

1st December 2021

RIIO-ED2: Technical Panel's view on the technical aspects of Northern Powergrid's Final Business Plan

Background and purpose of the Technical Panel ('the Panel')

Northern Powergrid's (NPg's) RIIO-ED2 business plan is based on an asset management approach and underpinning engineering assumptions, analysis, technical conclusions that are, by their very nature, technical and often complex. Therefore, in order for the business plan to be rigorously tested, challenged and improved, the NPg Board instructed an independent 'Technical Panel' to be established under my chairmanship, as a non-executive member of the Board.

The Panel comprises a group of independent consultants with a wealth of knowledge built from working in both industry and academia.

The Panel's function was to scrutinise and challenge the technical aspects of the plan and provide an opinion on the extent to which NPg's plans are:

- *Ambitious*: demonstrate a clear vision of the organisational goals with evidence of an aspiration to stretch the boundaries
- *Robust*: analysis is accurate and conclusions well justified
- *Resilient*: suitable consideration is given to the impact of uncertainty
- *Safe*: suitable consideration is given to public and operational safety and legal compliance
- *Forward looking*: decisions are made with future customers and utilisation in mind
- *Innovative*: evidence exists of the adoption of innovative solutions in business as usual
- *Progressive*: there is a progressive approach to continual improvement in both techniques and technologies

Approach and methodology

The primary focus of the Panel was to review network investment areas by assessing the logic and robustness of justification, suggesting ways to improve the justification where applicable. This included testing to ensure the business plan is robust and fit for purpose, confirming also that NPg

has taken a suitably balanced approach to managing risks for the company, and current and future consumers.

This included, but was not limited to, review of:

- The analysis carried out by NPg;
- The choice(s) of modelling methodologies employed;
- The inputs to, and outputs from, that analysis; and
- The impact of innovation and data and digitalisation across the plan.

Scope

The Panel has sought to challenge all aspects of the business plan that affect decisions on costs. Aligned to the structure of NPg's business plan this mainly covered the following areas, although some other areas were assessed during the course of our work.

- Decarbonisation (including scenarios, whole system solutions and DSO strategy);
- Environmental Action Plan;
- Engineering Justification Papers/Network Investment Strategy
- Reliability and Availability;
- Asset resilience;
- Climate Resilience;
- Innovation; and
- Data and Digitalisation.

The Panel's review process included document reviews, detailed written feedback and face-to-face / video meetings with NPg staff in order to discuss key issues. During the period from June 2020 to November 2021, the Panel has participated in 41 separate, formal meetings.

In addition to formal meetings, bilateral meetings have also taken place on numerous occasions between individual Panel members and NPg staff with specific expertise and responsibility for given areas of the business plan.

Summary conclusions

- i. The Panel has been satisfied by the nature and content of its interactions with NPg. The professional, technical and subject matter expertise of its staff was evident throughout the review process.
- ii. The Panel feels that NPg has responded well to its challenges and probing on a wide-range of issues covering the entirety of the business plan and that it has made significant progress over the course of the past year. As a consequence of this interaction, the Panel believes that NPg's business plan is a more robust, comprehensive, consistent and closely-argued document than the draft business plan released in July 2021.
- iii. NPg has been able to demonstrate a comprehensive understanding of the complex challenges it faces in the biggest area driving change in its plan and also the area with greatest uncertainty, namely decarbonisation. The Panel believes that it has developed a robust and well-justified methodology for its decarbonisation pathway and "best-view" scenario.

- iv. NPg has demonstrated good ambition in driving whole-systems solutions and in minimising costs to customers by seeking efficiencies throughout its network investment strategy.
- v. The Panel has been encouraged to see a strong track record of delivering innovation projects with tangible benefits that have been adopted into day-to-day business (such as Thor Hammer, the FORESIGHT and Celsius projects, self-healing cables and silent power vehicles). The Panel has challenged NPg to enhance its innovation programme and delivery model to stimulate even more innovation throughout the business as it invests in more digital capabilities. The Panel has also encouraged NPg to make ever greater efforts in co-operation with other DNOs, the innovation ecosystem and a range of other stakeholder groups, not the least of which is customer stakeholders. The Panel has been encouraged to see that NPg has fully embraced this approach and this is clearly reflected in its business plan.

The following is a brief overview of the Panel's opinion on key areas of the NPg business plan.

