Network Innovation Allowance Annual Summary 2021/22

July 2022

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2020/21 NIA Annual Summary

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Introduction

1. This report has been prepared by Northern Powergrid to inform interested parties of the innovation activities of its electricity distribution licensees, Northern Powergrid (Yorkshire) Electricity Distribution plc, and Northern Powergrid (Northeast) Ltd. It covers the period from 1 April 2021 to 31 March 2022.

2. A single report has been prepared because the two licensees are operated under common management, sharing best practice between them. Our approach to research and development is no exception, and we draw no arbitrary distinction in the innovation carried out for the two licensees and our innovation strategy is designed to be equally applicable across our full geographic area of operation. Projects and programmes are therefore set up and progressed jointly for both licensees.

3. The report focuses upon research and development work eligible for Ofgem's Network Innovation Allowance (NIA) however some details of our other activities are given where necessary to provide a broader context for some of the innovation being undertaken within the company. Innovation is funded through a variety of routes including other price control revenues, specialist industry funding sources (e.g. Innovate UK) and participation with universities (funded by UK research councils).

4. The report has been prepared in accordance with standard condition 46 of the electricity distribution licence, the associated Regulatory Instructions and Guidance (RIGs) and the Electricity Network Innovation Allowance Governance document. In particular the obligations specified in sections 6.6 and 6.7 relating to the requirements for an annual summary of NIA activities.

Progress of Innovation Activities

5. As a consequence of the depletion of the project pipeline as a result of Covid, and post-pandemic issues, there has been a significant impact on innovation investment through the last year.

6. Further serious storms and our ongoing response in late 2021 and early 2022 delayed both project implementation and new project identification and mobilisation.

7. Whilst our investment level over the longer term has been typically been greater than 90% of regulatory allowance during this year the level has been 41%.

8. We are now in the process of mobilising new projects and are taking the opportunity to fully align these with our new innovation strategy. New projects are also, wherever possible, in accordance with ED2 planning and needs.

9. Resilient Homes is a good example of a project that has been stalled. Entering customers' homes to install the equipment required to support the medically dependent and vulnerable has not been possible during the recent pandemic. As a result no progress has been possible this year. This project is of a type that can be ported through to ED2 with its emphasis on vulnerable customer support.

10. Despite this the portfolio of activities has remained close to 30 projects, of various sizes around the maximum size we believe we can sustain given the resources available. For the reporting year Northern Powergrid has participated in 25 separate NIA projects. 6 of these are collaborative projects with at least one other GB electricity distribution network operator (DNO) or gas distribution network (GDN) operator.

11. We continue to seek collaborative activities with other DNOs. We also have similar activities with some GDNs plus regional water companies. We will continue to undertake joint activities wherever possible, both for improved learning and project quality and to maintain good cost control. As an example of this we are seeking a joint collaborative effort with UKPN on overlapping aspects of our 2022 NIC bids. Alignment of the innovation funding regimes which will occur from March 2023 and the Innovation Fund (SIF) may provide options for partnering with GDNs on cross-vector activities.

12. The new ED2 Strategic Innovation Fund offers new opportunities to collaborate with both DNOs and Gas Distribution Networks on issues of mutual interest. It also has the potential to expose us to innovators new to our sector of industry. In anticipation of the start of ED2 in April 2023 we expect to be actively involved in SIF project proposals from quarter three of 2022.

13. The following table shows all of the projects which have been active during the reporting period:

	Reference	Project Type
Integrated substation Condition Monitoring (ISCM)	NIA_NPG_002	Northern Powergrid activity
FORESIGHT – LV pre-fault recognition and management	NIA_NPG_007	Northern Powergrid activity
Vehicle to Grid (V2G) - the network impact of grid integrated vehicles	NIA_NPG_014	Northern Powergrid activity
Intregrel - Baseline Implementation	NIA_NPG_017	NPg/NGN Collaboration
Micro-Resilience	NIA_NPG_018	Northern Powergrid activity
Customer-Led Distribution System	NIA_NPG_019	Northern Powergrid activity
Holistic Fault Anticipation	NIA_NPG_021	Northern Powergrid activity
Drones Within Visual Line of Site (Drones WVLOS)	NIA_NPG_022	Northern Powergrid activity
Resilient Homes	NIA_NPG_026	Northern Powergrid activity
Centralock Remote Access Management System	NIA_NPG_027	Northern Powergrid activity
Pragmatic Security	NIA_NPG_029	Northern Powergrid activity
Health Index Study of Electrical Energy Storage Systems within Electricity Networks.	NIA_NPG_031	Northern Powergrid activity
Boston Spa Energy Efficiency Trial	NIA_NPG_032	Northern Powergrid activity
Impact of LCTs on the LV Network	NIA_NPG_033	Northern Powergrid activity
Resin Mixing	NIA_NPG_034	Northern Powergrid activity
Covid Vulnerabilty Study	NIA_NPG_035	Northern Powergrid activity
Polesight	NIA_NPG_036	Northern Powergrid activity
The Value of Flexible Heat Demand as a Service	NIA_NPG_038	Northern Powergrid activity
Community DSO	NIA_NPG_039	Northern Powergrid activity
Assessment & Testing of Alternative Cut-outs	NIA_UKPN0029	ENA Collaboration, UKPN lead
Low Cost Fault Current Measurement of Wooden Poles	NIA_SPEN_0025	EIC Collaboration, SPEN lead
Environmentally Acceptable Wood Pole Pre-treatment Alternatives to Creosote (APPEAL)	NIA_SPEN_0008	EIC Collaboration, SPEN lead
Thor Hammer	NIA_SPEN_0039	EIC Collaboration, SPEN lead
Doorstop	NIA_NGN_272	EIC Collaboration, NGN lead
Streetscore 2	NIA_NGN_338	EIC Collaboration, NGN lead

