ERP Plenary meeting – Minutes

MEETING DATE: Wednesday 14 January 2015, 15:00 -17:30
LOCATION: Royal Society, London

ATTENDEES:

Chair:	John Loughhead	DECC, ERP Co-chair
Members:	Keith MacLean	Independent, ERP Co-chair
	Martin Grant	Atkins
	Carl Arntzen	Bosch
	Bob Sorrell	BP
	Tom Delay	Carbon Trust
	Miles Elsden	DfT
	Peter Emery	Drax
	Philip Sellwood	Energy Saving Trust
	Duncan McLaren	Friends of the Earth
	Derek Grieve	GE
	Masao Chaki	Hitachi
	Rob Saunders	InnovateUK
	Nick Winser	National Grid
	Sue Ion	Royal Academy of Engineering
	Julian Allwood	Uni. of Cambridge
	Ron Loveland	Welsh Government
Alternate Member attendees:	Colin Green	ABB
	Jacqui Williams	EPSRC
	Jo Coleman	ETI
	Naomi Luhde-Thompson	Friends of the Earth
	Andy Bullock	GE
	Mike Weston	UKERC
Observers:	Peter Bance	Origami Energy Ltd
	Mike Thompson	CCC
Invited:	Tony Ashton	DECC
	Scott Cain	Future Cities Catapult
	Graeme Marks	Shell
Secretariat:	Farida Isroliwala	DECC
ERP Analysis Team:	Andy Boston	ERP Analysis Team
	Mark Workman	ERP Analysis Team
	Helen K Thomas	ERP Analysis Team
	Simon Cran-McGreehin	ERP Analysis Team
	Tom Watson	ERP Analysis Team

1. Chair's introduction

Apologies were noted from: John Miles, ARUP, Stephen Trotter (ABB – with Colin Green in attendance); Jonathan Yewdall (BIS); David Clarke (ETI, with Jo Coleman in attendance); Neville Jackson (Ricardo); Angus Gillespie (Shell); Maggie McGinlay / Paul Lewis (Scottish Enterprise); Marta Smart (SSE) and Jim Watson (UKERC, with Mike Weston in attendance).

Guests at the meeting were welcomed and included: Scott Cain – guest presentation on the work of The Future Cities Catapult; Naomi Luhde-Thompson – Chair of ERP's work on Community Energy and Tony Ashton - Director of Science and Innovation at DECC. ERP's new part-time administrator Mathilde Bourgeois was additionally introduced.

Attendees were notified of some recent changes to ERP's membership, which included the following:

- John Perkins is due to step down as BIS CSA early this year & Chris Pook has now moved to another post within BIS. **Jonathan Yewdall**, Assistant Director in the Green Growth Team will be the interim representative.
- SME Member Isentropic (ERP Member Mark Wagner) has asked to terminate their ERP membership due to budget constraints.
- Scottish Equity Partners (SEP) who joined as an Observer Member in January 2014 have indicated they do not wish to become full members because whilst some of ERP's content and topics are relevant and interesting, the majority falls outside of their area of investment.
- Alison Wall will no longer be the representative for EPSRC as she has moved from working on EPSRC's Impact Strategy to heading up the Building Leadership Strategy work. EPSRC's CEO, **Professor Philip Nelson** will become the new ERP Member.
- **Jim Watson** will be the new ERP Member on behalf of UKERC, with Mike Weston as Alternate Member.

Minutes of the October 2014 meeting were approved and key objectives of the plenary meeting were outlined as follows: (i) Hear about the work of the Future Cities Catapult which also links with ERP's Cities project work; (ii) Receive an update on the 'Managing Flexibility of the Electricity System' project work (iii) Provide feedback on the conclusions and recommendations so far for the Community Energy project.

2. Future Cities Catapult

Co-chair John Loughhead introduced Scott Cain, Executive Director of Strategy, Business Development and Communications at the Future Cities Catapult. His presentation about the catapult was noted to have relevance to ERP's current project on Cities.

Members were informed that **Sir David King** is now Chairman of the Board of the Future Cities Catapult, and is additionally the Foreign Secretary's Special Representative for Climate Change. John reminded Members that Sir David was also previously the UK Government's Chief Scientific Advisor, during which time he officially launched the ERP with Dr. Paul Golby.

