

01/05/2019

Sent via email only to opennetworks@energynetworks.org

Energy UK Response: Open Networks Project Future Worlds Impact Assessment

Energy UK welcomes this further opportunity to feed into the work of the Open Networks Project (ONP) and the open and transparent approach to sharing materials related to the impact assessment. The Future Worlds Impact Assessment (IA) is a welcome addition in progressing the industry's exploration of the many options available for future system operation.

Energy UK members do not believe a single model has been revealed as optimal, and more work is required to examine the impact of each model on market participants and competition. Energy UK holds the following core positions about the Worlds presented in the assessment:

- The “considerable work to do in the coming years to develop new markets, platforms, operating practices, and access and charging arrangements”, as noted on page 10 of the assessment, is true of any transition path and should be reflected in all Worlds.
- World A should be removed from further work given potential incompatibility with European frameworks and regulations, as well as the technical complexity of this World regarding coordination of multiple system operator actions across network regions.
- World C should be removed from further work as it is not a standalone model as the other Worlds are. Reflective charging should instead be integrated across the other Worlds as is seen in some areas of the IA.
- The current interpretation of World B (Coordinated DSO-ESO Procurement & Dispatch), in which DSO actions are prioritised over those of the ESO, is not representative of the existing responsibility of the ESO for national system balancing. Transparent processes must be set out to enable ESO coordination of actions across network regions and define what actions are given priority and under what circumstances.
- World E (Flexibility Co-Ordinator) cannot be accurately assessed against the other Worlds until it the nature of the independent Flexibility Co-ordinator is fully defined.

Defining roles and responsibilities in the provision of flexibility is vital to delivering market certainty and investor confidence needed to meet changing system requirements, as set out by Energy UK previously¹. Energy UK would, therefore, note the importance of integrating products set out under Workstream 3 and Workstream 1A in the 2019 Open Networks PID into a holistic assessment of the options for system operation at distribution network level.

There is a particular need to ensure that potential conflicts of interest in market facilitation by network operators are clearly defined and mitigating actions are taken to effectively and decisively remove such conflicts.

If the ENA, or other stakeholders, would like to discuss any details of Energy UK's response, we would welcome further bilateral engagement, as well as continued engagement with Energy UK's many member groups as was seen throughout 2018.

Sincerely,
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¹ ['Roles and Responsibilities in the Provision of Flexibility'](#), Energy UK, 2018

Consultation Questions

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.

Energy UK is the trade association for the GB energy industry with a membership of over 100 suppliers, generators, and stakeholders with a business interest in the production and supply of electricity and gas. Our membership covers over 90% of both UK power generation and the energy supply market for UK homes. We represent the diverse nature of the UK's energy industry – from established FTSE 100 companies, right through to new suppliers, generators, and wider market participants including aggregators, software providers, EV chargepoint operators and others.

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 has done well to set out the range of uncertainties and variables across the range of the Future World options A-E, and it should be noted that there is room for a significantly wider assessment of options for DSO operations and whole energy system optimisation.

Energy UK has further comments on the interpretations within Section 2.2 of the Baringa report, including a significant concern about the approach to World B, as set out below.

World A – DSO Coordinates

Energy UK is strongly opposed to implementation of this World, particularly when looking to Stage 2 of World A. World A should be removed from further analysis based upon a range of factors.

Energy UK does not believe it would be efficient for the DSO to act as the gatekeeper to all markets due to two factors. Firstly, it is vital that all flexible assets are able to stack revenues across different markets in order to encourage investment and realise the full benefits of a smart, flexible energy system for consumers and the UK economy. Secondly, it is equally important to ensure that ESO markets remain open to a wide range of participants and are coordinated nationally to ensure efficiency and low cost delivery through competition.

Energy UK believes that World A does not comply with EU standards and regulatory obligations, including the EU Electricity Network Codes and Guidelines. It should be noted that at the stakeholder workshop on the IA held in London, the ENA stated that this had been considered. Further checks are needed to ensure that all models are compatible with these requirements, including with the teams at Ofgem that have been working on the implementation of these EU regulations.