14. The table identifies those projects where we are sole participant or, where we are working alongside other licensees, the nature of the collaboration involved. For projects where Northern Powergrid is either sole participant or, in the case of collaborative innovation, where Northern Powergrid is the designated lead licensee

we have posted the required annual progress update on the ENA Smarter Networks Portal.

15. In addition to these activities we also continue to participate in several activities in a supporting role, either as engineering consultants providing insight into the network compatibility issues or acting in a more active steering role. These projects are not formal NIA funded activities but are important in allowing us to influence the development activities of others and to stimulate the market.

16. We chose not to participate in the 2021 NIC funding round despite having identified a candidate project. This project, designed to make the adoption of community based smart local energy schemes cheaper and easier to implement for customers, was suggested and developed by SME third-party partners identified through an open call by the ENA. The ambition of the project was such that it was decided to undertake additional work to better understand the underlying implications and assumptions before submitting a proposal and bid for funding. Consequently the Community DSO project NIC bid will be submitted in the 2022 funding round.

17. We also continue to benefit from the advantages of being part of a broader international organisation, Berkshire Hathaway Energy (BHE). Exchange of innovative ideas, best practice and other learning from an organisation with very similar technology but with a different perspective significantly enhances the quality of our overall innovation portfolio. We are now actively engaged in the sharing of innovation project outcomes and the depth of that interaction is increasing.

Innovation Strategy Delivery

18. In December 2020 we published a refreshed version of our ED1 innovation strategy. Our ED2 innovation plans, also developed during 2021 and now submitted to Ofgem, have similar goals and priorities.

19. Our innovation strategy strategic objectives remain highly relevant to stakeholder needs and fall into three broad areas:

- Decarbonisation;
- Reliability and Resilience; and
- Value For Money.

20. In support of these strategic objectives innovation projects tend to fall into eight main areas of activity:

- Network environmental footprint (including safety);
- Network reliability and availability;
- Network management and flexibility;
- IT/digital enabled process improvements
- Demand side response (including customer flexibility);
- Network planning and design;
- Communications and engagement; and
- Social obligations

21. The bulk of our current activities remain focussed on the first five of these activity areas. These areas represent key engineering strands of our innovation requirement that have been in place for several years.

22. Storms, during December 2021 and January 2022, pointedly emphasised the importance to customers of network reliability. As society becomes more dependent on electricity this will become increasingly important. Projects such as MicroResilience aim to provide more inherent resilience within the network and a successful project will allow us to provide better support to the more isolated parts of our network.

23. Projects such as Community DSO should allow the connection of more community based local energy schemes which as well as providing customers with cheaper simpler connections and lower electricity bill should also help to deliver more embedded resilience.

24. We ae currently developing several projects that support decarbonisation. These include net zero support for rural/farming communities, enhancing Silent Power vehicles to support three phases and at greater capacity, and an improved EV adoption model, building on previous work by colleagues at SPEN.

25. Notwithstanding the ED1 innovation strategy refresh in December 2020 we continue to develop our thinking and strategy further, in part to meet ED2 planning needs. The ED2 strategy will be a clear and natural progression from the ED1 version.

26. Resilient Homes is aimed at supporting vulnerable customers through the installation of small scale storage system to protect them in the event of scheduled or unscheduled interruption to service. The in-home implementation of such systems has not proved possible this year and the project was effectively held pending an anticipated re-start during Q3 2021.

27. We have continued to support the Energy innovation Centre (EIC) during 2021/22 as we have done since its inception in 2008. This is an activity undertaken in collaboration with the majority of DNOs and GDNs as well as other utilities. It is designed to both identify and encourage innovations from new sources, such as other industries or SMEs with no previous experience of working with the electricity distribution network operators.

