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Our ref	*Your ref*	*Date*
-		**16 December 2011**

Dear Rachel

Re: Smart Girds Evaluation Framework – Consultation Response by Western Power Distribution

Thank you for the opportunity to comment on the Stage 1 report from Work Stream 2 of the Smart Grids Forum.

The published report sets out a very comprehensive approach to the development of a framework methodology to assess the cost benefit of "smarter" solutions to the provision of additional network capacity to facilitate the Low Carbon Transition. The proposed approach to the development of a model recognises that an accurate assessment of the total cost and life expectancy of Smart Grid solutions is not possible at this time. I support this assertion and continue to progress carefully targeted projects through the IFI and LCNF mechanisms to deliver answers to these issues.

Until the assumptions needed to populate the evaluation model have been confirmed by test and demonstration projects (either directly carried out by DNOs on GB networks, or from insight from other countries), the overall conclusions will need to be suitably caveated. Nonetheless I agree that the model could be used to provide an indicative range of cost benefit assessments for the selection of technical solutions modelled. Developing a range for the cost benefit would help inform uncertainty mechanisms for the ED1 period, and ensure the risk of stranded investments is managed appropriately.

More detailed responses to the specific question raised are in the Annex to this letter. I do however have some more general observations which are set out below:

1. **The proposed evaluation options will provide comparative analysis between "top down smart", "incremental smart" and "BAU". Load related investment by DNOs on LV and 11kV networks in DR5 forms a relatively small component of overall network investment. The majority of investment in new capacity on these networks is currently customer driven through new and upgraded connection requests. This could be characterised as "BAU incremental". Whilst recognising that the evaluation framework should not stray into assessments of future regulatory policy, the rate of change in LV and 11kV network capacity**

enhancements may be more efficiently be delivered by strategic network investments using conventional methods. For example, by whole programmes to lay larger cables, replace transformers or install additional substations ahead of customer connection requests. An assessment of what could be termed "top down BAU" could be modelled in the proposed evaluation methodology to provide more comprehensive outputs.

2. **The proposed methodology and scenarios may not sufficiently test a plausible range of future outcomes. For example, fixed assumptions are made on successfully delivering against the UK carbon budgets and 2050 targets. Further, the rollout of smart meters to all GB homes and businesses is assumed to be completed to the current target of 2019.**

3. **The evaluation model should be developed in a manner than can accommodate a wide range of smart grid technical and commercial solutions. The current proposal is limited to those assessed under Work Stream 3 (WS3) of the Smart Grid Forum. Other solutions are already under test by DNOs and further innovative solutions are likely in the future. The "merit order" stack of solutions delivered by WS3 is likely in itself to be a range, rather than providing definite results.**

I hope this response to your consultation helps to further develop understanding of the complexities and uncertainties associated with the adoption of Smart Grid solutions. If you wish to discuss further please contact Roger Hey (rhey@westernpower.co.uk).

Yours sincerely

ALISON SLEIGHTHOLM
Regulatory & Government Affairs Manager

Questions for consultation from Section 2

1. **Do you agree with our definition of smart grids?**

Yes

2. **Have we captured the main complexities associated with assessing the costs and benefits of smart grids?**

The complexities detailed in the report are well explained and demonstrate an understanding of the issues by those working for EATL and Frontier Economics. We have some concern over the fixed assumptions proposed over meeting climate targets and completing the Smart Meter rollout by 2019. The possibility of change to government policy on these items adds additional uncertainty which the model as proposed will not support.

