Ofgem – Consultation on a smart grids evaluation framework – December 2011

Response by E.ON

General remarks

- Smart grids have a vital role in accelerating investment in low carbon generation technologies connected at the distribution level, and in new heating and transport technologies (including heat pumps and electric vehicles) which will become large new sources of demand on DNO networks as the UK moves toward a low carbon economy.

- They do this by encouraging electricity demand and generation connected to DNO networks to be more responsive to network constraints and costs, reducing the need for load-related distribution system investment and the network costs these technologies would otherwise incur.

- Smart meters are key to the development of effective smart grids, as they allow the DNO to understand end-user demand profiles and to optimise demand, generation or electricity storage to balance the requirements for energy close to the point of use. Smart meters must provide the functionality to provide these capabilities.

- Consideration of the effect of the introduction of smart grids and new customer relationships on existing market arrangements is needed when assessing the costs and benefits of smart grids. Existing market arrangements are based on the supplier being responsible for balancing the demand of its customers with the generation it has contracted for, and it is important that any adjustment to customer load made in response to a DNO request does not expose the supplier to additional costs.

- We believe that technical standards are important for the effective development of smart grids. Work is already underway at European level, and the UK needs to be engaged in this to ensure that smart grids are developed in a harmonised manner.

- The effect of current regulatory interventions on the development of smart grids should be considered. For example, the complexity of tariffs is currently being looked at, and it is likely that in future, tariffs will be simpler. This means that smart grids are unlikely to be able to use complex tariff structures to influence customer behaviour.

Responses to specific questions

Q: Do you agree with our definition of smart grids?

1. We would like to see the high level definition expanded to mention explicitly the role of suppliers. Suppliers have the fundamental relationship with customers, and have a clear need to understand their customers' behaviour as it will affect the supplier's ability to balance its own position. Suppliers will also be integral to the development of smart grids as they will be able to develop tariffs to reflect pricing signals from the DNO to encourage customers to take up or offer services to the DNO. Whilst these points are considered to some extent elsewhere in the paper, the definition does not refer to them.

Q: Have we captured the main complexities associated with assessing the costs and benefits of smart grids?

2. The current GB market arrangements are based on the supplier hub principle. As noted earlier, the relationship between the supplier and customer is important and the development of smart grids needs to be done in a way that takes this relationship into account. Suppliers endeavour to balance their supply/generation position in each half hour, and it is important that they are not put out of balance or exposed to any additional costs by an action taken by a customer in response to a request from a DNO.

3. The costs of the technical solutions will vary depending on the solution chosen. We would like to see more consideration of what communications systems will be needed to support smart grids, and we believe there may be the potential to use existing communications routes such as the DCC.

4. Security of data transferred and used to facilitate smart grids must be managed carefully, with appropriate security measures in place to protect both the networks and the customers.

5. We would like to see a detailed assessment of the impact on systems and processes that is anticipated to facilitate the entry of new players and new categories of player to the market. For example, what changes to market arrangements and systems will be needed to accommodate aggregators acting on behalf of a group of smaller customers to the market?

6. We believe that the development of standards is important to support the further deployment and connectivity of efficient smart grid technologies. There is already work underway at an EU level to develop standards, and it will be important for any GB initiatives to consider wider

European developments. Smart grid mandate 490 is focusing on these standards for Europe, and it is important for the UK to be involved in these discussions.

7. CEN-CENELEC-ETSI committed to produce 'a set of consistent standards, which will support the information exchange (communication protocols and data models) and the integration of all users into the electric system operation' by end 2012. Their survey identified a number of gaps, which the GB work could also consider. Gaps included:

    - data model harmonisation, including the integration of field level with remote monitoring and control levels, as well as the integration of smart metering into smart grid systems;
    - protocols (including data models and communication services) for connecting smart producers and consumers, including aggregation;
    - the connection of new types of generators while ensuring the expected level of quality and grid stability, as well as enabling new types of operating distribution networks;
    - deploying cyber security to protect data and network security.

8. Finally, standardisation activity being undertaken around Vehicle 2 Grid Communication Interface (V2G CI) and under ISO IEC 15118 (Communication protocol between electric vehicles and grid) must be aligned with standards development for smart grids. Ensuring that use cases are reflective of reality will be critical to ensure that the wider energy system is able to accommodate the shift towards e-mobility, as well as ensuring that customers can benefit from future charging services which can adapt to their needs. Furthermore, developing smart grid standards which support the realisation of potential system benefits from small scale energy storage will also be important.

Q: Do you agree with our approach to dealing with these complexities, in the overall evaluation framework, in particular:

- ***We propose to take a two-stage decision tree approach, rather than relying on a conventional cost-benefit analysis framework alone. Does this constitute an appropriate approach, given the need to measure differences in the "option value" that different smart grid investment strategies provide?***
- ***Do you agree that the year 2023 constitutes an appropriate decision point in our analysis?***

9. The two stage approach and 2023 decision point seem sensible.

10. The paper seems to suggest that a top down approach would take longer and be more likely to lead to stranded assets. We do not believe that this is necessarily the case; setting a clear framework could enable companies to innovate but within the bounds of a clear direction of travel set from the top.

