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3rd May 2019

Dear Sir/Madam,

Open Network Project: Consultation on future worlds impact assessment

We welcome the opportunity to respond to the ENA's consultation on the future worlds impact assessment published on 6th March 2019.

The following Annex contains our detailed responses to the specific questions asked in the consultation. We hope this is useful input and should you wish to discuss any of this response, please do not hesitate to get in contact.

Yours sincerely,

John Tindal
Regulation

ANNEX

Q1. Please confirm which stakeholder group you believe that you belong to; this will enable the Open Networks Project to understand the spectrum of respondents to this consultation.

SSE plc is a diversified company with business interests across different types of generation (including thermal, renewable and storage), at different scales (including transmission and distribution), as well as electricity and gas supply (including both domestic and business customers).

Q2. Please provide your views on Baringa's interpretation of the Future Worlds, detailed in Section 2, for the purpose of this impact assessment and the overall approach, highlighting any key strengths or weaknesses, or areas which should be explored in more detail?

Baringa's interpretation was helpful and provides a good initial assessment of the issues. Further detailed assessment will be required before a final decision and implementation.

We would agree that World B Stage 1 best represents current arrangements, so is therefore an appropriate starting point for a transitional pathway.

We would suggest that the most appropriate path towards stage 2 would be transition path 1 with continued joint procurement and co-ordination between DSOs and ESO, particularly with regard to the LV network.

However, if it was to become apparent during stage 1 that any aspect of joint procurement could be better handled then we believe this needs to be capable of being accommodated. Similarly, we recognise that the Worlds are deliberately high level and it is recognised that the eventual World is unlikely to precisely mirror any of the five Worlds presented. For example, a possible hybrid could be World B, but with the ESO playing a greater role in coordination at the higher Distribution voltages.

We are mindful of the risk of excessive sunk costs incurred to develop new systems, platforms, or regulatory arrangements. This would be a particular issue if it resulted in unnecessary duplication, or if ongoing improvements in information technology were expected to result in new systems which were soon superseded by more efficient enduring solutions. We suggest it will be important to carry out careful cost benefit analysis before new sunk costs are incurred as part of the transition to any stage 2 scenario.

In short, it is important that work continues to hone understanding of the different Worlds and the practical issues of implementation. We have set out some of the challenges, as we see them, below.

<u>World A: DSO Coordinates</u>

We agree with Baringa's position that DSOs should not become balancing responsible parties. However, we believe more work is needed to understand how Distributed Energy Resources (DER) would have access to other markets in this World. Also, it is not clear how actions taken by DSOs would impact on balancing responsible parties, especially suppliers. This would be the case if DSOs used their own regulatory framework to dispatch distribution generation and DSR on a financially

non-firm basis without keeping energy positions whole because it would put out of balance the respectively contracted power offtakers and contracted power suppliers.

Also, it is not yet clear how system wide co-optimisation could be achieved under this World. Without this, there is a risk that DSO actions cause a need for additional knock-on balancing actions from other DSOs, or the ESO which could tend to result in a higher total system cost and higher cost to generators and customers compared with a GB system co-optimised approach. We would suggest that potential solutions to mitigate these issues such as greater co-ordination between DSO and ESO, or providing DER with the choice to directly bid in to providing services to the ESO would in effect turn this World into World B, or D anyway.

World B: Coordinated DSO-ESO Procurement and Dispatch

A key challenge of World B will be to define the details regarding how the co-ordination between DSOs and the ESO can most effectively operate in practice. In order to co-optimise balancing actions on both the distribution and transmission system, it is likely that users connected to the distribution and transmission networks will need more aligned access rights and responsibilities so that users connected at different voltages can compete in markets on the basis of price on a level competitive basis. It will also be important to clearly define the flow of data and responsibilities of different parties, while making it clear that responsibility for balancing of the national GB system remains with the ESO.

World C: Price-Driven Flexibility

We agree with Baringa that this World reflecting potential charging reforms would be basis of all future worlds and as such, we do not think it is particularly helpful considering this World on a standalone basis. We would also highlight that to successfully deliver any of these worlds will require an internally consistent solution which integrates the detailed design options for access rights, forward looking charges, roll out of smart meters, half hourly settlement and data flows. In particular, when designing an internally consistent energy system, it is important to consider the most appropriate tools for the job. In this regard, we would suggest it would be appropriate for Ofgem's charging reforms to provide more effective investment signals, while the signals for operational dispatch are instead best provided by the wholesale electricity market and balancing market via ESO and/or DSO according to whichever World is delivered.