Rob Saunders briefly introduced the session, providing further background information and explained that the Future Cities Catapult is one of seven centres

launched by Innovate UK, with two new Catapults in Energy Systems and Precision Medicine coming soon. Rob additionally announced that ERP Member **Nick Winser** has been appointed to the role of Chairman of the Energy Systems Catapult. Nick went on to say a few words regarding the initiation of the Catapult, highlighting that ERP Members were key stakeholders that they would be keen to work with.

Members were informed that The Future Cities Catapult, with £10m a year funding from Innovate UK, is a global centre of excellence on urban innovation, where cities, businesses and universities come together to develop solutions to the future needs of cities and Scott Cain went on to present, with the following main points noted:

- The Future Cities Catapult is a relatively new large-scale demonstration project with a 'people and insights' driven approach. They currently have 50 people in mixed roles;
- A cities 'lab' has been built to demonstrate products and technologies to assess their performance in use at city scale and is an important aspect of the Catapult's work. It also looks at how people interact with these products and how realistic they are;
- The Catapult is a 'project-led' organisation and looks into how systems can work together to reduce 'unintended happenings'.
- It also focuses on the data needed to underpin the Catapult's work and Cities products. It addresses the question of how to make data publicly available to increase its use. It has found that the kinds of data currently being shared by cities are not necessarily what the public requires.
- A number of international and UK-centric demonstration projects were referred to, including: Glasgow, Bristol and Milton Keynes – the latter being a relatively new example of a city, with more of a (modern) focus on the future. Infrastructure for Electric Vehicles was noted here (Milton Keynes being the first place in UK for large-scale demonstration and roll-out), plus considerations of Demand Shifting and Demand Response.
- Particular types of projects that the Cities Catapult are interested in were noted as being related to: Health, Neighbourhoods and Infrastructure, City Strategies and Finance.

Before drawing to a close, Scott went on to describe how measures of success would be derived and highlighted the expectation that there would be an 80% international focus and a 20% UK focus in terms of Catapult projects. International collaboration and learning were raised - which were points later noted as being of particular relevance to ERP's on-going project 'International Engagement'.

<u>Member discussion</u>

John Loughhead congratulated Nick on his new position before asking Members to engage in discussion. The following points were noted:

- The question was raised as to what extent the work is looking inwards i.e. UK based cities such as Manchester, Bristol, Stoke-on-Trent?
  In response, it was explained that each city is approaching related strategies in different ways. Firms based within cities are particularly interested in accessing UK cities as demonstrators, but some cities are reluctant as they have little capacity to focus on innovation. The Catapult therefore tries to provide thought-leadership and confidence to initiate this.
- There are non-technical and non-financial barriers and proximity of the 'tipping point' is a key consideration. It is a case of incremental change for

many cities and the interesting part is where energy sits within the strategy/debate.

- Another comment queried whether there were two distinct classes of innovation needs for cities – (i) Infrastructure in the Developing World and (ii) the governance and physical problems of existing infrastructure. It was noted that many Far East and Middle East Cities are being built from scratch and the question posed as to how a balance can be achieved between more modern and existing cities?
  The response was that most technology leaders don't see a difference between developed and developing cities, which particularly came across when deriving the business case for the Cities Catapult. It was pointed out that not all city strategies are heading for the same outcome and there tends to be more utilisation of a monetary 'typology' of city level rather than developed vs. non-developed e.g. categories such as $1-3m or passing certain World Bank criteria.
- The question was posed as to how the Catapult has managed to engage with issues of system interdependencies and to what extent engagement with energy companies has taken place. Here it was noted that the Energy Systems Catapult may be better placed to address this topic, but it was agreed that energy is always part of the project mix, although sometimes as a wrapper around cross-cutting issues and projects. Some examples were cited - such as Birmingham's engagement with Virgin Media and EDF, plus BMW regarding Electric Vehicles and infrastructure.
- It was reiterated that the Cities Catapult focuses on triggering the most beneficial projects at scale and the best economic return. The Catapult therefore wants to move to multi-partner / multi-year projects that fit with the topic of resilience, which is key in relation to cities and city strategies.
- The view was put forward that a main issue with a 'smart cities' approach is people - they do not engage or work with technologies in the ways anticipated; therefore community ownership is important. Scott was asked what the Catapult is doing to manage that tension? In response, the 'adjacent' example of air quality was used where a 'rich data' approach has been used to consider what it is that people understand about the issue and what it is they want. A similar approach with smart cities could result in people-led research and market products and solutions.