Enabling DSOs to become aggregators themselves, with a potentially large impact on balancing arising from their actions or inactions in their network region, without putting in place an appropriate route of recourse for when they cause an imbalance could cause significant issues for balancing responsible parties. A DSO action causing an imbalance for other market participants could result in market distortions and cross-border trading affects as Balancing Responsible Parties are charged for the cost of any national balancing action.

Furthermore, where the DSO is itself offering competing capacity into the market place, as seen in the use of technology trialled under Project CLASS to deliver an ancillary services product, this could give rise to competition / market abuse concerns where the DSO was accepting or rejecting offerings from competing market participants. This could further be incompatible with UK and EU Competition Law.

It is still unclear how many DSOs could be active across GB, providing a further concern in the potential lack of coordination across system borders under World A. One DSO action may cause an imbalance for another DSO, causing additional actions and a range of unforeseen circumstances leading to greater

overall cost to consumers. These relationships and potential conflicts in balancing actions must be better defined across all potential system operation models.

World B – Coordinated DSO-ESO Procurement and Dispatch

World B would, in theory, allow Energy UK members to stack revenues across markets. Given the potential value derived from revenue stacking across markets and services, DER providers can be encouraged to target investment and activities to meet the needs of both the ESO and DSO. The use of transparent planning processes and comprehensive heat maps of network constraints will aid those investors in targeting investment and will form a core element of any Future World.

It is, therefore, critical to the viability of World B that procedures, processes, contractual arrangements, lines of communication, technical requirements and routes of recourse are defined, consulted upon, and agreed well in advance of a move towards implementation. This is particularly crucial given the high cost of implementation presented for World B.

Energy UK holds concerns about the use of any DSO model in which the DSO is prioritised over the ESO, given the potential scale of a national imbalance compared to localised issues. The assumption set out on page 18 of the Impact Assessment that “DSO’s needs would be prioritised” requires further definition to ensure alignment with EU Network Codes. This would also help to ensure that unintended consequences of local balancing actions are fully explored.

While World B could allow room for DSOs to efficiently address a number of local constraint issues, the ESO must, as envisaged in EU Network Codes, retain overall responsibility for national system security to ensure no operational conflicts. More specifically, the ESO should hold responsibility for national balancing, frequency control and system restoration across the whole network. DSOs may take a more active role in congestion and voltage management across their operational areas, particularly on LV networks, but should not limit the capabilities of the ESO in delivering security of supply at lowest overall cost to consumers.

The ESO in World B must continue to hold the ability to call upon DNO’s network assets and other distribution-connected resources to address a national balancing issue, and the surrounding communications capability will need to be further developed to ensure that any DSO actions are not in conflict with national balancing activity.

Clarity is needed to ensure that DSO actions are only prioritised where there is a clear and apparent risk. Clear guidelines will need to be set out exploring the enablers and required decisions for independent activity across distribution networks. DNOs currently act at local level to address constraints with available assets, and it is assumed that they will continue to do so in future. If the interaction of ANM and the additional market processes being developed are not coordinated properly, preferably by a single entity, inefficiencies will arise, and the price of provision for DSO or ESO may increase due to this. Whole electricity system coordination is vital to ensuring that markets are efficient and deliver at lowest cost to consumers.

If the value and need for DSO activity is clear and any constraints on the ability of local assets to participate in national markets are set out to those customers in advance, then DSO activity independent of national balancing should be viable. For this activity to be acceptable, clear requirements will need to be set out for when the DNO must upgrade the network to address repeated constraints on a network.

World C – Price-Driven Flexibility

Energy UK agrees with the Baringa assumption that price driven flexibility would be a feature across all Worlds rather than being an independent model based on World B. Beyond this, it would have been beneficial to remove World C altogether at the beginning of the assessment, instead integrating price-driven flexibility as a factor across the other models.

Energy UK believes this approach should be applied to any further work on the Future Worlds, removing World C as a standalone model and integrating the impacts of price-driven flexibility across the Worlds. Further work will also need to be performed once the Ofgem review of access and charging has come to a close.

