The Voice of the Networks

Energy Networks Association

Open Networks Project

Consultation on future worlds impact assessment

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Energy Networks Association

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Introduction and background to the Open Networks Project

Launched in January 2017, ENA's Open Networks Project is laying the foundations for a smart energy grid in Great Britain and informing future developments in Ireland and Northern Ireland. It is a key initiative to deliver Government policy set out in Ofgem and BEIS' Smart Systems and Flexibility Plan, the Government's Industrial Strategy and the Clean Growth Plan.

The Open Networks Project has introduced real momentum into the development work required to enable GB's energy networks to:

- facilitate our customers' transition to a low-carbon future, including the electrification of heat and transport;
- address the challenges arising from the continued uptake of local generation;
- evolve to be market enablers for a whole range of new smart energy technologies;
- reduce costs to customers by contracting for flexibility services alongside investment in traditional and innovative network solutions, and
- play a key role in delivering overall lowest whole system energy system costs for customers.

In order to facilitate open debate and discussion across the industry, all outputs from the project are being published on ENA's website[1] alongside annual reports that summarise progress and achievements.

Purpose of this consultation

Background to the Future Worlds impact assessment

The Open Networks Project presented a range of five potential industry structures, known as Future Worlds, in 2018. These included a decentralised energy system where local electricity grids enable regional energy markets to balance supply and demand at a local level, to a more centralised system where co-ordinating local energy resources is the responsibility of the national System Operator. They also included a world where new independent national or regional organisations co-ordinate flexibility services for the electricity networks.

Extensive work was carried out with stakeholders to define these five Future Worlds and they were modelled using the Smart Grid Architecture Model (SGAM) to further define the information flows necessary for each world to operate. These detailed definitions and the SGAM models were presented as part of the Future Worlds consultation in 2018, which generated feedback from around 50 stakeholders.

The Future Worlds consultation also proposed a plan for an independent impact assessment to be carried out to assess the relative costs and benefits of the five worlds. Through the consultation, stakeholders provided feedback on the proposed approach and assessment criteria to be used for the impact assessment. Baringa, an independent consultancy was employed via a competitive tender to produce the impact assessment and this consultation seeks stakeholder views on that work.

Aims and objectives of the impact assessment and this consultation

The ultimate purpose of the impact assessment is to build an evidence base from the Open Networks Project to help inform discussions on policy in a decentralised, decarbonised and digitalised energy landscape. The report is intended to help stimulate and guide conversations within the industry and between stakeholders on the various models, the emerging distribution system operator (DSO) role and the effective coordination of distributed energy resources (DER). Lastly, the report identifies areas for further investigation which will help define future arrangements and reduce uncertainty relating to the assessment of the Future Worlds.

[1] http://www.energynetworks.org/electricity/futures/open-networks-project

Therefore, the questions in this consultation are structured to:

- encourage as many stakeholders as possible, from a wide variety of viewpoints, to read the report and the insights within it;
- seek feedback on the approach and inputs used to carry out the impact assessment, to ensure its validity and relevance; and
- help inform and shape the future work undertaken by the Open Networks Project and other organisations to further develop thinking in this area.

How we will use your feedback

Once this consultation closes and all responses are received, they will be summarised in a separate report. This summary report will be published alongside the Impact Assessment Report to supplement the evidence base presented to policymakers.

As mentioned above, the feedback will be used to shape the ongoing work within the Open Networks Project during 2019 and beyond. Phase 3 of the Open Networks Project started in January 2019 and is described in the Phase 3 2019 Project Initiation Document[2], while recognising that further work will be initiated from responses to this consultation.

How to engage and respond

During 2018 stakeholders requested longer to respond to the Open Networks Project's consultations, so this consultation will be open for eight weeks and closes on **1 May 2019**. Please send your responses to the consultation by email to opennetworks@energynetworks.org. The consultation questions cover all aspects of the impact assessment. Some questions may not be relevant to your organisation and it is fine for you to respond only to the questions which are relevant to your organisation.