Members felt that a key theme of the Cities Catapult work should be energy, as it is locked into the way cities are designed (transport / traffic control, building emissions, energy relating to the creation and use of steel and cement etc.), providing an excellent opportunity for the UK to become involved and address these areas.

Another opinion offered was that technology is the answer, not the question. It was felt that the main problem is engaging with Communities and Local Authorities about future energy problems; to enable more community based energy schemes etc.

The effect and role of Mayors within cities was queried and the question regarding the difference (in terms of successful strategies) of cities with and without a Mayor was posed. It was suggested that Mayors can provide a central and more driven focus whereas a Board can dilute priorities and makes them less clear.

A final question posed was in relation to Smart Cities and the number of (particularly EU) initiatives in this area being informed by international engagement going forward. In relation to this point, It was agreed that the UK can and should learn from, and share knowledge with, other cities e.g. in the BRICS countries. However, it was

reiterated that the Catapult and the Cities sector tends to take a more 'typology of cities' approach rather than focusing on a bi-nation or nuanced approach. Particular examples of these typologies were listed as: Amsterdam in terms of mobility; Copenhagen in terms of low carbon; South Africa for pioneering techs.

Scott was thanked for his attendance and presentation and John went on to introduce the following meeting item.

3. Managing Flexibility of Electricity System

Peter Emery (Steering Group Chair) introduced the item and thanked the Steering Group, Analysis Team and participants at the project workshop held in November 2014. After a brief introduction he reminded members that at the January 2014 Plenary the work had been praised but the need for more specific modelling work had been identified which had now be carried out. It looked at the total system cost and the ability to decarbonise and meet CCC's suggested target of 50g/kWh of CO_2 by 2030 utilising a variety of technologies. Peter suggested members should consider three key areas during the presentation:

1. The lowest cost solution tends to be specific to the system;
2. There are no-regrets decisions today essential to decarbonising the grid to 2030+;
3. Further work has been identified to examine low cost solutions and issues that could catch us out if action is not taken today.

Andy Boston continued with the presentation, focussing on the following three conclusions explaining how each had been reached with explanatory examples.

1. **A system with weather dependent renewables needs companion low carbon technologies to provide firm capacity.**
    - We cannot achieve decarbonisation targets (or get close) with just wind, PV and marine. Need nuclear or biomass or CCS.
2. **Policy makers and system operators need to value services that ensure grid stability so new providers feel a market pull.**
    - Currently some necessary services (e.g. inertia/ frequency response) are provided free or as a mandatory service. These providers are disappearing, and the need is growing, but new providers can't develop in the absence of a market signal.
3. **A holistic approach to system cost would better recognise the importance of firm low carbon technologies and the cost of balancing the system.**
    - The value to the system of a technology is dependent on the existing generation mix and the services, which that technology can provide.

The presentation also went through the key modelling assumptions / characteristics:

- Data was based on 2012 outturns scaled to National Grid's Slow Progress scenario for 2030 for a sample of 220 half hours in the year
- Nuclear, CCS and wind capacities were varied widely across 600+ sub-scenarios
- It ensured sufficient firm capacity was on the system to meet peak demand
- At each point it balanced the need for energy, reserve/frequency response and inertia, making the model unique in these capabilities.
- New providers of ancillary services such as the dynamic use of interconnectors, demand side response and new storage were not modelled.
- Key outputs were the total system cost and the CO_2 emissions.

The modelling work enabled the Steering Group to understand the forces at work, although the conclusions reached are not critically dependant on this. The presentation then gave some evidence behind the main three conclusions.

