



Network Innovation Allowance Annual Summary 2017/18

July 2018

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2017/18 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 2017 to 31 March 2018.
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. Considerable effort has been expended in increasing the level of innovation activity during 2017/18. We have initiated 11 new projects during the year and have expended the whole of the Network innovation Allowance for the regulatory year. This represents a major increase in the intensity of innovation as we seek to build on the platform provided by activities such as the Customer Led Network Revolution.
6. For the reporting year Northern Powergrid has participated in 29 separate NIA projects. Twelve of these are collaborative projects with at least one other GB electricity distribution network operator (DNO) or gas distribution network operator.

7. We have at least one collaborative activity with each of the other DNOs. We also have similar activities with some GDNs plus two water companies (Yorkshire and Northumbrian Water). This is very much in line with the view expressed in our innovation strategy; we would seek 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.
8. In the 2016/17 summary we anticipated cross-vector solutions to broader energy issues would be increasingly required as under-utilised capacity in each of the electricity and gas networks is depleted. We have during this year we have initiated a major activity with Northern Gas Networks to investigate and test the practical opportunities that such solutions might provide to energy consumers as a whole. The Northern Powergrid Integrel project builds on the investment already made on behalf of gas customers by Northern Gas Networks.
9. The following table shows all of the projects which have been active during the reporting period:

	Reference	Project Type
Vonag Utility Pole Strength Measurement	NIA_NPG_001	EIC Collaboration, NPG lead
Integrated substation Condition Monitoring (ISCM)	NIA_NPG_002	Northern Powergrid activity
Smart Data	NIA_NPG_003	Northern Powergrid activity
Development of An Improved Distribution Load Estimates Methodology	NIA_NPG_004	Northern Powergrid activity
Activating Community Engagement (ACE)	NIA_NPG_005	Northern Powergrid activity
FORESIGHT – LV pre-fault recognition and management	NIA_NPG_007	Northern Powergrid activity
Development of Oil-filled Cable Additive	NIA_NPG_009	EIC Collaboration, NPG lead
Pollywood - Alternative wooden pole system for OHL	NIA_NPG_010	Northern Powergrid activity
Distributed Storage & Solar Study (DS3)	NIA_NPG_011	Northern Powergrid activity
Improving Demand Forecasting	NIA_NPG_012	Northern Powergrid activity
Measuring the Societal Impact of Network Activities	NIA_NPG_013	EIC Collaboration, NPG lead
Vehicle to Grid (V2G) - the network impact of grid integrated vehicles	NIA_NPG_014	Northern Powergrid activity
Geospatial PV Mapping	NIA_NPG_015	EIC Collaboration, NPG lead
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
Smart Network Design Methodologies	NIA_NPG_020	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
AutoDesign: LV Connections Self Service Tool	NIA_NPG_024	Northern Powergrid activity
Lightning Prediction	NIA_NPG_025	Northern Powergrid activity
Environmentally Acceptable Wood Pole Pre-treatment Alternatives to Creosote (APPEAL)	NIA_SPEN_0008	EIC Collaboration, SPEN 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_SPEN0008	EIC Collaboration, SPEN lead
Management of plug-in vehicle uptake on distribution networks	NIA_SSEPD_0026	Coollaboration SSE lead
Harmonic Effect on Network Assets (HENA)	NIA_UKPN0023	ENA Collaboration, UKPN lead
Improved Statistical Ratings for Distribution Overhead Lines	NIA_WPD_008	EIC Collaboration, SPEN lead
Eye in the Sky	NIA_WWU_0045	EIC Collaboration, WWU lead

10. 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.
11. 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. Examples of these projects include an Innovate UK funded activity to trial vehicle batteries as storage once they are past their useful life for transport, an EPSRC funded academic study of energy storage, and contributing to regional and sub-regional economic and innovation strategy development. By interacting in this way with others' projects we

- help them to deliver better learning outcomes and we leverage our innovation funding by accessing additional understanding at relatively low cost.
12. Internally, within Northern Powergrid, additional innovation is also being undertaken. Several activities are underway which are aimed at delivering improvements in our customer facing processes such as delivery of connections where we have been re-engineering processes in the year to improve customer satisfaction. We are also now seeking innovation built on the considerable enabling investment that we have made the EAM asset management and GIS system. These are not necessarily NIA funded but are, nevertheless, innovative activities.
 13. Where we see these improvement activities are unable to deliver the improvement needed we will seek improved technological solutions through the innovation stimulus mechanism if that is appropriate. Our recently initiated Autodesign project to speed up network design delivery and improve customer service is an example of this approach.
 14. 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 now actively participate in a variety of corporate activities to enhance this collaboration.

