

**MEETING DATE:** 7<sup>th</sup> July 2011

**LOCATION:** Westminster Conference Centre, 1 Victoria Street, London SW1

**ATTENDEES:**

**Chair:**

Nick Winser                      National Grid

**Members/alternates:**

David Clarke	ETI
Graham Pendlebury	DfT
John Miles	Arup
Richard Ploszek	Royal Academy of Engineering
John Loughhead	UKERC
Frigyes Lestak	Shell
Alison Wall	EPSRC
Jeremy Watson	DCLG
Mike Garwood	E.ON
Neil Morgan	TSB
David Eyton	BP
David Franklin	SSE
Ron Loveland	Welsh Assembly Government
Neville Jackson	Ricardo
Duncan McLaren	Friends of the Earth
Richard Neale	Atkins
Stephen Trotter	ABB
Paul Hollinshead	DECC
Mike Farley	Doosan Power Systems
Peter Bance	Ceres Power

**Non-Members:**

Mike Thompson	CCC
Bernie Bulkin	ORED

**Secretariat /Analysis Team:**

Ian Welch	National Grid
Farida Isroliwala	DECC
Jonathan Radcliffe	ERP Analysis Team
Richard Heap	ERP Analysis Team
Mark Workman	ERP Analysis Team
Ilaria Longo	ERP Analysis Team

**Apologies/Not present:**

Peter Emery	Drax
Martin Grant	Atkins
Julian Allwood	University of Cambridge
Sue Ion	RAEng
Ian Marchant	SSE
Graeme Sweeney	Shell
David MacKay	DECC
Allan Jones	E-ON
Tom Delay	The Carbon Trust
Paul Lewis	Scottish Enterprise

## **1 Chair's introduction**

Nick Winser (NW) introduced Paul Hollinshead, Director of Science and Innovation, deputising for David MacKay who is on paternity leave.

Apologies were noted from Peter Emery, Martin Grant, Julian Allwood, Sue Ion, Graeme Sweeney, Ian Marchant, David MacKay, Allan Jones, Tom Delay and Paul Lewis were noted; with substitutes, Richard Plozsek for Sue Ion, Frigyes Lestak for Graeme Sweeney David Franklin for Ian Marchant, , Mark Garwood for Allan Jones and Richard Neale for Martin Grant. NW acknowledged the change of circumstances for Peter Bance who is no longer the CEO for Ceres Power; nevertheless, he will continue to give his contribution to the ERP meetings in the foreseeable future.

Nick welcomed Bernie Bulkin from DECC's Office of Renewable Energy Deployment and Mike Thompson from Committee on Climate Change, attending for the item on renewable energy.

The minutes of the previous plenary meeting were approved.

Jonathan Radcliffe (JR) gave an update on the Consortium Agreement; he thanked all the members for taking the time to read it and send through their signatures and said that the hard copies will be posted to all members the following week.

NW gave an update on the North Sea Offshore Networks conference which was co-hosted by the ERP; its key messages were circulated with the meeting papers.

The Energy Storage report and Bio-energy Executive Summary have been published, copies have been sent around and NW congratulated the ERP on this achievement.

Other ERP projects are updated in the meeting papers.

John Loughhead (JL) gave an update on the International Engagement work following a recent Steering Group meeting. Members re-established the priorities for the project which would be to provide a framework through which the role for the UK in technology areas can be identified and then actions derived, which will now be pursued by the Analysis team. The outputs will help identify the areas in which proactively try to establish a specific international engagement, likely to be presented in January 2012.

## **2 Industrial Efficiency, David Eyton / Richard Heap**

David Eyton (DE) introduced the item, by saying that the World's energy systems are little more than 10% efficient. The focus has been on carbon efficiency, so this project made a point of looking at energy efficiency. For example, carbon capture and sequestration will be necessary to reduce carbon emissions but it increases energy demand. There is also a presumption that companies are economically rational and hence if there is an economic rationale for improving energy efficiency they would implement it. Studies indicate that this is not necessarily the case, and this report looks at the impediments to rationale behaviour. The study has taken an energy efficiency lens to industrial energy use, but has not looked through other lenses for efficiency, in particular resource or material efficiency. The work is not complete and DE highlighted the revised recommendations that had been tabled. He encouraged Members to highlight areas that need further attention and development.