World D: ESO Coordinate(s)

Over time, as some DER becomes progressively better integrated into providing fully smart and economically efficient price-based flexibility services for the GB system, then these GB system services may best be achieved through those DER participating in existing GB wholesale market, Balancing Market and Ancillary Services markets operated by the ESO. This is dependent on how effective stage 1 is and the learning that can be implemented. However, we believe World D is unlikely to work for all parties – particularly those connected at lower voltages. As such, we believe World D is more likely to involve at least an element of joint procurement.

World E: Flexibility Co-ordinator(s)

We agree with Baringa that "Consequently, the only reason for moving to World E would be to mitigate any perceived conflicts of interest which surround integrated network and system operation within network operators."[1] We would suggest that if there were a concern about conflicts of interest, then this may be better addressed by considering the legal and organisational structures of both National Grid and DNOs. This would likely be better value than creating one or more completely new organisations which would involve additional costs of replicating existing organisational, technical and platform capabilities.

Q3. Do you agree with the conclusions and insights within the Executive summary? If not, please explain your rationale. Please provide reference to more detailed comments against individual sections if this is appropriate.

We broadly agree with Baringa's conclusions and insights regarding Transition path 1 and transition path 3. In both of these, World B presents a reasonable starting point and the key question becomes whether over time this should transition towards World B stage 2 (transition path 1), or adopt learning from stage 1 and transition on to a different path.

We would agree with Baringa's assessment that World B stage 2 could be viable if coordination mechanisms between ESO and DSOs are able to deliver effective competition leading to an economically efficient outcome for the GB system. This co-ordination may become more challenging to deliver if there is a large growth in DER playing a substantially larger role in the operation of the GB system.

We also agree with Baringa that it would be necessary for Ofgem's access and Charging reforms to be successful along with digitisation of the energy system to enable DER to operate in national GB wholesale markets on a fully smart basis for World D to be a viable option. In this scenario, it would be unlikely that there would be any value to separate local markets which would otherwise distort the competitive outcome in GB national markets, which could increase costs to customers.

We are less convinced with Baringa's conclusion that a transition path 2 leading to World A Stage 2 would be triggered by a higher uptake of DER. We would suggest that this scenario could trigger larger implications for the management of the GB system. This increased role of DER in the GB system would increase the importance of the ESO being able to coordinate their operational dispatch, which might tend to point more strongly towards World B, or D.

We would disagree with Baringa's conclusions regarding Transition Path 4 which moves towards World E with independent flexibility co-ordinators. It would have been more helpful for Baringa to consider how this world could be delivered through potential organisational and legal changes to National Grid and DNOs as an alternative to creating one or more new organisations.

[1] Future World Impact Assessment 2019, p58 http://www.energynetworks.org/assets/files/Future%20World%20Impact%20Assessment%20report%20v1.0_pdf.pdf

Q4. Do you agree with the options set out as potential transition paths?

We broadly agree that the transition paths set out represent potential options worth considering.

Q5. Do you believe there are any other viable transition paths? If so, please explain why.

We recognise that in establishing these Worlds and viable transition paths, it was never the intention to capture all feasible options, but rather to capture a plausible set of scenarios from which to work with. As set out elsewhere in this response, we believe it is entirely possible that a 'hybrid' type scenario – most notably between Worlds B and D could emerge. In our view, it is important that if, at any point, this is found to be the most sensible path, there is sufficient flexibility within this work to be able to take it.

Q6. Do you agree with the assumption that all transition paths start in Stage 1 of World B?

Yes.

Q7. Do you agree with the areas identified for further work in the 2019 workplan and the further work ideas in the impact assessment or do you feel there are other areas of work that should be prioritised to progress in this area?

Yes, we broadly agree with the areas identified for further work and have provided further detail below.