World D – ESO Coordinate(s)

Energy UK agrees with the approach to World D, but would note that active network management by DNOs is another important factor in how far the ESO will need to reach. The operation of network assets will continue to be optimised at distribution level. It may be more cost-effective to ensure this capability is enhanced at the LV level as Stage 1 continues, resulting in less of a requirement for the ESO to reach into the very lowest voltages.

World E – Flexibility Co-Ordinator

Energy UK agrees with the approach taken to World E, but would note the difficulty of ensuring a fair assessment of this World before the Flexibility Co-ordinator is fully defined. Energy UK and its members place a lot of importance on a solution that would ensure neutrality and remove all real or perceived conflicts of interest to enable robust competitive markets to develop.

Further Comments

Energy UK would note that World E is the only World that specifies the number of Flexibility Coordinators – acting as DSOs – as separated from the organisations and geographical remits of existing GB DNOs. More work may be needed across the models to assess the appropriate number and regional reach of DSOs. Further work must be taken forward to ensure appropriate levels of separation of those DSO bodies from DNO organisations and from commercial activities that could negatively impact market confidence, as set out in Energy UK's letter to Ofgem on the same subject.

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.

Energy UK agrees that most of the Future Worlds are technically feasible but would caution against beginning the costly implementation of World B until the evidence of need is further developed and the assumptions relied upon in the IA are given more certainty. World D is the least cost to implement, and wherever possible the least cost and least regrets actions should be implemented without locking GB into one model. The choice between Worlds B, D and E at a later stage may depend on the investment climate for flexibility and the success of network operators in dealing with real and perceived conflicts of interest.

Energy UK does not support World A, as providers of flexibility at distribution level should retain direct access to markets at transmission level.

There remains a significant amount of uncertainty over the appropriate level of flexibility provision at lower voltage, given the expectation that the proliferation of flexible assets at LV network level is not expected to reach critical mass for some years. Electric Vehicles, often cited as the most immediate concern for LV network stability, will hold a lower impact than has been estimated previously, thanks to the development of smart charging standards by the Office for Low Emission Vehicles along with the ongoing increase of time of use tariffs matched with Ofgem's ongoing reform of network charging.

Uncertainty over the effectiveness of network charging, in terms of its ability to incentivise behavioural change through time of use tariffs, will continue until the SCR has delivered. The outcome of the SCR will need to be integrated into all Future Worlds. Further to this, it should be noted that work is needed to ensure that commercial arrangements for demand side response, in the form of markets for flexibility, are coordinated with signals delivered by network charging arrangements.

Given the number of changes being progressed to ensure appropriate price signals across lower voltage networks, the value of LV markets is uncertain. Energy UK, therefore, believes that until the Ofgem review of Charging and Access arrangements is complete, as much optionality should be retained as possible between transition paths. The focus must be on ensuring that the key enablers, including enhanced data provision and improved monitoring on LV networks, are in place.

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

Energy UK believes that a number of small changes to ensure World D Stage 1 can be adopted in the near term and as necessary would greatly improve the approach. Energy UK, again, holds reservations about the development of a World in which DSO actions are given priority over those of the ESO, and a number of Energy UK members would find the use of World B Stage 1 more acceptable and feasible if this was better defined with specific transparent processes defined, or otherwise removed for Stage 1.

Some Energy UK members believe that World D should, given its relatively low cost of implementation, be the selected Stage 1 transition path ahead of any transition to other options. Whilst the current circumstances in the UK are moving closer to those set out under World B, full development of World B is dependent on the development of sustained and successful markets for flexibility at local level, which will not be proven or fully tested until trials are completed, active tenders are delivered, and lessons learned are applied to the market framework.

Even then, a number of Energy UK members hold concerns over the viability of World B, given a level of uncertainty over whether or not local markets will be functional in terms of low liquidity, unresolved conflicts of interest regarding DNO / DSO assets and a lack of national standardisation of contractual terms and conditions to maximise market participation. While Energy UK welcomes work being progressed by the ONP to address the need for standardisation, the range of ongoing trials and approaches to DSO actions and wider DSO strategies being progressed by the GB's DNOs outside of the Open Networks project suggest that a single approach is far from being realised.