While the consultation is open, you are invited to join two public events, the first to be held in Glasgow on **8 April 2019** and the second at ENA's offices in London on **10 April 2019**. In addition there will be two public webinars on the consultation, on **11 March 2019** and on **27 March 2019**. Further details on these events and webinars will be provided on the ENA Future Worlds Impact Assessment webpage[3] and communicated to stakeholders on the project's mailing list. You can sign up for this mailing list or ask questions by emailing the Open Networks Project.

All consultation responses are intended to be published on ENA's website, therefore if your response is confidential and not for publication, please clearly notify us. Or, if elements of your organisation's response are confidential then please provide us with a full version for consideration and a non-confidential version for publication.

Everyone is welcome to respond: Feedback on the independent impact assessment is welcomed from all stakeholders, including but not limited to: network users; energy market participants; network operators; independent distribution network operators; aggregators; suppliers; DER producers; consumers; community energy schemes; new and existing business models; and technologies businesses.

[2] http://www.energynetworks.org/assets/files/electricity/futures/Open_Networks/ON-PRJ-Phase3PID-v1.2Final(Published).pdf

[3] http://www.energynetworks.org/electricity/futures/open-networks-project/future-worlds/future-worlds-impact-assessment.html

Impact assessment context

In Autumn 2018, the Open Networks Project commissioned Baringa to undertake an independent impact assessment of the relative costs and benefits of the five Future Worlds. Between September and December 2018, Baringa developed a framework for assessing the strengths and weaknesses of the Future Worlds, including quantification of the relative costs and benefits. This has been supported by stakeholder engagement to understand wider views and test the appropriateness of the assessment methodologies. In addition, Baringa was guided by the responses from the 2018 Future Worlds consultation[4] and throughout the project have been supported by the Open Networks Project groups, BEIS and Ofgem. Stakeholder workshops were also held to gain wider perspectives on the operation of the Future Worlds, including on the potential unintended consequences and conflicts of interest which could arise from the Future Worlds.

Baringa's high-level approach for its relative assessment is designed to be simple and transparent. The spreadsheet models, which underpin the analysis, are available alongside its Future Worlds Impact Assessment Report to allow others to review and build on this initial work. This consultation document, the Future Worlds Impact Assessment Report and the supporting materials detailing the methodologies and data are available to download from ENA's website. The following workbooks containing the data and methodologies used within the impact assessment have been published:

- **Master benefits_v1.0**: The methodology for the benefits assessment;
- **Final Master costs_v1.0**: The methodology for the cost assessment;
- **Final Master costs_Integrated World C_v1.0**: This is the methodology for the cost assessment but where we assume that World C is integrated into all other Future Worlds;
- **Final Future World results**: This brings together the outputs of the costs and benefits methodologies across all assumption cases; and
- **Final Future World results_Sensitivity_v1.0**: This brings together the results of the costs and benefits methodologies across all assumption cases based on a later development of Worlds D and E into Stage 2.

Impact assessment questions

We have categorised the questions into seven distinct areas that are cross-referenced to the key sections of the Impact Assessment Report of Executive summary, Transition paths, Benefits assessment, Cost assessment, Qualitative assessment, General and Further work.

Prior to asking a question we provide the context for the question and highlight the relevant sections of the Impact Assessment Report.

Please consider and respond to as many of the questions that are relevant to your organisation.

We will start by asking a question on the general conclusions and insights in the Executive summary to allow stakeholders with limited time to review the Executive summary only and provide their response. This will also allow high-level comments to be raised and reference to the next level of detail in the sections of the report.

General questions

Knowing which stakeholder group each respondent is from will help give context to the answers given and will also help the Open Networks Project team determine if they are reaching a wide range of stakeholders which is representative of those impacted by the changes occurring in the energy industry.