<u>How far can reformed access and charging arrangements go in delivering flexibility to the system?</u>

In addition to Baringa's points, we would suggest it is important to consider how Ofgem's reforms to access and charging arrangements may best reduce distortions to operational dispatch decisions to enable flexibility markets to operate more efficiently. In this regard, it will be important to consider the most appropriate regulatory tool for the job. Ofgem's charging reforms may be most effective if they provide investment signals for flexibility providers, but avoid providing operational dispatch incentives. This could then be complemented by operational dispatch signals provided by the GB electricity wholesale market, Balancing Market, ancillary services and potential new flexibility market arrangements facilitated by DSOs.

This division of objectives between network charging providing investment signals to flexibility providers, while operational dispatch signals are provided by market arrangements is an important distinction to ensure that both types of signals are provided in the most effective way. In practice, network charging has historically been used in some instances to provide operational dispatch signals for users who have previously been unable to participate in a fully smart way in competitive markets. However, as users become more engaged with market signals, then operational signals from network charges may no longer be required and will tend to become a less efficient tool for operating the GB system.

Network charging would not be a suitable enduring solution to providing operational dispatch incentives because of an important trade-off. If network charges were set in advance, they would not

be reflective of outturn operational conditions, so would tend to incentivise inefficient operational dispatch out of economic merit at times when there is no network constraint reason to do so, increasing total system cost and cost to customers. However, if network charges were set on an ex-post basis to be fully cost reflective, then users would not be able to respond effectively to them.

Even if network price signals could be provided in an effective way, this would leave the ESO, or DSO as a price setter and volume taker and a relatively steep supply curve would make it very difficult for DSOs or the ESO to set a price which gave them their desired volume of constraint management action. Instead, this price setting approach would tend to result in substantial over provision, or under provision of flexibility actions which would then need to be compensated for by using a more targeted flexibility market anyway.

Correspondingly, market-based system operational tools, developed along with the Future Worlds approach, would be a better solution for incentivising efficient operational dispatch for network constraint management. These could be specifically designed to incentivise operational dispatch in a way which should give DSOs and the ESO more efficient control over the operation of DER on the distribution network and result in better value for customers over the long term.

What is the value of flexibility to network operators at low voltages?

We agree that it will be important to further test the economic viability of flexibility solutions relative to the counterfactual of alternative solutions including network reinforcement. For example, it would be important to consider how, over the longer term, an approach based on financially non-firm access with flexible connections and constraint action based on last-in, first-off may perform compared with fully smart solutions such as competitive markets based on price signals equivalent to GB balancing mechanism.

What are the potential conflicts of interest and how can they be mitigated?

We agree that it will be helpful to further consider potential conflicts of interest.

How can industry arrangements facilitate a different pace of change across regions?

We agree that it will be helpful to further consider regional implications. In this regard, it will be important to be explicit regarding the difference between short-term mitigating measures compared with longer-term enduring solutions. For example, if there is a small scale, isolated local problem, then it may be appropriate to address this using a short-term mitigating measure. However as the local needs grows and technologies improve, it may become increasingly important to consider more economically efficient market based enduring solutions. It will be important that any enduring solution should be consistent and aligned across GB to better enable DER to participate efficiently and to avoid regional distortions to competition.

Q8. What future work do you believe would enhance the debate and body of evidence around transitioning to the potential Future Worlds?

It would be helpful to take a more joined up approach regarding how interactions may work between the Future Worlds design, Ofgem's access and charging reform, smart metering, half hourly

settlement, broadening of access to GB Balancing Mechanism, ancillary services and scenarios for decarbonisation. It will be important to deliver reforms which are internally consistent because the detailed design of one area will have substantial implications for other areas.

Q9. Do you agree or disagree with the four categories of system operation benefits identified? Are there areas that should be excluded from the list and/or other areas that should be included?

We broadly agree with the categories identified. However, it would be helpful to more clearly differentiate between system benefits and customer cost benefits, as well as knock-on effects on other charging arrangements. While it is helpful to consider potential benefits, it would be misleading to base conclusions on these without considering whole system impacts.

For example, a reduction in balancing services costs may result in higher cost to customers over the long term through correspondingly higher costs elsewhere. This may be the case if reduced balancing costs were achieved through offering financially non-firm connections for DER, because an implication of this would likely be cheaper network charges for financially non-firm DER, which may reduce the efficiency of locational investment signals and also mean the shortfall in network charge recovery will need to be made up through higher charges on all other users.