Richard Heap started his presentation by giving an overview of energy use within industry stating that industry accounts for 34% of total UK emissions, 19% of UK final energy demand and 22% of GDP. Since the 1970s industrial energy demand has fallen from 43% to 19%, 63% of which is from intensive energy users and 36% from assorted other sectors. Information about industrial emissions can be difficult to obtain, because companies view

data as confidential, which makes detailed quantitative analysis challenging. However, some high-level messages are clear.

The potential for efficiency varies between intensive energy users and non-intensive energy users. Intensive users are already highly efficient, but with potential for some incremental improvements or plant upgrades to meet global best available technology. Less intensive users have greater potential for improvements, but are hard to quantify. Some options are specific to sectors, but generic technologies and processes can also be made more efficient such as electric motors.

The study focused on energy efficiency within the factory gate, but additional energy savings can be made downstream through material efficiency. This includes light-weighting of products and the recovery of materials. Recycling can reduce energy demand, but can still have an energy demand, for example for re-smelting metals. Managing the embodied energy indicates the need to develop product reuse options and transformation of products through low energy conversion costs. The drivers and policy tools for material efficiency are different to energy efficiency, focused more on product and waste management. It will require new business models to be developed.

Companies may appear to be economically rational but even cost effective options are not being implemented as fast as expected. The barriers and responses to them differ between intensive energy users, large companies and smaller companies, but the common issues are much the same.

1. Information is a primary issue to identify projects and accurately assess their potential. A senior level energy manager is important, but gathering information can be inordinately expensive for smaller companies. Audits and demonstration projects are needed.
2. Perception – growth projects are more appealing and visible than energy efficiency projects. Targets and legislation can help address this.
3. Resources to deliver project – projects tend to be smaller requiring too much resource, proportionally, to deliver them. Ring-fenced funding can help.
4. Strategic benefit of efficiency - lower energy demand can reduce company exposure to energy price changes and are not exposed to market volatility, unlike growth projects. They should therefore attract greater attention for investment.
5. Other barriers include costs of plant downtime and location, e.g. linking to heat sources.

Policy requires a package of measures. Current policies focus more on carbon rather than energy, which may also incentivise less efficient options, such as low-carbon supply from renewables. Regulatory measures are also necessary, such as performance standard mandates, for example for electric motors. Information measures such as energy audits are also valuable.

Revised recommendations were tabled.

### ***Discussion***

NW opened the discussion encouraging members to focus on the recommendations.

- It was recognised that the whole question of efficiency versus carbon reduction is a very big and long debate that needs to be looked at in much greater detail. This report looks just at efficiency, as carbon reduction had been looked at by ERP separately, particularly CCS and biomass. It was also noted that efficiency is not a goal but a means to reducing operating costs and mitigating climate change. It was

noted that carbon emissions are an effective measure of progress in energy efficiency.

- Report should recognise what the Carbon Trust has done and is trying to do in terms of bringing through many of the improvements into industry and products. The report should give more recognition of what they have done and how they might take it forwards. This includes at a system level and for technology development.
- It was suggested that the report should be clear about the potential prize from energy efficiency and where the R&D element is in this.
- More details are needed about where the R&D knowledge and potential improvements lay. Research is needed into how new technologies are used and understanding the role of human behaviour.
- The uncertainties and risks to return on investment are not well understood by the investment community and more needs to be done to draw attention to the corporate benefits.
- An additional driver, which is not mentioned in the report, is corporate image and reputation. Company marketing departments could be important particularly for driving resource and material efficiency.
- Work led by Geoff Hammond at Bath funded by UKERC should be noted by the report, although it was too early for any significant outputs.
- Where possible more detail would be valuable about the scale of efficiency gains in both intensive and non-intensive users, and how the UK compares internationally. UK intensive industries are better than global average but are some way from meeting the most efficient.
- It was suggested that the UK might adopt a demand target, such as the Germans have.
- The role of public and private financing will be important and mention should be made of the role of the Green Investment Bank, and the electricity market reform, and whether they are going to see energy service company models financing these projects.
- The Energy Intensive Users Group has done considerable work this area and they should be consulted over the findings.
- The EU energy efficiency directive extends from industrial efficiency to the efficiency of the electricity production. It was suggested that the study might extend to include power plants.
- One of the big technology opportunities is to establish the best ways of doing CCS on industrial processes and how to integrate them, such as using some of the waste heat.
- Many small medium industrial organizations outsource all or part of their production, reducing the direct control over energy efficiency. They also contract out energy using equipment. It was suggested that efficiency gains could come from looking at the supply chain.

