



Network Innovation Allowance Annual Summary 2020/21

July 2021

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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 2020 to 31 March 2021.
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. We continue to expend the vast majority of our Network Innovation Allowance, with a utilisation of 97.2% this year. This utilisation is now standard and has been similar for the last four years.
6. The portfolio of activities is typically around 30 projects, of various sizes. This is reflective of maintaining the portfolio at around the maximum size we believe we can sustain given the resources available. For the reporting year Northern Powergrid has participated in 27 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.

7. There has been an impact on the portfolio this year due to the Covid-19 pandemic. Whilst the overall level of activity on running projects has been more or less maintained, the pipeline of new projects has been affected. A determined effort will be made throughout the rest of 2021 to remedy this.
8. We continue to have at least one collaborative activity with each of the 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. The trend direction over the last year has been for an increasing number of project activities to be undertaken on a collaborative basis and with the increased relevance of whole system thinking we anticipate that this will continue although experience has shown that opportunities which fit within NIA and NIC criteria under both GD1 and ED1 are currently difficult to identify. We will continue to seek such opportunities although these may have to wait until the alignment of the innovation funding regimes which will occur in ED2. In the meantime the Strategic Innovation Fund (SIF) may provide options for partnering with GDNs on cross-vector activities.
9. Progress on the Integrel project, in which we collaborate with Northern Gas Networks in a cross-vector activity, has remained slow during the year, mainly associated with site-access, wayleave and more general issues resulting from the pandemic. It is hoped that these problems are now close to resolution and the project can proceed as originally designed.
10. 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
Distributed Storage & Solar Study (DS3)	NIA_NPG_011	Northern Powergrid activity
Improving Demand Forecasting	NIA_NPG_012	Northern Powergrid activity
Vehicle to Grid (V2G) - the network impact of grid integrated vehicles	NIA_NPG_014	Northern Powergrid activity
Silent Night - Hybrid EV Generator	NIA_NPG_016	Northern Powergrid activity
Integrel - 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
Centrallock Remote Access Management System	NIA_NPG_027	Northern Powergrid activity
Pragmatic Security	NIA_NPG_029	Northern Powergrid activity
Switchgear Enhanced Ratings	NIA_NPG_030	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 Vulnerability Study	NIA_NPG_035	Northern Powergrid activity
Polesight	NIA_NPG_036	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
Eye in the Sky	NIA_WWU_0045	EIC Collaboration, WWU lead
Thor Hammer	NIA_SPEN_0039	EIC Collaboration, SPEN lead
Doorstop	NIA_NGN_272	EIC Collaboration, NGN lead

11. 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.
12. 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.

13. The 2020 Network Innovation Competition bid called Flexr was not funded. This project was designed to provide a high integrity repository for energy system data, built on open standards, to support the energy system transition, new 3rd party commercial services, analytics and a variety of other activities that would be enabled by easy access to data of a consistent quality. We still regard this activity as important particularly in enabling wider participation in future DSO activities. We will continue to seek ways to deliver the final outcome of this project.
14. In an open call for proposals in the autumn of 2020, through the ENA, we identified a potential Network Innovation Competition proposal entitled Community DSO. This is potentially a third party designed and led project. We are keen to explore the possibilities and issues with running such projects.
15. 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

16. In December 2020 we published a refreshed version of our ED1 innovation strategy.
17. 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.
18. 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
19. 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. However the shift in priority, flagged in previous years, to include more work on social obligations and particularly vulnerable customers is now beginning to deliver. This will be a continuing theme and priority area as we enter ED2. Further it is also becoming clear that project

- activities increasingly sit across the boundaries as the nature of changes required become pan-business.
20. 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.
 21. 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.
 22. We have continued to support the Energy innovation Centre (EIC) during 2020/21 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.
 23. During 2020/21 we have been able to use the EIC to interact directly with parts of Northern Powergrid that have not necessarily been at the forefront of innovative activities. New projects are now being developed as a result of this interaction although many are small-scale and, as they are in support of normal operations, not funded via innovation stimulus funding. However the benefit has been in an upturn in interest in innovation in the organisation and this cultural change should provide future benefits.
 24. 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.
 25. The Northern Utilities Joint 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.
 26. 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. 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.
 27. Building on previous success the CEP is in the process of being refreshed and expanded. A considerable amount of time and effort has been invested this year in revising the governance arrangements in anticipation of ED2. This includes expanding the scope to allow the inclusion of electricity transmission as well as gas distribution and transmission activities. This also should facilitate cross-vector/whole system projects and studies.

Learning

28. 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.

29. 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.
30. The Silent Power project has been substantially completed during the period and is now in the reporting phase. This project has designed and developed a van-mounted battery system to be used in circumstance where a generator would normally be deployed. Considerable experience of use in the field is now available. The vehicle is popular with staff and stakeholders alike and meets the original environmental and operational objectives. The original vehicles were designed for supporting single phase LV circuits and this technology is now transferring to BAU. Additionally a follow-up project is now in design to extend capabilities to flexibly address multi-phase circuits.
31. The Boston Spa Energy Efficiency Trial is now fully up and running. This aims to use already extant technologies, such as standard voltage control, along with real-time monitoring through smart meters to reduce customers' energy bills. The initial phases of this project are now complete and early results indicate that a 1% voltage drop provides a 1% energy saving and that up to a 4% saving may be available. This would provide customers with a typical ongoing saving of up to £20 per annum. This can be achieved with low levels of additional investment.
32. The Drones Within Visual Line of Site project is complete. This looked at the field use for small-scale unmanned aerial vehicles to help with routine network tasks and inspections. The project's conclusions are that whilst potentially useful the UAV technology cannot be used for routine tasks on an ad-hoc basis as local short-term weather conditions have to be taken into account and these are too variable for reliable use. One-off or scheduled line inspection may be different as this can be scheduled for favourable conditions. A report, including some use cases, is in preparation.
33. The initial analysis from the Vehicle to Grid (V2G) is that we consider V2G as a technique is more likely to be a tool in energy retail than electricity networks in the short to medium term, although it clearly has network potential in the long term. Currently the value of V2G capability is available to retailers, exploiting the fungibility of energy, whereas the economic and technological conditions for exploitation by network operators, where power is of more importance, are not yet in place.
34. We continue to use the ENA Electricity/Energy Innovation Forums to disseminate project learning as it occurs. During 2020 we have held an on-line innovation fair, allowing us to engage with diverse stakeholder groups on innovation topics, both general and innovation project specific. We will be repeating this during 2021.

Summary of 2020/21 Network Innovation Allowance Investment

35. 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)	£3,476,758
Eligible Project Spending (internal)	£854,890
IFIEt, Grand Total	£4,331,648

36. This is a slightly higher figure compared with 2019/20 (£4,119,155). This difference was due to some project timing issues pushing some planned expenditure into the 2020/21 regulatory year and we retain our, now well established, ambition to ensure that the ED1 annual allowance is fully utilised.
37. Internal spending represents 20% (cf 20% 2019/20) of the total investment. This is below the governance maximum limit of 25%.