It will also be important to consider the impact on the cost of reducing carbon emissions and the generation technology mix beyond simply serving peak demand. For example, if a less economically efficient solution provided different incentives for users at different voltages, then it could tend to over incentivise investment in smaller scale generators (e.g. PV, reciprocating engines and batteries) and introduce market distortions which could correspondingly incentivised under investment in larger scale generators (e.g. offshore wind, CCGTs and pumped hydro storage). Taken together, if there are distortions to investment decisions, this would tend to result in a more expensive GB system cost at higher cost to customers over the longer term.

Q10. Do you agree, disagree on the key benefits assumptions contained within Appendix B (e.g. all Worlds, apart from World C, achieve the same benefits by 2050 etc) and used in the impact assessment? If you disagree, please explain your reasoning. Do you have any other comments?

We would be concerned about some of the assumptions and conclusions in this section. We believe this is indicative of the need for further work to develop the necessary evidence to support this work.

In particular, we would want to caveat the conclusion that substantial transmission constraint costs could be saved through greater competition provided by DER. This would be contingent on a number of factors, not least whether the DER was in economic merit to provide the necessary flexibility services at lower system cost. Moreover, it cannot be assumed that new investment in DER would necessarily reduce transmission constraint costs, or mitigate voltage, or reactive power issues any more than new investment in other providers of flexibility, which may be connected to the transmission network.

We note that Ofgem is mindful of the constraints arising on both the Distribution and Transmission network as a result of DER. We would suggest that this is largely because those DER are not exposed to cost reflective price signals such as the half hourly wholesale power price, but instead tend to

operate their dispatch based on ex-ante network time of use signals which do not reflect the real time value of their operational dispatch. In this regard, we welcome Ofgem's charging reform, which is seeking to address these signals.

Regarding avoided distribution network investment, we would suggest that it would be necessary to carry out market dispatch modelling and network cost benefit analysis to identify to what degree particular DER responding to particular operational signals actually delivers in terms of avoided distribution network investment. We would suggest that further work is needed to evidence these high level assumptions about network impact.

We would be concerned about the assumptions regarding avoided generation investment and to assess this fully would require detailed market modelling.

Further, the conclusion likely over states the customer saving from reduced Capacity Mechanism because new DSR would likely receive revenue by securing a Capacity Mechanism contract instead of generation, so the customer cost of the scheme may not reduce. Alternatively, the DSR may receive payment for reducing the charging base on which Capacity Mechanism charges are applied, which would tend to increase the unit rate cost of the scheme. Further it is possible that DSR may be receive revenue from both sources together. This means the net effect of DSR displacing Capacity Market contracts to generators may result in no reduction, or even result in an increase in the cost of the Capacity Mechanism to customers.

Q11. Do you agree or disagree on the approach used to assess the overall potential benefits of improved system operation?

Due to the high level nature of this assessment it is difficult to draw firm conclusions from this work. It will be helpful to assess options based on economic principles regarding which approaches provide the most economically efficient price signals for users. It would also be helpful to complement this assessment with detailed market modelling.

Q12. Do you agree with the assessment of the proportion of benefits which each Future World is capable of delivering in Stage 1 and Stage 2?

We would be concerned about placing too much weight on the conclusions in this regard due to the relatively high level approach and simplified assumptions. While we recognise it is helpful to carry out a high level assessment at this stage, it is most useful as a tool to better understand the scale of the respective issues rather than being relied upon to provide an accurate quantitative result.

In practice, the benefits during the 2020s may be lower than those indicated. This may be because any Ofgem reform to embedded benefits is likely to result in much slower growth of new distribution connected generation compared with recent years, and growth in demand from electric vehicles and heat pumps will take time to establish. In addition, it will take some time for new technologies to take full advantage of new smart metering, half hourly settlement, tariff and contractual structures required to enable substantial capacities of DER to operate in a fully smart and flexible way.

Q13. Do you agree or disagree on the approach taken to deal with the uncertainty/range of benefits? If you disagree please explain your reasoning.

As described in our response to questions 9 to 12 above, the modelling may tend to overstate the likely range of benefits by potentially over stating the benefits, while not fully accounting for potential disbenefits.