1. Modelling showed that even with 60GW of onshore wind (more than double the National Renewable Energy Action Plan [NREAP] target of 28GW), without any zero carbon firm (ZCF) capacity emissions would not fall below 200 g/kWh, 4x the CCC's recommended target for 2030 of 50 g/kWh. Even with the addition of perfect infinite storage this would still be at 100 g/kWh. Even without modelling the simple stacking capacity against the load duration curve showed why this is the case.
2. The demand for ancillary services such as reserve and response will increase, driven by more weather dependent renewables and larger unit sizes. Providers of these services are disappearing as fossil plant closes or is uneconomic to run. Although there are a range of new providers (e.g. DSR, storage and interconnectors) there is little market pull to bring these forward
3. Results from the modelling showed how low carbon technologies such as wind, nuclear and CCS could have different economic values dependent on the system to which they are offered. The system independent Levelised Cost of Electricity (LCOE) was shown to be a less than useful metric, giving technologies different relative values to a holistic approach.

Member discussion

The work was well received by Members who thanked Peter, Andy and the Steering Group. The following questions and responses were put forward:

- More care should be taken in the way language is used to present the work, which has some potentially controversial key messages. Any assumptions made should be clear and any (deliberate) caveats to the modelling work should be stated e.g. that the work hasn't modelled storage, varying total demand, patterns of demand, wind speeds affected by climate change.
- The above point was echoed, however some conclusions (e.g. relating to CCS and the magnitude of the figures) were broadly in line with other work produced by the CCC, who noted that market signals were also an important point and that they'd be happy to share work / conclusions in this area.
- There are accepted limitations of the work, but the work is more likely to be read, accepted and engaged with, if it used generic technology neutral terms (such as zero carbon firm capacity). It should be noted that although the nuclear solution is more difficult, it is not impossible.
- Given that more flexibility should be valuable the characteristics for low carbon plant was queried - specifically nuclear is thought by some to be relatively inflexible so ought to be reflected in the modelling. Andy explained that a nuclear plant was modelled as being able to flex by 10% although a 50% scenario was run.

The assumptions and support for the following 'Important Observation' was queried:

- Technologies like DSR / flexibly operated interconnectors and new storage will help optimise the system but probably not bring fundamental changes to the ultimate solution.

It was explained that storage and interconnection could help to utilise some excess generation, meeting the targets would require a very significant increase over current levels and meteorological correlation limited the usefulness of interconnection.

Some felt that this highlighted the need for market innovation, especially for new entrants, and that it has helped raise importance of those at the edge of grid. The assumption that market mechanisms always solve the problem had been challenged.

Rhe example of Germany was raised, where nuclear energy is being phased out and yet a low carbon energy system is being achieved. Andy pointed out that Germany's main solution to balancing is to use its neighbours to soak up excess renewable generation, typically exporting 40% of PV and wind generation whilst baseloading lignite. This is unsustainable in the long term and unsuitable for the UK.

Keith MacLean thought this demonstrated the need for innovative new projects to consider storage solutions on a seasonal rather than daily timescale. It was suggested that alongside power to gas or other storable, cross-vector, time-shiftable solutions this would be a good use of Research Council funding.

Finally, the scale of the engineering challenge to deliver recommendations from the work was highlighted, with a reminder that it is already 2015.

John summarised Members comments and emphasised the need to make the assumptions behind the modelling work and analysis very clear.

4. Social & Political Barriers to Technology Uptake: Community Energy

Naomi Luhde-Thompson (Project Chair) thanked the Steering Group and outlined the aims of the presentation which were to:

- Give an overview of the topic; and
- Seek members' views on areas of need and potential recommendations, to allow the Steering Group to produce the report for circulation to members ahead of the April 2015 Plenary meeting.

ERP Member Duncan McLaren additionally provided some key points ahead of the presentation, as follows:

- The project provides the ERP with an opportunity to understand ways of mobilising public support for the low-carbon transition. The key point is transition: community energy is about changing the energy sector to have more customer engagement; not just about winning support for technologies.
- It additionally aids the understanding of different system configurations and social relations with associated technologies. It allows us to consider the option value of having Community Energy (CE) supported by the system, and how they are differentially disadvantaged by the sunk costs of incumbents.
- The work builds on what has already been achieved to deliver policies, market liberalisation and fair and affordable energy; and
- CE can contrast with struggles relating to conventional commercial models to deliver the low carbon transition.