[4] http://www.energynetworks.org/electricity/futures/open-networks-project/future-worlds/future-worlds-consultation.html

To allow the relative assessment of the Future Worlds, Baringa had to clarify the definition of each world including making reasonable interpretations to clarify the roles and responsibilities expected to be assigned in each world. These interpretations are detailed in Section 2 the Report.

Q1. Please confirm which stakeholder group[5] you believe that you belong to; this will enable the Open Networks Project to understand the spectrum of respondents to this consultation.

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?

Executive summary

The Executive Summary provides a high-level view of the conclusions and insights in the report and allows stakeholders to get that summary view and provide feedback.

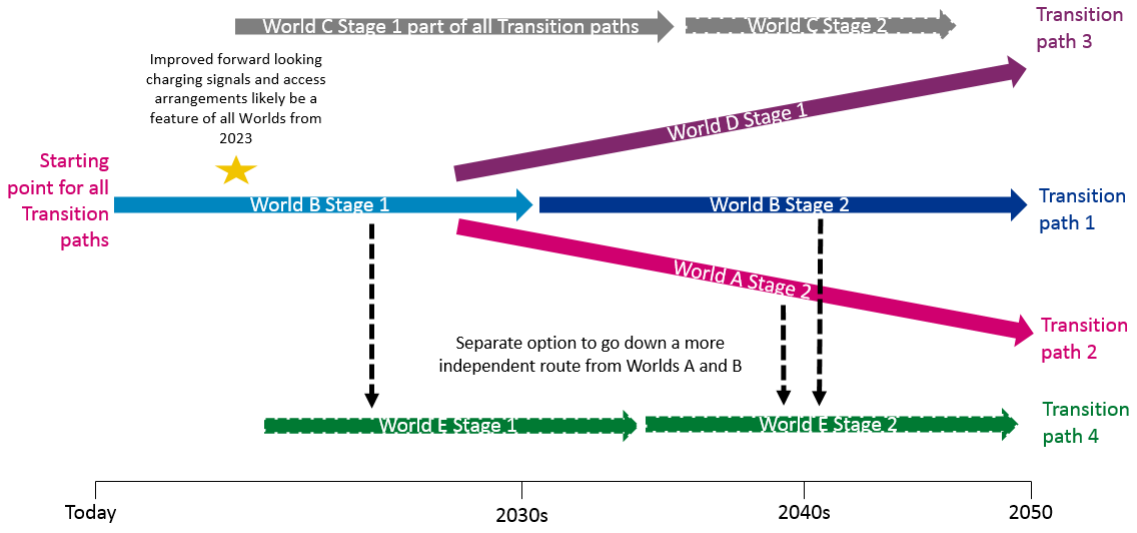
Q3. Do you agree with the conclusions and insights within the Executive summary? If not, please explain your rationale. Please provide reference to more detailed comments against individual sections if this is appropriate.

Transition paths

In Section 5, Baringa describes their observations on the performance of the Future Worlds and proposes four potential Future Worlds transition pathways which are illustrated in Figure 21, and reproduced as Figure 1 below for ease of reference. Each world has been subdivided into Stage 1 (initial development phase with limited coverage) and Stage 2 (mature development, full scope coverage) and it is assumed that World B, Stage 1 best represents where we are now and so is chosen as the starting point. In summary, Baringa believes that all Future Worlds are viable and the **transition paths** from World B Stage 1 could be:

- transition path 1: continued joint procurement and co-ordination between DSOs and electricity system operator (ESO) (World B Stage 2);
- transition path 2: move to DSO led co-ordination (World A Stage 2);
- transition path 3: move to ESO led co-ordination (World D Stage 1); and
- transition path 4: move to independent flexibility co-ordinators (World E).

Figure 1: Potential transition paths



[5] http://www.energynetworks.org/electricity/futures/open-networks-project/future-worlds/future-worlds-consultation.html.