The transition paths as they are set out in the Impact Assessment do not take account of an early move from World B Stage 1 to World D Stage 1, which may be necessary if DSO transitions take longer than expected or reveal unintended consequences that require ESO coordination. Such a transition from World B Stage 1 to World D Stage 1 could, for example, be triggered by high uptake of HV and EHV connected DER in a short time period resulting in high requirements for complex co-ordination between DSOs and the ESO. This would make it more sensible for the ESO to deal with these assets directly until DSOs are ready to take on a greater level of responsibility.

If this happens, then it is likely to occur before the World B Stage 1 to World A Stage 2 transition, as this transition is about high uptake of connected DER across all voltage levels. Once on the World D Stage 1 path, it is feasible that LV connected DER take up also becomes high and a version of World B is taken on, with medium and low systems managed by DSOs on a case by case basis.

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

Progressing with World D Stage 1 would also be viable given the low cost to consumers in the near-term, in particular if the investment climate for distribution-level flexibility continues to be suppressed by uncertainty and delays to developing reforms. It would be possible to transition to a World B approach at a later date, but would enable the completion of work to develop appropriate mechanisms for LV markets whilst enabling the ESO to continue to coordinate the increasing range of DER on HV and EHV distribution networks.

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

Some Energy UK members believe that the UK's existing circumstances are closer to World D Stage 1, and that progressing with World D Stage 1 would be a more appropriate approach given the low cost to consumers in the near-term. It would be possible to transition to a World B approach at a later date,

but would enable the completion of ongoing work to develop and standardise across GB an appropriate set of processes and mechanisms for LV markets, whilst enabling the ESO to continue to coordinate the increasing range of DER on HV and EHV distribution networks.

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?

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

Energy UK agrees with the need for further work in this area as set out by Baringa.

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

Energy UK agrees that the work described is important to complete, but believes that this work would be better focussed on how the value of flexibility to network operators translates into tangible value to consumers in terms of overall lower network costs on energy bills. This work also needs to look at the impact each transition path has on the functioning of markets for flexibility and the impact of this on the investment climate for flexibility.

Energy UK would note that the qualitative assessment only took into account value to consumers in terms of accessing revenue streams based on participation in flexibility services and may, therefore, not be truly representative of the benefits for consumers of higher utilisation of flexibility over traditional reinforcement.

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

Energy UK welcomes the inclusion of conflict of interest examinations in Workstream 1A Product 1 of the 2019 workplan, but finds that a broader examination of potential conflicts of interest between DNO and DSO, as well as concerns around DSO / DNO actions being potentially in contravention of Competition Law, is required. Examining potential conflicts of interest, as well as the range of options for mitigating potential conflicts and their impacts, will be core to ensuring continued participation in markets by a wide range of stakeholders.

This work should include an examination of the recent legal separation by National Grid of its ESO and TO functions, and the appropriate level of separation between DSO and DNO functions and organisations. All potential conflicts of interest should be explored fully ahead of the implementation of any DSO framework, avoiding network investment and actions in areas later found to be a conflict of interest.

Further to this, it is vital to ensure that any investigation of conflicts of interest is independently conducted, with active engagement from market participants across, for example, Energy UK membership. It is also important that this be accompanied by research to explore the impact of these conflicts on market participation, Competition Law and investor confidence. As the Impact Assessment identifies, robust competitive markets drive down the cost of balancing services and result in additional savings for consumers.

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

Energy UK agrees that this work should be taken forwards, but would note that uniformity and consistency across GB has delivered and will continue to deliver benefits to customers and to the market by ensuring simplicity.

Further areas to be considered

Beyond the Impact Assessment, further work is needed to clarify a range of uncertainties, including:

- Developing fully-evidenced assumptions;

- Resolving conflicts of interest for network and system operators ahead of further investment;
- Identifying barriers to delivery of the highest value of flexibility for the GB consumer;
- Continuing to ensure that no-regrets enabling actions are delivered in the near-term, including simplification, through standardisation, of processes and contractual arrangements;
- Assessing options for better data access to and from network and system operators;
- Developing transparent and open frameworks that enable providers of flexibility to stack revenues between different markets;
- Deriving the true value of robust markets that benefit from high levels of competition.