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

We broadly agree with the approach but take the opportunity to make the following observations:

- **The technology list being developed by Work Stream 3 is not exhaustive. Additional solutions are currently under test by DNOs and new innovative solutions will inevitably be developed.**
- **The proposed assessment of DSR appears concentrated towards demand and thermal constraints. The role of Distributed Generation in supporting local networks could be significant, particularly in more urban areas.**
- **The evaluation could be expanded to include both "BAU incremental" and "BAU top down" approaches.**
- **The model appears to deal with supplier-led and DNO-led DSR sequentially, with supplier-led DSR creating additional network peaks for DNO-led DSR to then address. It would seem more appropriate to handle DNO-led and supplier-led DSR decision making in parallel. At the very least it should be assumed that suppliers will take into account network capacity constraints before executing "blind" DSR actions purely to balance their wholesale positions in accordance with today's energy market processes.**

4. **We propose to take a two-stage decision tree approach, rather than relying on a conventional CBA 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?**

This appears to be a reasonable compromise, balancing complexity with accuracy. This compromise is in line with the recognition that ultimately the model will only be as good as the assumptions made. We should avoid giving any impression that the model will provide definite and quantified outputs.

5. **We propose to use the year 2023 for the decision point in our decision tree analysis. We have chosen 2023 on the grounds that this is likely to coincide with the beginning of the first price control period after the completion of the smart-meter rollout and so is likely to be a natural point for the industry to take stock and adjust its smart grids strategy if necessary. Do you agree that the year 2023 constitutes an appropriate "break point" in this regard?**

Yes. A date in the range 2020-2025 would be a suitable waymark although, as recognised, 2023 is the commencement of ED2 delivery, rather than business plan development.

Questions for consultation from Section 3

1. **Do the technologies set out in Table 2 constitute a sensible list of value drivers?**

The technologies listed are sensible, and we particularly support the assumptions on the adoption of thermal stores for heat pumps. This appears to be a pragmatic and logical solution. We do note that consideration has not been given in the analysis to air-conditioning (reverse cycle Heat Pumps). The use of such technologies may increase substantially with the deployment of heat pumps, especially if climate predictions are realised. We are also pleased that the report acknowledges that Power Quality and harmonic issues may arise with some Low carbon technologies, and that addressing these may be the dominating factor rather than thermal constraints.

2. Do you agree with our assessment of the technical characteristics of each?

Yes, although we make the following observations:

- **The report does not mention how networks of other voltages will be handled by the model, ie: 6.6kV, 20kV and 66kV networks.**
- **The report suggests that charging of electric vehicles is permitted from stanadard domestic sockets, in addition to dedicated charging points. The IET are producing a code of practice to support the 17th Edition Wiring regulations which confirm that this is not an approved practice, requiring dedicated surs from consumer units to be fitted on safety grounds. The model should be updated to reflect this latest guidance.**
- **The model as defined assumes that the energy required to charge a car remains a constant out to 2050. The data used is based on typical EV and PHEV on the market today, which tend to be small city cars. Larger and higher performance cars (and vans / LCVs) will probably need to be developed if drivers are to switch to electric rather than combustion engine vehicles.**
- **The analysis concludes that more affluent consumers will lead the mass adoption of EV and PHEV. We would suggest that this assumption may be flawed should fleet and leasing companies offer attractive rates, and that drivers of these vehicles may predominate (eg. Motability, company cars, commercial fleets).**

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

Aside from our previous comments about air conditioning units, we note that gas fired CHP and Gas Turbine type Distributed generation are not included in the analysis. Further we beieves tht there may be a role (at least in the intermediate period) for gas fired Micro CHP, possibly in conjunction with heat pumps to support seasonal peaks in heat demand..

4. 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?

No, the variables documented appear logical.

Questions for consultation from section 4

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

Due to the inherent uncertainty of future energy market models and how well the smart meter rollout progresses we feel it would be better to test a range of options. There may also be a difference in the role played by smart meters geographically. For example some rural areas may

eventually have very different functionality to those in urban areas (and including the possibility that some homes may never have smart meters with remote communications).

We would also point out that DNO-led DSM may or may not de despatched through the smart meter. Depending on the eventual functionality (and cost) of the DCC Co there may prove to be more cost effective means of sending control signals from substations to local homes. There are several LCNF projects testing these options (eg. Project BRISTOL and Smart Hooky within our own portfolio)

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

The proposed approach is sound, although we note it follows today's Supplier Hub model. There is a possibility that aggregators will play a much larger role in the future, offering ancillary services to DNOs, TSO and Suppliers, and managing any conflicts of interests.