Q14. Do you agree or disagree with the areas identified for quantification of the implementation costs that will be faced by DSOs and ESO in Appendix C? If you disagree please explain your reasoning.

We would suggest that the most important missing element is an assessment of the total system cost based on full market dispatch modelling. This is necessary to assess the way each option affects the way users make economically efficient investment and operational dispatch decisions which is likely to be the largest driver of the cost to customers over the long term.

Q15. Do you agree or disagree with the approach used to assess the costs of each world? If you disagree, please explain your reasoning.

Please see answer to question 14.

Q16. Do you agree or disagree with the approach to dealing with the uncertainty/range of costs? If you disagree please explain your reasoning.

Broadly agree with the approach and Baringa's caveats regarding avoiding placing undue reliance on the assumptions.

We would suggest it is more important to consider a principles-based approach taking into account the economic efficiency of the market arrangements and prices signals which users will face. Efficient markets will be more likely to result in lower total system cost and better value for customers irrespective of how individual technology costs may develop over time.

Q17. Do you agree with the trade-offs of each of the Future Worlds identified against each of the high-level criteria in Table 1 of the Executive summary?

There are some aspects of the trade-off we would question.

We would suggest that the higher the electrification of heat and transport, the more important it will become to co-optimise the whole GB system. This would increase the importance of successful co-ordination in World B, or place more emphasis on a more national solution including elements of World D.

Whilst World B would likely minimise structural change for DER connected at lower voltages, we would expect the eventual structure to facilitate larger DER users connected at HV and EHV to provide flexibility services to both the ESO and the DSO.

Q18. Do you agree or disagree with the Appendix A approach of ranking of worlds to help identify the strengths and weaknesses of each World against each criteria? If you disagree please explain your reasoning.

Agree that this approach is helpful, although care should be taken not to read too much into the result because of the subjective nature of summarising a range of complex issues into a simple rank.

Q19. Do you agree or disagree with the rankings and whether they are suitably justified? If not, please comment on which ones and why?

We broadly agree with most of the rankings and comments and would add the following comments.

Regarding the criteria of choice, we would highlight that more choice for users is not necessarily always better for the welfare of customers overall. This is because more choice can result in higher risks of regulatory arbitrage, freeriding and adverse selection whereby some customers may reduce their own costs at the expense of higher costs to all other customers. These issues should be considered carefully whenever additional choices are offered.

Regarding criteria of energy efficiency, decarbonisation of generation, or decarbonisation of heat in Worlds A and B, it will be important to avoid the risk of inefficient market fragmentation This is because in Worlds A and B, there may be a higher risk of the GB market being fragmented into smaller local markets. Care would be needed in these Worlds to ensure that if there were to be regional platforms or local markets then these would need to be efficiently integrated into the GB national market, otherwise, it could result in less economically efficient outcomes for the GB system overall with environmental objectives being missed, or achieved at a higher cost.

We would disagree with the ranking of World D stage 1 as "5" where Baringa states "World D is not operating any markets at LV level, so performs worse as this is where much of the new flexibility providers will emerge (according to the FES)". It is a misleading to make the assumption that new DER is necessarily flexible, or that the provision of flexibility necessarily requires new DER. Flexibility on the GB system can be provided at all voltages and World D could be compatible with bringing substantial new flexibility onto the system through assets connected to the transmission system, HN and EHV voltages during the 2020s.

To avoid misleading, it may be more accurate to re-phrase this evaluation criteria to "Brings more flexibility into the distribution system."

Regarding Resilience and recovery, recovery of the system from failure we would disagree that World D would necessarily be worse than Worlds A and B. Recovery of the system in the event of failure is best facilitated by taking a co-optimised whole GB system approach which may tend to be easier in World B or World D. The key here is that DSO-ESO co-ordination is effective. Also, it may be clearer to re-phrase the criteria as "Resilience and recovery of the distribution system"

Q20. Do you agree or disagree with the list of potential unintended consequences identified in Section 4.5, and their prioritisation and potential mitigation as charted in Figure 20? If you disagree please explain your reasoning. Should the Open Network project progress further work on unintended consequences?

We broadly agree with the list of unintended consequences identified by Baringa. It will be important to consider these in much greater detail when the work is taken to the next stage.