Energy UK believes that a full and comprehensive analysis of the costs and benefits of any viable World should be progressed with a **Whole Electricity Systems** focus. This would need to incorporate the impact on Transmission level system operations, to ensure that national balancing is prioritised and additional considerations are integrated.

For example, procuring services for curtailment of electric vehicle charging or energy storage at LV level may appear to be beneficial to the DSO or DNO in deferring a network upgrade, but repeated activity to curtail LV demand, as proposed for example under Smart Energy Code Modification Proposal 0046, may result in a reduction in the amount of low carbon intermittent generation being utilised, resulting in a higher cost of curtailment of low carbon generation.

Further to this, there is a need for additional work to ensure **whole energy system outcomes** are delivered, incorporating the continuing role of gas as well as the opportunities and challenges across heat, transport and industry. This work is being explored in Workstream 4 of the ONP, but will require a much broader stakeholder base and remit to be comprehensive and may require primary legislation and comprehensive regulation to implement. Time taken to examine and implement a whole energy system approach should not delay required implementation of near-term actions, including rolling out more comprehensive network monitoring technologies and standardisation of processes across GB.

Energy UK agrees that **commercial arrangements, liability and responsibilities** need to be defined on a national basis across markets and between system operations and network ownership. This includes a review of the ways in which IT systems, platforms, and monitoring hardware could be rolled out by the ESO, DSOs, TOs, and DNOs across LV, MV, HV and EHV network levels in a coordinated and standardised manner. Additional monitoring is also needed by DNOs, particularly at LV levels, to support smart operations.

Furthermore, it needs to recognise that having 15 (one ESO and 14 DSOs) or more different systems, and commercial arrangements for the same products ('x' kW or MW of capacity exporting to the network or importing from the network – or making no change in their export/import levels - to meet a network need) across GB will be highly inefficient, will be sub-optimal for all concerned, lead to less competition and result in much higher costs for consumers.

It should again be noted that the “considerable work to do in the coming years to develop new markets, platforms, operating practices, and access and charging arrangements”, as noted on page 10 of the assessment, is true of any transition path, not just World B.

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

Please see response to Question 7.

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?

Energy UK broadly agrees with the categories set out on page 22, but would note that the last of the four should have been slightly modified as set out below:

- *Avoided generation investment (due to peak demand reduction and higher utilisation of existing generation assets)*

Energy UK agrees with Baringa that there is a need for further work to be done in quantifying whole energy system benefits, although we understand that this is much more complex area to examine and therefore would not fit within the timescales allowed for this work.

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?

Energy UK is uncertain as to the accuracy of some of the assumptions.

For example, the assumption that the reduction in transmission constraints cost over time is a function of the percentage change in transmission connected generation over time is stated in Appendix B.2.2 with no evidential justification. Transmission constraint costs from 2013 to 2018 show a noticeable increase, but over that period transmission connected generation in fact fell. This data suggests that there is no historic relationship between transmission constraint costs and transmission connected capacity², and as such any correlation of the two suggested by Baringa must be justified.

Similarly, the assumption that balancing costs are related to the percentage of intermittent generation is based on two data points (2005/6 and 2017/18). A fuller analysis suggests that the relationship suggested is not particularly strong³, as these dates could be seen as outliers presenting a more significant relationship.

It is vital that any assessment of the impact of flexible assets is technology neutral and fully inclusive of the range of options for GB. To this point, analysis of distribution network reinforcement avoidance through generation turn up profile, should not omit technologies capable of contributing towards this. It is unlikely to change the general form of the generation constraints, but it is not clear why technologies such as biomass and biogas have been excluded from the analysis.

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

Energy UK broadly agrees with the approach. It would be beneficial to know more detail about the amount of distribution network investment that will be avoided thanks to Ofgem's reform of charging and access arrangements.

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?

Energy UK holds concerns over the use of very limited data to estimate benefits available through distribution network reinforcement avoidance as set out in Appendix B Section B2.2 and Table B5. For any amount of accuracy in estimating the impact of increased demand at LV network level, DNOs would need to share much more granular information on the current state of LV networks and the amount and type of demand, generation and energy storage connected.

Outside of the Future Worlds initiative Energy UK is keen to see DNOs, as a priority, installing LV monitoring and using and sharing this information with market participants and the ESO.

