their previously suggested threats and opportunities, with focus on low probability/high impact opportunities and high impact threats. The idea here was to arrive at a reduced list of issues that DECC does not currently have well covered, for discussion and development as appropriate.

The headings of Carbon Reduction, Energy Security, and Innovation, were used to structure this discussion. The SAG were then asked to identify the things DECC needs to do,

particularly on science, technology and social science, in response to these threats/opportunities.

James Davey, Jane Dennett-Thorpe and Rhiannon Mulherin helped facilitate the discussion.

The following table summarises the topics selected for further discussion :

Carbon Reduction	Energy Security	Innovation
Modular Nuclear Reactors	Variations in fuel wholesale prices, including – Gas price high ; coal cheap ; reduction of international gas prices ; oil prices increase dramatically	Unexpected geo-engineering (including unilateral Solar Radiation Management (SRM))
Effective reduction of emissions from Industry + Transport	New nuclear – Communities	Negative Emission Technology (e.g. CO2 removal from the atmosphere)
Exploration of methane hydrates	Heat networks - Communities	Efficient solar to hydrogen method / other breakthrough technologies in renewables
Shale gas & oil	Type failure of generating plant and failure of CCS	Focusing on co-benefits of mitigation actions (e.g. air quality improvements)
Rate of Climate Change fast or past tipping point	Fukushima 2	
"Deal or no deal" on global climate change	Gen IV nuclear reactor designs	
Impacts of changes to fuel/technology prices on levy spend		
Definition of dangerous climate change moves towards defining dangerous rates		

The outputs of this session will be captured in a paper from the SAG to the Chief Scientific Advisor.

8) AOB

Nick Pidgeon raised concerns about the next round of reports being prepared by the Intergovernmental Panel on Climate Change (IPCC). He feels they are becoming too "bureaucratic" and thus almost unintelligible to outside audiences. David Mackay said he would flag this up to the Climate Science team.

Action: David Warrilow to look at the IPCC reports as they develop and brief David Mackay.

SAG Forward Look (subjects to be considered)

- DECC Response to Emergencies, in particular Civil Nuclear Security, Oil & Gas
- Game Theory w.r.t. International CC negotiations (e.g. Cramton & Stoft)[3]
- Embedded Carbon Emissions: Methodology for assessment (e.g. J Barrett)[4] and policy option development.
- The global emissions gap (and need for negative emissions technologies)
- Electricity Market Reform & the Energy Bill

Action: SAG Secretariat to talk to EMR Team to identify further areas that would benefit from SAG support and/or comments)

[3] http://works.bepress.com/cramton/42/
[4] http://www.see.leeds.ac.uk/people/j.barrett