Each of these transition pathways are described in more detail with potential triggers identified that could initiate a change to another transition path. A single transition path is presented for each of the Worlds B, A and D, with three alternative transition routes to World E:

- an early transition from World B (Stage 1) to World E (Stage 1, then stage 2), or
- a later transition part way through World B (Stage 2) to World E (Stage 2); or
- a later transition part way through World A (Stage 2) to World E (Stage 2).

Note, there is no path indicated for a transition from World D to World E since it is assumed that the legal separation of the ESO does not require a separate fully independent Flexibility Coordinator or Coordinators. In addition, the impact assessment indicates that World C is not a stand-alone world but forms an additional layer within all the other worlds. World C, in the form of reformed access and forward-looking charges arrangements, is shown as being implemented from 2023 (coinciding with the next distribution price control period).

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

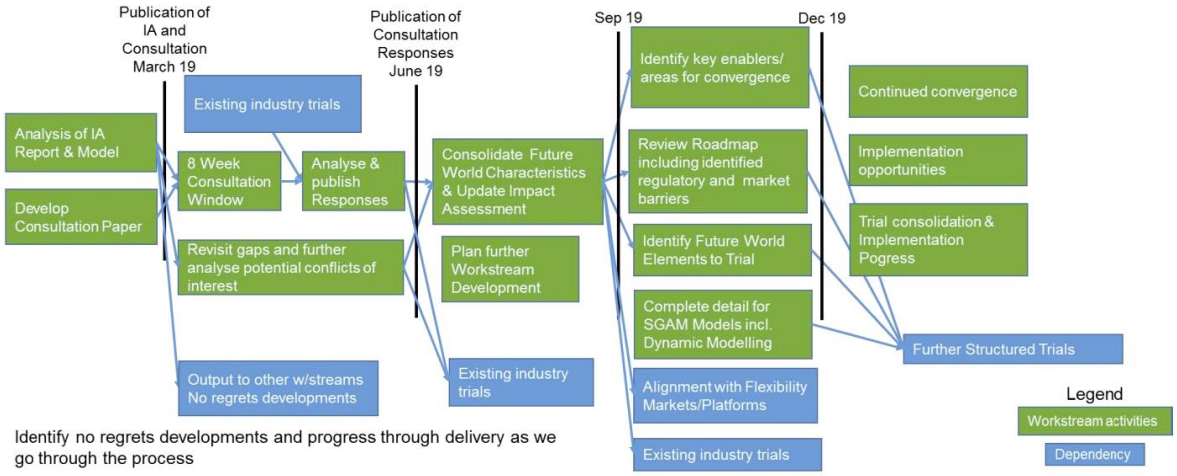
Q5. Do you believe there are any other viable transition paths? If so, please explain why.

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

Further work

The approach to the impact assessment was intended to be broad with only relative outputs, this hopefully allows the reader to draw general conclusions about possible transitions to Future Worlds. Baringa has listed further work ideas in Section 5.5 that could follow their Impact Assessment Report and the Open Networks Project workplan for 2019[6], with the timeline and potential activities for Workstream 3 is reproduced below in Figure 2. We are looking for stakeholder views on what activities would add the most value to either the impact assessment or which areas ENA could focus on during 2019.

Figure 2: Workstream 3 elements of Open Networks project 2019 Workplan



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?

[6] http://www.energynetworks.org/electricity/futures/open-networks-project/open-networks-project-stakeholder-engagement/public-consultations.html

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

Benefits assessment

The impact assessment describes the benefits of each Future World in Section 3.2 based on the two 2018 National Grid System Operator Future Energy Scenarios which deliver Government carbon targets but with a different mix of centralised versus decentralised energy resources, namely 'two degrees' and 'community renewables'. These benefits are assessed in two ways:

1. **Considering the benefits available through better system operation** under the sub-categories of:
   - avoided transmission investment (reinforcement costs less costs of managing constraints);
   - avoided distribution investment (reinforcement costs less costs of managing constraints);
   - reduced balancing service costs (balancing services excluding constraints); and
   - avoided generation investment (due to peak demand reduction).