Innovation Strategy Delivery

15. Our innovation strategy contains four strategic objectives that remain highly relevant:
 - the creation of a smarter powergrid;
 - the introduction of smart meters;
 - continued growth in web-based and digital-enabled services; and
 - issues of affordability.
16. Further, the priority areas identified in the innovation strategy are:
 - Network environmental footprint (including safety);
 - Network reliability and availability;
 - Network management and flexibility;
 - Demand side response (including customer flexibility);
 - Network planning and design;
 - Communications and engagement;
 - IT enabled process improvements; and
 - Social obligations
17. The bulk of our current activities remain focussed on the first five of these priority areas. These areas represent key engineering strands of our innovation requirement that have been in place for several years.
18. All active projects, excepting two, were initiated under ED1 project eligibility governance. Activating Customer Engagement (ACE) was initiated as an LCNF tier 1 project and the Integrated Substation Condition Monitoring (ISCM) project was transitioned from IFI. ACE is now complete with dissemination activities being undertaken during the summer of 2018.

19. The information technology enabled processes and customer engagement activities are relatively new and the project portfolio is still in its relative infancy. We anticipate that these areas in particular will become more active as we develop more distribution network operator orientated projects. These will naturally require more active and engaged customer and better IT systems for support.
20. It was noted in the 2016/17 report that network flexibility was the innovation area with least activity and that new activities in this area would be initiated during 2017/18. A major project, entitled Microresilience, has now been initiated to explore the application of systems of new technologies in supporting resilience for difficult to serve parts of the network. We anticipate that this will also provide useful insight into more general issues of network flexibility and to systems operation. This project will re-use some of the equipment acquired for the CLNR project.
21. Supporting our strategic objectives, network and customer flexibility are key areas of transition for the electricity system in general and network operators in particular. We anticipate an evolutionary path which will pass through smarter grids and move onwards to new distribution services. The smart grid implementation team whose role is to begin the transition of our network to a more actively managed system are now well embedded and delivering the near and medium term needs. To support this, and to better understand future options we have initiated the Customer Led Distribution System (CLDS) during this year. This is a major activity to explore the technology, economic and social issues to understand, and ultimately deliver, the practical needs of Distribution System Operation and the flexibility options, both network and customer, needed to deliver this.
22. We have continued to support the EIC during 2017/18. This is an activity undertaken in collaboration with the majority of DNOs and GDNs. 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. Several new projects from this source have been identified and initiated this year. 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.
23. The first pan-utility project, Measuring the Societal Impact of Network Activities, through the Northern Utilities Joint Innovation Group (NJUIG) and managed by the EIC is now approaching its conclusion and reports will be issued during the summer of 2018. 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.
24. It has been clear from this activity that all utilities share many common issues and we will seek to deliver further activities through this forum.
25. In the 2016/17 report we noted that the Beyond Visual Line of Sight project had identified the potential of drone technologies to improve the economic and safety aspects of operation inspection, and other field activities. We have initiated two projects in this area during the year; one collaboratively with other licenced entities to address issues of aviation regulation, and another internal project to accelerate field use.
26. We have continued to develop the role of our Innovation Steering group. All innovation projects now have named senior/executive level sponsors. This change in the top level engagement of our organisation is now delivering better engagement from the business as a whole and we will continue to develop this ongoing cultural change through 2018/19 and beyond.

Learning

27. 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.
28. 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.
29. Learning output has been relatively low during the year as many of our longer duration projects initiated during 2016/17 have yet to deliver their key outcomes. We have also concentrated on the exploiting learning from previous projects and building on these further as we increase our innovation intensity. We expect delivered learning to increase markedly during 2018/19.
30. A key conclusion during the year has been that the Pollywood system may provide an excellent alternative to current overhead line support approaches. Wooden poles, as currently used, have a variety of problems - they are natural but heavy, very slowly grown and require creosote preservation. Pollywood has demonstrated that light, hollow poles can be developed, with carefully physical engineered properties, using fast growing and sustainable species such as birch. As this project is now coming to an end we are seeking collaborators for follow-up work to accelerate this technology to higher TRL levels and provide field-ready prototypes.

Summary of 2016/17 Network Innovation Allowance Investment

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

Eligible Project Spending (external)	£3,492,938
Eligible Project Spending (internal)	£615,929
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IFIET, Grand Total	£4,108,867

32. This represents a more than doubling of expenditure when compared with 2016/17.
33. Internal spending represents 15% (cf 14% 2016/17) of the total investment. This is below the governance maximum limit of 25%.