There are a number of issues with the assumptions set out, including:

- That the 'My Electric Avenue' study is outdated and limited in terms of sample size and detail;

² National Grid MBSS (2013-2018) and National Grid Future Energy Scenarios (2013-2018)

³ National Grid MBSS (2011-2017) and National Grid Future Energy Scenarios (2011-2017)

- Advances made in EV charging technology alongside anticipated mandatory smart charging standards mean that the impact of EVs will be managed ahead of any transition path progressing;
- The number of existing constraints and networks close to constraint across the GB's LV networks is not known and, therefore, the cost of reinforcement in the next 5-10 years with or without high uptake of DER on LV and other networks cannot be quantified with any degree of certainty.

These factors cause doubts over the veracity of the expected impact of distribution cost avoidance and as such cause uncertainty over the gap in accrued benefits between Worlds A&B and Worlds D&E up until 2030. More research is needed into the expected reinforcement requirements at distribution level.

Further to this, whilst Energy UK expects participation in time variable tariffs and automation of smart charging to increase levels of demand response at LV levels, if the development of flexibility markets has low value to consumers and high complexity to engage, then participation is expected to be low throughout the 2020s until a critical mass is achieved and aggregated assets present a more attractive business case for investment.

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.

It is important to note that the benefits set out are indicative of benefits directly attributed to the system operation model, and that other benefits may be delivered regardless of the approach. For example, the benefits of avoidance of distribution network reinforcement may be delivered across all five Worlds if Ofgem's review of charging and access is successful and if the Office for Low Emission Vehicles is able to establish comprehensive EV charging standards in a timely manner, not to mention other factors developing under the Future Retail Market Design process.

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.

The fundamental assumption that all five Worlds can achieve the same level of benefits in their full maturity is flawed and more analysis is required to understand the degree to which managing constraints on a local basis before considering the national position leads to an overall suboptimal solution.

An example of the additional cost of DSO prioritisation over ESO is presented by the need for a series of separate coordination systems that the ESO would need to interact with as each of the 14 DSOs - and more CDSOs and IDSOs - notify the ESO of local activities before, during, or after an event. Failure to ensure that a comprehensive set of systems were in place to ensure full ESO visibility of DSO activities; across all timeframes, including real time may increase the risk of a national imbalance, and therefore increase the amount of contracted flexibility services and speed of response that the ESO would need to perform. This could, in turn, increase the overall cost of system operation for consumers. In extreme scenarios, if this procedure is not performed correctly each time, this could endanger the security of the electrical system, leading to a higher possibility of brown-outs or black-outs).

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 the response 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.

Energy UK broadly agrees with the approach and the importance of the need to "avoid firm conclusions being drawn on the back of assumptions which are inherently very uncertain" as set out on page 27.

Energy UK also agrees with the difficulty of estimating changing costs. It is important to note the rate of reduction of cost for a range of energy technologies based on investor certainty and economies of scale (e.g. solar, offshore wind, Li-Ion battery technology). This aligns with the imbalance of optimistic variability range of 50% lower cost and pessimistic variability range of 25% higher, as costs are expected to fall as certainty drives investment and efficiencies of scale are realised.

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?

Energy UK would note that Worlds A and B *must* include mitigations for conflicts of interest and Competition Law compliance. Using '*may require*' instead of '*will require*' is a misrepresentation of the importance of establishing clearly defined roles and responsibilities to give both market participants and consumers confidence in the proposed approach.

World E may take more time to implement based on defining and establishing a facilitator role, but World D Stage 1 should not take longer to implement at HV and EHV levels than the proposed approach to World B. This would be a result of the complexity required for each DSO to establish (i) separate operational procedures, (ii) a staff fully trained in new procedures/systems (iii) separate platforms and (iv) separate IT systems.

This would be required in order to ensure that each DSO can communicate in a fully joined-up way with other DSOs and the ESO while ensuring that they (each DSO) conforms with standardised GB market arrangements and commercial contractual terms, compared to an expansion of existing NGESO capabilities. LV networks could be developed further as the uptake of flexible assets at that level reaches critical mass in the 2030s

Energy UK broadly agrees with the rest of the trade-offs set out on page 6.