Decarbonisation:

- The decarbonisation methodology is transparent and well-justified. NPg gave the Panel significant access to both its approach to scenario modelling as well as its outputs enabling the Panel to gain a good understanding of NPg's load related planning processes.
- The Panel challenged NPg on the **sensitivity analyses** of its decarbonisation scenarios. In responding to this challenge, NPg worked with the Panel to considerably expand the analysis. This interaction resulted in the Panel being satisfied by the level of detail and understanding of the impacts of the various externalities that may affect the company's operations. This analysis demonstrates that the company's plan is robust and suitably flexible to manage the likely future uncertainties as scenario pathways evolve. NPg has dealt with the Panel's challenges and has provided confidence in its approach to sensitivities with a high level of comfort.
- NPg's approach to **Whole Systems** gives appropriate consideration to cross vector influences with a solid set of initiatives and objectives that are a clear progression from ED1. At the end of the review process, and following a series of intensive challenges on this issue, the Panel is able to provide a significantly higher level of comfort on NPg's 'Whole System' approach than at draft business plan stage.
- The **Distribution System Operation (DSO) Strategy** is critical to the future of the electricity networks and NPg plans to become a more active participant in an increasingly dynamic market. The objectives and initiatives are clear with direct linkages to data and digitalisation, which will enable NPg to better manage future uncertainty. At the end of the review process, and following a series of intensive challenges on this issue, the Panel is able to provide a significantly higher level of comfort on NPg's DSO Strategy than at draft business plan stage.
- The Panel acknowledges that two of NPg's four **Customer Value Propositions (CVP)**, have cross-cutting relevance to **DNO Strategy** as well as to **Whole Systems** solutions CVP3: Dynamic voltage optimisation for customer energy efficiency; and CVP 4: Phase 1 rollout of the next generation energy system. The Panel held a CVP review session with NPg and made numerous comments and challenges, which were captured in the meeting notes. The DSO Strategy will be kept up-to-date in the light of findings from the Boston Spa Energy Efficiency Trial (BEET) which will in turn, inform the roll-out of CVP 3 on voltage optimisation.

Environmental Action Plan:

- The Panel reviewed the optioneering carried out as part of NPg's Environmental Action Plan. This work focused heavily toward the management of EHV/132kV fluid filled cables and how

best to use the latest techniques to manage the associated environmental risks. The Panel was encouraged by NPg's progressive asset management approach to managing this risk through new technology which, inter alia will, enable a reduction in costs without a reduction in ambition.

- On electrical losses the Panel has been encouraged with the scope of NPg's analysis, emphasis on a whole system approach and consideration of the wider carbon benefits to be achieved rather than a narrow focus on network loss reduction. The Panel is satisfied with the work carried out to determine the value to customers through the saving of losses and the extent of analysis undertaken on the decision to adopt amorphous core transformers.
- SF₆ was discussed in both the wider context of Net Zero and NPg's business carbon footprint. When considered alongside the Climate Change Committee's (CCC) current stance on SF₆ and its continued use in the electricity industry, NPg is taking a progressive and proportional approach to adopting SF₆ alternatives.
- In relation to Polychlorinated Biphenyls (PCBs), specifically, the Panel raised concerns about risks posed with respect to deliverability considering supply chain capacity as the requirement to remove PCBs falls on all DNOs within the UK and also across Europe. The Panel has no major concerns with NPg's EAP investments. It feels that the company has generally responded well to the wide range of challenges put to it and is therefore comfortable with the approach adopted in its EAP.

Reliability & Availability

- There has been a wide-ranging engagement with NPg over the review period on this issue including data-analytics, benchmarking and Worst Served Customers (WSCs). The Panel intensified its scrutiny during the latter part of the review period post NPg's draft submission of the business plan.
- NPg is in a transition period regarding the definition of WSCs. Ofgem itself is revising its definition of WSCs to those experiencing 12 or more interruptions over a 2-year period (revised from a 3-year period under ED1) all at the HV level. The Panel is in agreement with the Customer Engagement Group (CEG) which, has expressed its strong desire for NPg not to stick too rigidly to the Ofgem definition of WSCs but to conceive a more challenging definition.
- The Panel feels that NPg has set stretching reliability and availability (R&A) targets for ED2. Benchmarking with other DNOs clearly strengthens the case for accelerated remote control investment and demonstrates that it is beneficial for consumers.
- The Panel has pushed NPg to adopt new innovations in areas such as pre-fault information and to use this important tool in its asset management approach. The Panel has pushed NPg hard to think more about adopting a progressive and innovative approach to R&A issues and to make it explicit in the business plan. Through the adoption of new technologies and approaches such FORESIGHT, the Panel is able to provide a significantly higher level of assurance than at draft business plan stage.

Asset Resilience

- The issue of 'resilience' was divided into three sub-categories, namely; network resilience, cyber resilience and climate resilience. Cyber resilience is covered in the Data and Digitalisation aspects of the business plan.