### **Actions**

- Additional material to be added to report and work up the recommendations, with aim of updating at Members at next Plenary meeting
- Particular focus on opportunities for research, including policy research and energy systems research and new technology research.

### **3 Renewable Energy**

NW asked Neil Morgan to say a few words on the technology innovation centre on offshore renewables. NM stated that the centre had been announced in May and the expression of interest document is to be published next week. The expression of interest will finish in September; four submissions will then be invited forward by mid-November and the selection process will be concluded by the end of the year.

#### **Committee on Climate Change: the Renewable Energy Review, Mike Thompson**

This review was commissioned by the Government to advise on the role of renewables and scope to increase ambition. The Renewable Energy Review:

- Builds on our fourth carbon budget work looking to 2030 and beyond
- Sets out new technical and economic analysis
- Presents scenarios for renewable energy
- Considers implications for 2020 ambition
- Assesses key enabling factors

The key messages were:

- Renewables are part of a range of promising options for decarbonisation. In some areas they are essential, particularly in heat and power. In transport there are uncertainties about sustainability, and the targets are therefore restricted to the limits set by the Gallagher Review.
- Renewables should play a major role in decarbonisation. There is plenty of renewable resource available, potentially twice current energy demand.
- A portfolio approach is appropriate for power sector decarbonisation. Other generation technologies have limitations such as nuclear where public acceptability may limit the number of sites available. Onshore wind may face similar restrictions.
- The review found that in some cases there was value in paying more upfront to keep options open for the future. Firm commitments on support for offshore wind and marine to 2030 should be made now as part of new electricity market arrangements
- By 2020 renewables could supply 30% of electricity demand, giving a grid intensity of 300gCO<sub>2</sub>/kWh. By 2030 scenarios suggest that 40% is achievable, equivalent to 50gCO<sub>2</sub>/kWh
- Offshore wind needs more detailed analysis of its potential for 2030. The 25GW figure proposed is a ball park figure and will depend on ability to reduce costs and tackle technical issues. The review found that high shares of renewables need not materially impact security of supply given a range of options for addressing system-level intermittency, and that the system could cope with up to 40% renewables in 2030 at relatively low cost. A dependency on HVDC links to Europe was part of this rationale.
- The key challenge for renewable heat is delivery. Energy efficiency and heat need to be more joined up, with the RHI and Green Deal working together. Supplier accreditation is needed to develop confidence and the supply chain.

Office for Renewable Energy Deployment (ORED): Roadmapping activity, Bernie Bulkin

Bernie Bulkin (BB) opened the presentation noting that the Renewable Roadmap will be published on Tuesday 12 July. The 2009 Renewable Energy Strategy Lead Scenario was a centrally produced rational set of technologies that could meet the 2020 target. The roadmaps indicate that the 2020 target is achievable. To get there focus needed to be on what matters: big (multi gigawatt) contributors, demand/efficiency, costs, finance and the cost of money, grid.

Forecasting demand is an important part of planning – a 7% reduction by 2020 is achievable (235TWh +/-30%).