2. **Mapping the proportion of benefit to each Future World**, driven by the three key factors for system operation of:
   - primary control (for dispatch of DER);
   - certainty of response; and
   - maximising participation in markets (reducing cost through greater competition).

The full details of the benefits assessment are given in Appendix B of the Impact Assessment Report.

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?

The impact assessment chooses to focus on the development of the Future Worlds over time, rather than assessing the 2050 end state. Baringa stated that this was so as not to pre-judge the outcomes of the Future Worlds but focus on the near-term performance which can provide greater insights into the DSO transition. This approach drove the assessment of the Future Worlds in an initial stage of development (Stage 1) and a more mature state of development (Stage 2) with the assumption that when Worlds A, B, D and E enter Stage 2 of development they are all capable of delivering all of the potential benefits of operating a more flexible electricity system if well designed and effectively implemented. This enables the impact assessment to differentiate the Future Worlds by the speed by which they can develop into Stage 2, and the costs of getting there. Further assumptions surrounding the detailed benefits assessment are contained in Appendix B of the Impact Assessment Report.

Q10. Do you agree, disagree on the key benefits assumptions contained within Appendix B (eg 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?

The impact assessment considers both the value of flexibility to network operators and also what you might expect to pay flexibility service providers for these services. The data for these assumptions has come from several sources, such as network operator reference costs for the cost of reinforcement (£/MW/yr), CDCM and Capacity Market prices, as well as relevant network innovation trial results. These benefits are explained in Section B.2 - Assessing the benefit stack of Appendix B.

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

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?

There is always likely to be some uncertainty when estimating the value of future benefits and so the impact assessment has endeavoured to use a range of values as described in Section 3.5.

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.

Cost assessment

In Section 4.3 of the impact assessment, Baringa utilises a bottom-up approach in order to assess the costs associated with the Future Worlds. They use a list of the DSO functions developed by the ENA and the SGAM modelling and identify where they sit with different actors in each Future World. Technology, resource, interface and business change costs are then overlaid on this base. Baringa sets out the detailed cost assessment undertaken for their relative impact assessment in Appendix C.

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 cost assessment focuses on system and network operators; consequently the quantified cost assessment is limited to how the costs of the Future Worlds will impact network operators. However, the wider cost impact to other stakeholders of DSO transition has been captured qualitatively through a specific session with stakeholders through the Open Networks Advisory Group to understand the different impact which each Future World might have on them. This has helped feed into the qualitative assessment.

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

There is always likely to be some uncertainty when estimating the costs so the impact assessment has endeavoured to use a range of values as described in Section 3.5.

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

Qualitative assessment

The qualitative assessment in Section 4.4 is based on the criteria set out by the ENA in its Future Worlds consultation. It is structured around HM Treasury's five case model which is highlighted as best practice for public sector impact assessments and addresses the strategic case, the economic case, the financial case, the commercial case and the management case. The qualitative assessment extends the context of the Future Worlds to those stakeholders outside of networks and assesses the Future Worlds' wider socio-economic impact. The qualitative assessment approach, illustrated in Figure 19, ranks the strengths and weaknesses of both stages for each World against the criteria. The full details of the Qualitative Assessment are given in Appendix A of the Impact Assessment Report.

This qualitative assessment was used to summarise the trade-offs between each of the Future Worlds which is presented in Table 1 in the Executive summary.

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?

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.

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

Baringa held a specific session with stakeholders from the Open Networks Advisory Group to understand the potential unintended consequences and risks of the DSO transition, including potential

mitigations. The result from this session is detailed in Section 4.5, with Table 6 summarising the key themes and categories of unintended consequences and Figure 20 showing the prioritisation of themes.

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?

Next steps

The consultation closes on **1 May 2019**.

Please send your responses to opennetworks@energynetworks.org.

It is our intention to review the responses to this consultation and publish our comments on the feedback by the end of June 2019 on the ENA's website.