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.

Energy UK finds that the approach used in Appendix A is sensible and, again, welcomes the transparency shown in sharing all the information here. Energy UK members have raised that World C should not have been included in this process, as this World is an application of charging and access reform across the other Worlds and just adds to the complexity of this analysis.

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

Strategic Case

Enhanced Customer Sub-Criteria

Energy UK disagrees with some of the assumptions used in grading Worlds based on **Choice**. Energy UK does not believe that World D should be awarded a 5 on Choice, given the importance of the Ofgem SCR and Access review in enabling passive engagement in flexibility regardless of which World is used. It is also worth noting that DSR is already actively participating in national markets, and is expected to continue to contribute an increasing share amount of flexibility as price signals drive greater uptake.

Energy UK would further disagree that World A is a 2 on Choice, as a requirement to go via the DSO to access other markets could act as a barrier to customers' participation.

It would be beneficial to understand the underlying reasoning for **Confidence and Trust** being expected to fall in Stage 2 of World D.

Consumer benefits from markets are not only seen in benefits accrued through active participation but are also derived from the wider benefits resulting from: an increased rate of decarbonisation enabled by flexibility; cost savings driven by competitive energy markets; a wider range of service offerings enabled by SCR changes that enable greater potential uptake of innovative arrangements.

Greater Environmental Sustainability Sub-Criteria

Energy UK would again note that **Facilitation of heat and transport** in Stage 1 should be at least the same as World C across all Future Worlds, as the SCR will result in similar benefits across all Worlds.

Economic Case

Financial Benefits

Regarding **Cost of implementation versus benefits**, please note our response to Question 17 in reference to the assumptions set out in Table 1 of the Executive Summary.

Regarding **Expected benefits**, please note our response to questions 11 and 12.

Whole System Optimisation

Energy UK would question the assumption, under **Brings more flexibility into the system**, that no price signals or access arrangements from the SCR would be implemented at LV levels up until 2030. This is dependent upon what the SCR includes, and it should be noted that the current direction of travel incorporates domestic flexibility.

Energy UK would note that **Exploiting synergies** will be difficult for Worlds A and B in the near-term, given the limited level of experience in tendering for flexibility; complexities of LV constraint management until assets at that level reach critical mass; low levels of existing monitoring capabilities across distribution networks; and the complexity required for each DSO to establish (i) separate operational procedures, (ii) a staff fully trained in new procedures/systems (iii) separate platforms and (iv) separate IT systems.

Existing work from the ONP and individual DNOs is looking to resolve these issues, but requires a greater level of coordination, as well as requiring clear definitions of the appropriate level of separation between DNO and DSO functions and bodies.

Commercial Case

Energy UK believes that World A should be removed as an option due to its low score in **Market viability** in Stage 2 of implementation. Without robust competitive markets in place, flexibility will be high-cost and certainty of delivery will be low.

Appropriate regulation should include the need for additional oversight of all the activities and actions of DSOs in near to or actual real time, including: their ability to run markets for flexibility; their compliance with Competition Law; their achievement in delivering of the lowest overall cost for consumers and, potentially; an entirely new DSO licence in line with the level of legal separation seen at Transmission-level.

ESO led markets already incorporate DER flexibility provision for national needs. An argument can be made that expanding the reach of the ESO into other markets could be less onerous, costly and inefficient than the development of 14 DSOs' market-centric solutions. There is a counter argument in the inexperience of the ESO in balancing at local levels, meaning that DSO operations at lower voltages could be better suited in Stage 2.

Enabling DNOs or DSOs to take independent actions without consulting the ESO would require additional primary legislation to address a number of matters, from compliance with existing Network

Codes⁴ to appropriate and efficient information provision. This would include establishing appropriate levels of business separation between DNO and DSO and the wider rights and responsibilities between actors, including routes of recourse when something goes wrong.

Financial Case

Energy UK would note that Worlds in which potential conflicts of interest (perceived or actual) are lower and no issues with Competition Law compliance emerge will experience greater levels of engagement and therefore be better at facilitating high market participation, leading to the lowest overall cost for consumers.