The Renewables Roadmap has several elements, ambition, constraints and risks, pipeline, costs and geography, with a bottom up plan to get the ambition in the market for each technology:

- Onshore wind can continue to grow, but will level off in back half of decade;
- The central estimate for 2020 UK offshore wind capacity is 18 GW (56 TWh), but actual deployment depends on cost reductions;
- The central estimate for biomass electricity capacity is 4.4 GW (27.2 TWh) –at lower cost end of renewable; There is potential for a big ramp up in heat pump deployment – non domestic delivers 80% of our target ;
- Biomass boilers involve both domestic and commercial sector – a key part of the heat story but tough to achieve
- DfT assumes 1st Generation Biofuel is main contributor to transport targets – 2nd generation and EVs rapidly evolving

Four possible policy trajectories to achieve the transport target

- More biodiesel, more ethanol – the technically safe option, but raising other issues of sustainability
- Next generation (s) biofuels for road transport – bet on new technologies for conversion of waste to energy, mainly drop-in fuels.
- Aviation, shipping, heavy duty transport – full conversion of defined sectors. Technical qualification of fuels by 2020 may not be possible for all sectors
- Electrification – aggressive strategy of EV infrastructure and incentives, coupled with maximum low carbon electricity

Costs for large scale electricity depend on risk, affecting cost of capital, learning curves, and technology development. Many renewable heat technologies should be cost competitive by 2020, but need a kick start to get there.

Conclusions were:

- The wind, biomass and heat pump segments, plus hydro/landfill gas, can get us close to the target
- There is quite a lot of upside on some of the technologies, but also risks to delivery, and much policy uncertainty around transport
- Many (but not all) of the smaller components are among the most expensive renewables

With recommendations:

- Government should concentrate resources on the big contributors for 2020 and try to achieve upside potential of these
- Support technologies that could be material in the 2020-2050 timeframe **and** have significant economic development contribution to the UK (examples: wave, tidal stream, electric vehicles).
- Incentive mechanisms are key, and will certainly evolve

### **Discussion**

The following points were raised in discussion:

- The different approaches to bioenergy between the two presentations were questioned. It was suggested that a 2050 timeframe would allow much more freedom for its use in the energy system with transport efficiency improving much more than other areas. Improving bioenergy is not just about biofuels, but the efficiency of the whole system, e.g. farming, forestry, etc. Specifically the assumptions around the bioenergy uptake for mobility presented by CCC was challenged. In response it was noted that both scenarios have the same amount of bioenergy in 2020. However, the CCC scenario in 2020 has less biofuels in transport; but as much biomass in the power sector; in the heat sector going to 2030 they have biomass increasing but not in power and transport. Further work by the CCC will review bio-energy targets specifically.
- The assumptions about development and advances in technology contained in ORED's bottom-up plan were technology-dependent.
- The ability of the energy system to deal with intermittency from renewable at a level and cost projected by the CCC seemed very bullish, with some critique offered by ERP Members. There appeared to be a strong dependence on interconnection to meet demand, when a wind lull may affect supply across much of Europe; follow-up questions were raised by ERP members concerning assumptions used and indicated that further dialogue is required in this area.
- The ambition of efficiency in ORED's roadmap could be greater. There was concern about the suggestion in background to the CCC work that nuclear could block a greater deployment of renewable. Discussion about the opportunity costs of the different trajectories would be important.
- The CCC ambition for CCS seems too small and risked being self-fulfilling.

NW stated that he, David MacKay, Paul Hollinshead and the Analysis Team should look at the work presented in detail and consider what ERP could contribute. He invited comments from Members on what ERP could do and on broader clarification of the presentations and the degree of ambition.

### **Actions**

Secretariat and Analysis Team to consider future work by ERP to put to co-chairs and Members.

### **A.O.B.**

None

#### **4 Chair's Closing Remarks**

Members were asked if they would be prepared to hold the October plenary, which focuses on SMEs, outside of London with Oxford or Cambridge being suggested. David Clark also offered to host a future meeting at ETI Loughborough.

Nick Winser closed the meeting and thanked everyone for attending it.

#### ***Date of next meeting***

The next meeting is on the 6th October, 10 a.m. – 12 noon, venue TBC.