Simon Cran-McGreehin presented an overview of the project's work to-date, including an overview of CE in the UK and other countries, and examples of projects including their different motivations. He discussed the trade-offs that CE offers compared with other approaches to decarbonisation, including its ability to create a "virtuous circle" that reinforces: public engagement with energy; "energy literacy"; public acceptance of infrastructure; and deployment of technology. Challenges that occur at different project stages were identified - predicting the costs and benefits; deployment; and delivering the expected benefits. Simon noted that further work is required to better understand CE in the UK, and proposed that the ERP should make

the recommendations to improve this, including: development of a standardised model for collecting project data; greater co-ordination of research and dissemination of findings; promotion of best practice examples and off-the-shelf models; and trials of alternative local energy arrangements.

Member discussion

Comments and suggestions from Members included:

- The work should draw on lessons from projects across the UK and abroad.
- The work should highlight benefits of CE regarding energy security, affordability and low carbon sources.
- It was asked whether there has been an exploration of the misalignment of governance between energy suppliers and individual customers, and whether this could be improved by Housing Authorities and Local Authorities taking a role in energy. In response it was noted that there are examples of Local Authorities taking this role (to be discussed in the ERP's Cities project).
- The recommendation regarding exploring alternative local energy arrangements was approved of because it is important to understand the potential scale of impacts. It was noted that such impacts can happen quickly, and that they are often due to new entrants (rather than incumbents).
- An ESRC grant relating to Energy Community was noted as being of relevance; this has been looked at as part of the project work.
- The project has some relation / overlap with ERP's work on Cities, and it would be interesting to consider the importance of coupling energy with communications and internalising energy issues;
- The report should distinguish between recommendations that are new, and those that have been made by previous studies but not yet implemented.

5. The Women's Engineering Society Mentoring Scheme

John Loughhead briefly informed Members of the role of the Women's Engineering Society and its mentoring scheme. Members were urged to promote the scheme throughout their organisations, or consider supporting the society, which is approaching being 100 years old. The following points were noted:

- Primary sponsorship is through Institute of Engineering & Technology
- Patrons include David Kennedy and others;
- The Society Mentoring scheme has been set up to help women (and men) to prosper and stay within the Engineering discipline;
- The mentoring scheme now has new members and sponsorship partners;
- DECC is to working with the Society to help find a reasonable way of supporting the scheme and to raise awareness.

ERP Member, Dame Sue Ion is on the list of mentors and urged Members to take a look at the scheme, which provides good advice (for men and women) on things such as taking career breaks and being successful within the sector.

Note: The proposal from the Women's Engineering Society Mentoring Scheme re-launch has been circulated with these minutes. Members interested in joining, supporting or funding the Society please contact Francine Oddy at DECC by 20 February. Email: francine.oddy@decc.gsi.gov.uk.

6. AOB

Items for AOB included:

- An update that ERP Co-chairs John and Keith had attended meetings with HMT and Tara Singh, the No 10 energy advisor, in late October and early November**.** The meetings were to inform about ERP and its work**.** Members were informed that HMT have asked to meet with the Co-chairs again in the first quarter of 2015 and in June 2015.
- Following the Resource Efficiency and Demand Reduction workshop which took place in June, a paper has been produced and can be viewed via the ERP website. The paper is entitled: *Potential benefits and cost savings from the better use of material resources and energy***.** This summarises the discussion from the workshop of "quick wins" and longer-term recommendations on some sector-specific opportunities (construction, automotive, food) and some cross-sector opportunities. The paper was sent to relevant Special Advisors and is due to be discussed at a Chief Scientific Advisors sub-energy group meeting.
- The new ERP website is now complete and the Members Area of the site will be up and running soon.
- The next plenary meeting will take place on: **Wednesday 15 April at the normal time of 09:45 – 12:00 a**nd will be at Coin Street Neighbourhood Centre not far from Waterloo

Members were reminded of the drinks reception and post-plenary session and the meeting was brought to a close.