28. The EIC is also undertaking an increasing role in engaging operational staff in problem solving and innovation needs identification. This is helping to embed a broader innovation culture. Whilst this has been curtailed somewhat during the past year progress has been maintained through the use of online meetings and the intention is to increase activities in this area during 2022/23

29. During 2021/22 we have engaged with the EIC in projects with an emphasis on vulnerable customers. Streetscore 2 is designed to improve the lived experience of customers as they navigate areas in which we are engaged in street works. Doorstop is designed to protect all customers from the risk of door step fraud by providing a trusted and reliable system for identification of utility operatives. Both of these activities merit a cross-industry approach and this has been facilitated through the EICs broad membership.

30. The costs of running the EIC have been distributed across the running projects identified from this activity. We see the EIC as an increasingly important forum for the identification and implementation of cross-vector, cross-utility projects.

31. The Northern Joint Utilities Innovation Group (NJUIG) continues to meet. NJUIG supports the innovation needs of Infrastructure North and consists of representatives of Yorkshire and Northumbrian Water as well as Northern Gas Networks and ourselves. Activity levels in this area have been lower than anticipated during the reporting period and no new opportunities to progress pan-utility projects have been identified this year.

32. Northern Powergrid also supports activities undertaken through the ENA. The Collaborative Energy Portfolio (CEP) activity is aimed at the delivery of innovative activities of mutual interest. We consider this a core collaboration activity for

innovation through the ENA. All of the projects undertaken through the CEP are collaborative. While some of these are supported using innovation stimulus funding a significant proportion are funded as business-as-usual activities.

33. The CEP, should have completed its re-vamp and re-launch this year. However expanding the scope to allow the inclusion of electricity transmission as well as gas distribution and transmission activities has entailed long legal discussions which have delayed this activity and led to new projects being initiated. It is expected that this situation will be resolved in the middle of 2022 and we can resume cross-vector/whole system projects and studies through this forum.

Learning

34. The annual reports for each of the individual projects are available on the ENA smarter networks portal. These address the learning, both in terms of the delivery process and the project outcomes for each activity in detail.

35. Many of our projects are in progress and their nature is such that the conclusions on the learning delivered cannot be fully understood in the context of a partially completed project and the activities must run to their scheduled end point before conclusions can be drawn.

36. The Foresight project has now been completed. The learning from this project was substantial and a comprehensive report is available and has been uploaded to the ENA smarter energy Networks Portal. The project has demonstrated that the use of low cost sensors and the appropriate analytics can detect and locate developing faults before they become permanent. This allows significant operational efficiency and customer service improvements. The project outcomes are generally good but it is clear that there are network circumstances where the technique cannot be used yet. A further project, Polesight, is now being developed to test the approach in areas of mixed overhead lines and cables as opposed to the original fully LV cabled areas. Other DNOs are also taking an interest in adopting the project into their normal operations.

37. The Boston Spa Energy Efficiency Trial is now fully up and running and is in the hardware/software implementation phase. We are especially keen that this project is successfully delivered given the ongoing saving of up to £20 per annum which can be achieved with low levels of additional investment.

38. The Resin Mixing project has now finished. This looked at alternative methods for mixing joint potting resin. Current manual methods are slow, inconsistent and difficult for operators. The outcome of this project was to demonstrate that alternative mixing could be developed but that the stated objectives of the project to provide a small-scale, economic system could not be met without substantial further investment. On this basis the project output will not be adopted into business as usual.

39. The Centralock project is now successfully complete. The CentraLock system provides a realistic alternative to traditional ‘iron’ key and electronic locking suites, Enhanced functionality has been delivered alongside competitive economic performance. In accordance with the original objectives of the project a generic “keyless” locking specification has been developed and may form part of Northern Powergrid’s forthcoming locking replacement tender. It is anticipated that Centralock will be a part of this tender.

40. The Pragmatic Security project is also now complete. This examined the role of low carbon technologies, including embedded generation and storage, in providing network security. A range of interesting conclusions, amongst which was the need to

consider local network topology and characteristics when assessing the effect of low carbon technologies. Currently only the nature of the LCT is considered and this work demonstrates a much broader, holistic and contextual analysis is needed. A comprehensive set of reports has been produced but it is clear that many new questions are now open and will need to be resolved as the network develops to support the low carbon transition.

41. We continue to use the ENA Electricity/Energy Innovation Forums to disseminate project learning as it occurs. We will continue to support "The Summit" conference while it still serves our regulatory requirements.

Summary of 2021/22 Network Innovation Allowance Investment

42. We can also summarise the total network innovation allowance spending for the reporting period across the two Northern Powergrid licence areas:

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Eligible Project Spending (external)	£978,980
Eligible Project Spending (internal)	£721,645
IFIEt, Grand Total	£1,700,625

43. This is a much lower figure compared with 2021/22 (£4,331,641). This difference was due to the reasons outlined above.