SP ENERGY NETWORKS

Regulation & Commercial

Your ref

Our Ref

Date

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Contact / Extension

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Dear Rachel,

Smart Grids Evaluation Framework – A Smart Grids Forum Consultation Report

SP Energy Networks welcomes the opportunity to provide our response to this consultation, and confirm that our response is non-confidential. We have provided our response to the specific questions raised in the appendix attached, but wish also to make the following general points in respect of the proposed evaluation framework for smart grids.

Any future evaluation framework for the development of smart grids should recognise that the future role of Distribution Network Operators (DNOs) is likely to evolve to enable active management to match increasingly intermittent load and generation at a local level, in order to avoid the need for significant network reinforcements.

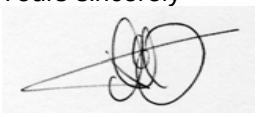
The proposed evaluation framework must consider different network characteristics based upon penetration of demand vs. generation that we expect throughout the country, for example whilst we expect relatively low application of PV technology in Scotland we expect to continue to see industry leading levels of wind generation.

Cognisance of the treatment of different categories of investment through the regulatory settlements is important, specifically incentive mechanisms, in order to fully quantify any perceived benefits that will be realised by DNOs, and to avoid unintended disincentives.

Previous distribution price controls have recognised that much of the UK's electricity network is aged and approaching end of life, although for many categories of assets current agreed replacement rates are less than 1%. One challenge for the industry will be to seek to develop solutions to minimise the probability of asset replacement investments, necessary to maintain public safety and network security, becoming redundant in the near future.

I hope that you find this response useful. Should there be any questions regarding any aspect of our response or the views expressed, please ask your team to contact me or alternatively Euan Norris.

Yours sincerely



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Appendix 1

Section 2: Smart Grid Evaluation Framework

Do you agree with our definition of smart grid?

Yes, we believe this is appropriate and in line with previous definitions. The definition of a smart grid is always subjective but this would appear to be accurate and concise.

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

Whilst the paper addresses a number of the main complexities there are further dependencies on achieving some of the grid functionality such as monitoring and automation which are prerequisites to the evolution of smart grids but are not considered within the scope of the document. Such activity will incur significant costs to develop and deploy throughout existing networks.

Consideration should also be given to asset replacement as well as load related growth. Replacement of future equipment may provide the option to deploy a smart solution alternative however price controls through to DPCR5 have recognised that the majority of the GB's electricity network is approaching the end of its useful life, although typical asset replacement rates remain <1% through DPCR5. With the expected migration to smarter networks one challenge for the industry is to seek to avoid investments in the short term, which are necessary for public safety and network security, becoming redundant or stranded.

It may be that a new regulatory mechanism is necessary to facilitate DNOs future proofing such investments through marginal additional smart investments, which would share the associated balance of risk and reward appropriately between customers and DNOs. For the purposes of this report it may be useful to ring-fence this incremental investment that would help keep any future analysis simple and negate the creation of further complexity.

Another area which is not addressed adequately is the innovative commercial arrangements which will be necessary to facilitate the evolution of a smart grid. These are likely to create significant financial benefits but we do not believe they are easily captured as they are largely undefined at present.

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?**

Yes, we agree that the proposed two-stage decision tree approach is appropriate.

- **Do you agree that the year 2023 constitutes an appropriate decision point in our analysis?**

No, given that DNOs are already preparing their submissions for ED1 we would consider that 2023 as a point to make a decision following analysis will be too late and that any decisions should be made at least 1-2 years previous from that date in order to inform ED2 business plans and provide DNOs with every opportunity to submit appropriate and well justified investment proposals. However, we believe every effort should be made to incorporate the transition to smart technology within the ED1 process and arrangements.

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Section 3: Value Drivers & Scenarios

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

Yes, we consider that the technologies set out in Table 2 represent a sensible list of value drivers. Further consideration however should be given to the impact of hydro which is likely to have bigger impact in Scotland & Wales based on the geography of both countries. Hydro is likely to have similar characteristics to Distributed large scale wind and biomass.

In addition the potential for pan European interconnection which may alleviate some of the lack of flexibility of large scale renewable generation should also be considered.

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

Yes we agree with the assessment of the technical characteristics for each technology identified in the consultation.

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

No, we consider that the consultation captures the appropriate technologies that could have a significant impact upon the value of smart grids.

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?

We agree that the consultation captures the three most relevant points however a further factor which will impact upon the scenarios is the location of generation which we believe will be a critical aspect of any analysis. This will be most prevalent with respect to large scale generation as this is likely to be sourced and located within rural areas such as Scotland, Wales and the North of England which will have a profound impact upon the 132kV network and below.

Furthermore the location of the proposed generation will also impact and scenario planning based upon the fact 132kV assets in Scotland are classified as Transmission as opposed to Distribution which is the case throughout the rest of Great Britain.

Section 4: Smart Grid and conventional investment strategies

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

From the options presented, it would be prudent to consider the assumptions associated with Option 1 to be reflective of the smart meter functionality. This Option provides that the supplier can deliver static and dynamic Time of Use but not the DNO based on current technology. However no consideration has been given to DNO controlled DSR such as being able to switch off appliances such as Electric Vehicles, Heat Pumps etc, which is something we have specified in smart meter consultations and consider to be more realistic than the DNO going down the dynamic Time of Use route. Such a concept is already being delivered through the radio tele-

switch scheme for the control of electric heating, albeit a supplier led service, some DNOs use this for load shaping at critical times.