Management Case

Industry Structure and Organisation Sub-Criteria

Rules and regulations will need to incorporate a comprehensive definition of conflicts of interest and potential issues with Competition Law compliance, as well as the mitigating actions required to address these. This would simultaneously need to ensure a standardised approach is adopted across GB in terms of market arrangements and commercial terms.

The contrasting level of **Difficulty to implement for system operators and market participants** must be taken into account in terms of the delivery of competitive markets able to provide services at low cost to consumers. Ensuring a homogenisation of market and commercial approaches across network and system operation areas will aid in reducing the level of complexity for market participants as well as system operators, thus lowering costs for customers. This is of particular importance when considering the need for flexibility providers to be able to stack revenues across markets.

Technical Performance sub-criteria

Prioritising DSO activities over ESO activities is a potential **Safety risk** for the safe and secure operation of the national electricity network and could impact upon **Service reliability and availability**. For World B to be viable, and for it to score highly against these criteria, the ESO must be able to take priority wherever necessary. World A is not viable as an option for the same reason, and should be removed from further work.

There is also a requirement that security of supply be guaranteed at local network levels, ensuring that loss of service is minimised or entirely avoided. For this reason, there is a level of coordination and prioritisation of DSO actions to avoid loss of service. This process must be able to be overridden by the ESO if local actions would cause wider issues across other areas, minimising the impact of any event.

Energy UK would note that if “all Worlds can be designed to ensure a high degree of **service reliability**”, as stated on page 86, all Worlds should be scored equally against this criteria. Given that the reasoning given for Worlds D and E scoring lower is here justified based upon separation of network and system operations, there is even more reason for all Worlds to be aligned on scores.

Ensuring network ownership and system operation are given an appropriate level of legal separation is something that should be integrated across all Worlds and should not impact upon coordination of activity given the amount of expenditure in IT systems and platforms across all Worlds. If Worlds A and B assume DSOs will “exploit the synergies between network and system operation” (page 87), this will mean relying upon an approach with significant conflicts of interest and Competition Law compliance concerns. There remain significant concerns, therefore, that market participation would not be high enough in these Worlds to ensure **service reliability and availability** or low cost delivery for consumers, due to a lack of market confidence.

If each DSO is taking on their own actions with a priority over the ESO, notwithstanding the legal ESO priority in the System Restoration Plan and the Emergency & Restoration Network Code, in order to

⁴ Network Codes including the System Operation Guideline (SOGL), the Electricity Balancing Guideline (EBGL), the Requirement for Grid Connection of Generators (RfG), the Demand Connection Code (DCC) and the High Voltage Direct Current Connections (HVDC)

recover after a system failure, this may cause conflicts resulting in a longer time taken for power to be restored safely while different actors coordinate. Further to this, comprehensive codes would need to be set out to establish to whom, DSO or ESO, the contracted Black Start stations defer.

Energy UK would further note the existent uncertainty over the actual potential for LV assets to be used in restoring power after a system failure. How, for example, can DSOs communicate with LV-connected generation or storage during such an event in the volumes necessary to energise their system in a safe and robust manner? We would expect this to be very low potential, unless looking at an individual LV outage and, even then, to be of very low potential until the late 2020s.

It would be beneficial to understand the various kinds of system failure identified and how system failures at distribution level differ to outages experienced today. There is the potential that a DNO could recover the system as they do now without the need for DSO actions.

Clear dischargeable accountability for technical performance should be clarified, as it seems that all of these are assessed from the point of view of a DNO only and not customers or ESO or DSO.

Would World D not hold the same level of performance in **Clear dischargeable accountability for technical performance** as World A, as they both hold one responsible party?

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?

Energy UK would note that it is currently unclear as to whether or not the impact on market participation of potential DNO / DSO conflicts of interest or the wider use of network assets in flexibility markets and their respective impacts is included here. It is vital that all elements of conflicts of interest, Competition Law compliance, and network assets used in balancing be resolved to ensure investor confidence and a high level of market participation.

Unintended consequences occurring due to conflicting actions across network areas must be fully explored ahead of the implementation of any of the Future Worlds to ensure that the ESO retains the ability to deliver security of supply.