3. Do our proposed smart grid strategies capture the main deployment options?

No – but they do represent a reasonable cross section until real results available from Smart Grid testing and demonstration projects are available. The limited network modelling proposed (eg. A single 11kV network) will require any conclusions reached to be suitably qualified.

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

Yes

5. Do you agree with our proposed assumptions on the characteristics of these technologies?

Yes. We also take this opportunity to point out that statutory voltage limits are likely to be modified to fall in line with other parts of Europe during the period under consideration. These changes could allow an additional 4% of voltage headroom or "footroom".

Questions for consultation from Section 5

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

No

2. Do you agree with our conclusions regarding the distribution of costs and benefits?

Yes.

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

Yes, we agree that the model should attempt to look holistically at the physical investments needed in the electricity system, and try to determine the relative efficiency of transmission versus distribution network investment. It should not be constrained or dominated by current energy market regulatory rules.

Questions for consultation on section 6.

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

We note that the proposed modelling methodology includes a large number of simplifications and assumptions. These imply that the evaluation tool will provide general indicators and "ballpark" answers rather than specific numbers. Further, there appear to be additional assumptions and simplification implicit in the analysis as well as those that are explicitly stated.

The parametric approach taken, while freeing the analysis from the burden of carrying out nodal analysis, is likely to result in higher levels of error. The number of network types modelled at each voltage is inconsistent with the approach being taken for Work Stream 3 and may therefore make it harder to integrate the results of the various Work Streams together.

We are particularly concerned that the use of a single parametric model for 11kV networks is unlikely to provide representative results. We also expect the impact of low carbon technologies to be location specific. For the LV network we note that technologies are applied at random and with clustering algorithms but it was not clear that the difference in impact of a cluster at various different locations along the feeder was built into the model or the locational aspect on the HV taken into account. We support the representation of clustering within the model and suggest that this is not purely due to social influences but a natural result of suitable building types existing in the same area. E.g. some housing estates may contain a higher proportion of south facing properties than others, community energy schemes will target a specific location etc.

The use of a nodal time-stepped load flow model for the representative feeders will be affected by the generalised nature of the load profile as well as the generalised nature of the representative feeder. There may be a large degree of variance for any part of the network from the assumed load profile which will impact the confidence in the overall result. This is expected as approximately one third of energy supplied at low voltage is for non-domestic consumption and is likely to be "lumpy" in its distribution and may not be consistent with domestic load profiles. While industrial loads are included in the GB wide energy model, we believe that their localised impact tips the balance in favour of nodal modelling rather than parametric representations.

We also take this opportunity to raise the following specific comments:

- **It would be useful to understand how the probabilities are derived for assigning to each scenario for weighted NPVs on page 106.**
- **We understand that the model is focussed on costs, however if the model is to have a continuing life it may be useful to increase the factors considered as per newly awarded LCNF project FALCON i.e. network performance, safety, practicality, public inconvenience etc.**

2.Are the voltage levels from 132kV down to LV being considered by the network model appropriate or should the model be limited to focus on any particular voltage levels?

There are areas in GB with 6.6kV and 66kV networks. It may be that the modelling would be similar to that for the 11kV and 132kV network but that different costs are applied. It would be useful to have a specific statement on how this would be corrected for.

3.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?

The approach defined is a sensible compromise between complexity and modelling cost.

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

The approach defined is a sensible compromise between complexity and modelling cost.

5. 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?

The approach defined is a sensible compromise between complexity and modelling cost.

6. Should a simple representation of interconnection be included in the model?

No.

7. Does the model represent DSR (“supplier-led” and “DNO modified” profiles, with simple heuristics used rather than simultaneous optimisation) adequately?

Please refer to our comments in earlier sections of this response. Any analysis here is likely to limited by the low degree of confidence that can be given to any predicted values of uptake and cost.