11. There appears to be little consideration of retrofitting smart grid technology to existing assets. We recognise that there may be technical limitations with older equipment, but would like to see greater analysis of the possibility of making use of existing assets.

Q: Do the technologies set out in Table 2 constitute a sensible list of value drivers?

12. Yes.

Q: Do you agree with our assessment of the technical characteristics of each?

13. The assessment seems reasonable.

Q: Are there any other technologies that could have a significant impact on the value of smart grids?

14. The effect of air conditioning load should be considered. It is probable that the UK will experience higher summer temperatures in the future, which could lead to an increase in air conditioning load, particularly the use of portable units which could result in more unpredictable load on distribution networks.

Q: Our analysis suggests that the most important factors to vary across the scenarios will be:

- ***the pace of electrification of heat and transport;***
- ***the increase in distributed generation; and***
- ***the increase in intermittent and inflexible generation?***

Do you agree? Are there any other variables that we should look to vary across the scenarios and why?

15. The list seems comprehensive.

Q: Out of the options presented, which set of assumptions should we make on smart meter functionality?

16. Current regulatory intervention is aimed at simplifying tariffs quite substantially. Whilst new products are still being developed (for example, tariffs with low night rates to support electric vehicle charging), it is reasonable to assume that there will be more homogeneity of tariffs and less complexity.

Q: Do you agree with our proposed approach of including smart appliances in the business as usual?

17. Yes.

Q: Do our proposed smart grid strategies capture the main deployment options?

18. Yes, although we are not yet convinced that the possibility of retrofitting smart technology to existing network equipment has been fully explored.

Q: Have we provided an accurate overview of the main services that smart grid technologies can provide?

19. Yes.

Q: Do you agree with our proposed assumptions on the characteristics of these technologies?

20. The assumptions seem reasonable.

Q: Are there any other groups in society that we should consider in the value chain analysis?

21. There is perhaps a wider benefit to GB that is not considered in the paper. There may be opportunities for new jobs to be created in the deployment of smart grids, such as technical roles installing equipment on the networks and IT systems development roles, as well as jobs in manufacturing the new equipment.

Q: Do you agree with our conclusions regarding the distribution of costs and benefits?

22. The general areas in which costs and benefits arise and the manner in which they may do so are set out in the document. However, it does not seem appropriate to ignore the way in which this will interact with potential market mechanisms and different categories of participant. The efficiency of the market is dependent on participants being able to respond to the commercial incentives placed upon them by market mechanisms. If these are

incompatible with a system consisting of smart networks, then participants may be faced with obligations and risks which they cannot manage and which may incentivise inefficient behaviour.

Q: Do you agree with our proposed approach to assessing the costs and benefits for the transmission network?

23. We agree that it is important to consider balancing, congestion costs and the investment costs associated with the transmission network as they are to some extent linked. That is, congestion is caused by limitations on the network, which could be alleviated by more investment if economically justified. It is also correct to state that the approach set out would be limited in assessing the benefits for transmission associated with demand side response (DSR).

24. The extent to which DSR can assist with costs associated with the transmission system depends on how that response is organised and incentivised. Greater amounts of DSR being available may provide an alternative source of reserve (such as STOR) as long as it is controllable either by the System Operator (SO), or by some form of agent (such as suppliers) on the SO's behalf. If the DSR is not controllable, but is predictable, then this can potentially reduce the requirement for holding reserve.

25. Similarly, DSR can help with the costs of investment and congestion on the transmission network as long as it is organised appropriately. As noted in section 5.2.4 of the consultation, demand peaks on the distribution and transmission systems won't necessarily coincide all of the time. Therefore, an action taken to alleviate an issue on a distribution network won't always provide a benefit for the transmission network and vice versa. Indeed, as more intermittent generation connects to the networks, then the investment on the network is less likely to be driven by conditions at peak times. For instance, a higher proportion of costs may be driven by transporting power from high wind dominated areas during low demand periods. This means that to achieve an optimal outcome, both network investment and congestion management has to be coordinated effectively between network companies. Therefore, there is a limit to how effective the relatively simplistic approach to analysing the impact of DSR outlined in the document will be in reality.

Q: How suitable is the proposed network modelling methodology which use representative networks, with headroom used to model when network investments should be made on feeders?

26. We have not been able to study the approach in detail, but at a high level it appears reasonable.

Q: Are the voltage levels (from 132kV down to LV) being considered by the model appropriate, or should the model be limited to focus on any particular voltage levels?

27. We have not been able to study the approach in detail, but at a high level it appears reasonable.

Q: For each of the voltage levels we are considering, are current methods sufficient to recognise available headroom and the cost of releasing additional headroom in these networks? If not, is the proposed approach considered to be too simple or overly complex?

28. We have not been able to study the approach in detail, but at a high level it appears reasonable.

Q: Is our approach to estimating the clustering of low-carbon technologies appropriate? Is any other evidence available in this area?

29. The approach seems reasonable.

Q: Are the proposed generation model assumptions (a simple stack of generator types, no technical dispatch constraints, half-hourly demand profiles for summer and winter, and representative wind profiles) suitable?

30. The assumptions are a reasonable starting point.

Q: Should a simple representation of interconnection be included in the model?

31. Yes.

Q: Does the model represent demand side response appropriately?

32. We have not been able to study the approach in detail, but at a high level it appears reasonable.