Any future evaluation framework for the development of smart grids should recognise that the future role of Distribution Network Operators (DNOs) is likely to evolve to enable active management to match increasingly intermittent load and generation at a local level, in order to avoid the need for significant network reinforcements.

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

Following on from the point raised in our response to the previous question, we consider that the role of smart appliances should be viewed in the context of a DNO solution for controlling appliances.

We do agree with the view that the roll out of smart meters will increase over time however we consider that any significant penetration will only be seen if appropriate leavers/incentives to support the manufacture and installation of such appliances are developed. Again similar to the benefits from generation technologies, only once there is a significant penetration of smart appliances over a DNO's network supported by appropriate commercial arrangements will any benefits be realised.

For these reasons we would conclude that the impact upon DSR over the period to 2023 from smart technologies will be minimal based upon smart appliance penetration and their density over a particular DNO's network.

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

In general we would conclude that the proposed smart grid strategies do capture the main deployment options however it must be highlighted that there is also a requirement to recognise that some technologies will require a top down approach to realise forecast benefits such as system monitoring and automation. Other technologies will be value driven on a case by case basis dependent upon the relevant circumstances at the time they are being rolled out or considered.

An example of which could be Dynamic Thermal Rating, whereby it may require a top down approach because it is identified as being beneficial and can be installed as part of ongoing maintenance or refurbishment activity, while batteries may only be installed at specific sites where a proper technical/economic assessment has been completed and can be clearly justified. None of the proposed strategies capture the commercial solutions which may be involved as these are likely to provide value for money on a case by case basis but we do not believe can be easily quantified as these are not yet as clear cut.

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

Yes we would agree that the consultation provides an accurate overview of some of the main services that smart grid technologies can provide. We believe that the technologies which are being considered are only a small subset of a smart grid. Key developments such as active network management, stat-coms and LV network voltage control have been considered, all of which are elements of the current portfolio of LCNF projects by various DNOs

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

Yes we would agree that the proposed assumptions on the characteristics of these named technologies are reflective. We cannot comment on the costs as these are unknown and the long term cost is uncertain as economics of scale develop.

Section 5: Value chain analysis

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

We would conclude that the groups identified in the consultation for consideration are appropriate and whilst other groups in society may be recognised as this process evolves, we would support a view to keep the process simple without trying to consider too many parties at this time.

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

Yes we broadly agree with the conclusions regarding the distribution of costs and benefits. However whilst it is recognised that a some benefit of a move towards smart grids will be realised by DNOs through deferred investment, some of this benefit will be offset by an increase in operating costs and the need to invest in more innovative and smarter equipment.

With the expected migration to smarter networks one challenge for the industry is to seek to avoid investments in the short term, which are necessary for public safety and network security, becoming redundant or stranded.

It may be that a new regulatory mechanism is necessary to facilitate DNOs future proofing such investments through marginal additional smart investments, which would share the associated balance of risk and reward appropriately between customers and DNOs. For the purposes of this report it may be useful to ring-fence this incremental investment that would help keep any future analysis simple and negate the creation of further complexity.

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

We agree that the DNO will stand to realise a benefit from the smart grid services identified within the consultation. However it should also be recognised that in order to make use of these services there will be additional costs that will be borne by the DNO in respect of increased monitoring, provision of data, enhanced communication requirements, additional IT systems required to run analysis etc and an increase in operational costs due to the shift towards a more active system management approach.

Furthermore any model will need to take cognisance of the detailed funding arrangements for difference forms of DNO investment to ensure perceived costs and benefits are accurate and fully understood and to avoid unintended disincentives on network owners and operators.

Section 6: Proposed Model Specification

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?

We recognise that the proposed modelling methodology will be very high-level but are comfortable with this approach as this will be explored in more detail in Work Stream 3 (WS3).

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

Given the issues that DNOs will be expected to respond to are likely to be concentrated at 33kV and below, we consider that this would be a more appropriate voltage level to focus any proposed modelling.

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

We would consider that the proposed methodology would appear appropriate however would stress that all assumptions require to be clearly stated in order to inform future analysis and consideration and to put outputs of this work into context.

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

Yes we consider that the split would appear appropriate based on the data that is available but the location of where clustering takes place across Great Britain needs to be considered as an importance variable. For example, Scotland has less than 5% of the total PV installations, however more than one third of all wind generation which highlights how clustering varies between technologies. Electric Vehicles are also likely to have a lower uptake in rural areas then in urban due to the longer distances involved.

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?

We consider that the model assumptions are fair given the high-level nature of this analysis.

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

Yes, we consider that interconnection will be a key enabler to realising the benefits of a greater density of renewable generation onto the GB system and should be appropriately addressed within any future model and analysis.

Does the model represent demand side response appropriately?

Yes however it must be recognised that it will provide a generally high-level view and that specific circumstances of each DNO's network configuration, location and demographic will be unable to be properly modelled without the need for more in depth analysis. Furthermore the model needs to consider the use of controlled DSR by the DNO such as switching off Electric Vehicles at appropriate times.

Any future evaluation framework for the development of smart grids should recognise that the future role of Distribution Network Operators (DNOs) is likely to evolve to enable active management to match increasingly intermittent load and generation at a local level, in order to avoid the need for significant network reinforcements.