- The Panel reviewed all of the underlying asset strategies for major asset classes. It had detailed engagement with the Network Asset Risk Metric (NARMS) approach that is used extensively for asset replacement and refurbishment choices.
- The Panel finds that the choices around asset sizing and integration with the Net Zero objectives are well thought out and seem to offer significant value whilst balancing the inherent uncertainty of future demands on the network.
- The Panel has been satisfied with NPg's asset resilience approach. It is particularly pleased to see new and interesting innovation projects and how they fit with NPg's overall plans. The Panel finds projects such as Silent Power and Micro-resilience, particularly good examples of a more progressive asset management approach by the company and which, it has consistently encouraged.
- In general, the Panel is comfortable with NPg's overall approach to asset resilience and innovation plans. Elsewhere, a wide range of asset resilience related issues have been covered through the preparation by NPg of dedicated Engineering Justification Papers of which, the EJP 9.2 for Low Frequency Demand Disconnection (LFDD) and EJP 6.2 Microwave Radio (Cyber Resilience), serve as a good examples. Towards the end of the review process, the Panel closely scrutinised these and other asset resilience EJPs and found them to be sensible and logical proposals for the distribution network. As such they provide the Panel with a significantly greater degree of reassurance than at draft business plan stage.

Climate Resilience

- The Panel finds that NPg is using the best available data for their climate change analysis. Their work has been done in conjunction with both the Met Office and the other DNOs.
- The Panel believes that NPg is generally well-advanced in terms of flood defences. The company is likely to be just 2-3 sites short of full compliance with national standards for flood protection by the end of ED1 enabling a reduction in investment in this area for ED2.
- The company has also established working groups with the Energy Networks Association (ENA) for a co-ordinated approach to the issue which is welcomed by the Panel. In general, the Panel is satisfied with NPg's Climate Resilience measures.

Engineering Justification Papers (EJP)

- Towards the end of the review process, all 61 of NPg's EJPs were closely scrutinised by the Panel. The Panel focused intensely on these documents due to the fact that they cover the majority of NPg's proposed investments. One EJP for example, EJP-11.1: (HV/LV network reinforcement) alone accounts for some £300 million of investments.
- It has been a significant focus of the Panel to understand and challenge NPg's overarching strategy towards its investment programme; how different drivers on investment are assessed and how underlying decisions build towards a coherent approach. To facilitate this, the Panel has scrutinised the EJPs with particular focus on their:
 - Technical accuracy;
 - Strength of engineering and investment justification;
 - Strength of optioneering; and
 - Progressive asset management approach.
- A summary has been produced by the Panel assessing each EJP according to the above criteria and is contained in Annex 3 of the Final Assurance Report.
- NPg's investment strategy sets out a very clear intent of a holistic asset management approach which the Panel can see evidenced from both the discussions it has had with NPg and within its documentation.

- The Panel has worked intensively to improve the quality of the narrative and encouraged NPg to establish explicit links between the supporting data and investment decisions within the EJPs. These improvements as recommended by the Panel will be of significant benefit to NPg.
- The Panel's detailed review of EJPs give a high level of confidence in NPg's optioneering and investment decision-making across a range of different methodologies. The Panel's latest challenges arising from formal meetings held in October 2021 and, marked review of the EJPs, have mostly been accepted by NPg and have already been, or were in the process of revision prior to final submission to Ofgem. The Panel's reassurance on the robustness and objectivity of the suite of EJPs has therefore, reinforced confidence in NPg's Network Investment Strategy.

Innovation

- The Panel has pushed the company hard in this area and has been pleased to see a range of new innovation projects emerge, with an understanding of how they fit in with NPg's overall plans and how learning will be implemented into the business (for example Silent Power, Voltage Optimisation (BEET project), Auto Design and Micro-resilience). In general, the Panel is comfortable with NPg's overall approach to innovation plans and its generally progressive approach to asset management.

Data and digitalisation (D&D)

- In general, The Panel believes that NPg has done well in connecting its data and digitalisation plans (Digital Strategy Action Plan – DSAP) to business imperatives and especially, with regard to integrating the voice of stakeholders. The Panel feels that this is crucially important and comes through very clearly in the documents reviewed.
- The Panel is impressed with the interconnection of different task streams with different plans and their links to expected outcomes. The Panel is pleased to see that its interaction with NPg has resulted in the delivery of a dedicated Justification Annex to the business plan which seeks to address its many challenges, suggestions and interrogations. As a result of the work done, the Panel has a good degree of comfort that NPg is moving in the right direction with regards D&D.

In conclusion, the Panel is convinced that as a result of its challenges to all technical aspects of the business plan, this document has evolved to become far more robust, well-argued, consistent and rigorous than at draft business plan stage, as a result, the Panel is able to express a high degree of comfort and reassurance in the NPg business plan.

A copy of the Panel's Final Assurance Report has been submitted to the CEG and Ofgem.

Yours sincerely,



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Chair of the ED2 Technical Panel

Pro Vice-Chancellor (Research and Enterprise)