



Network Innovation Allowance Annual Summary 2016/17

July 2017

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2016/17 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 2016 to 31 March 2017.
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. For the reporting year Northern Powergrid has participated in 18 separate NIA projects. Nine of these are collaborative projects with at least one other GB electricity distribution network operator (DNO) or gas distribution network operator.
6. We have at least one collaborative activity with each of the other DNOs. We also have similar activities with some GDNs. 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.

7. We anticipate cross-vector solutions to broader energy issues will be increasingly required as under-utilised capacity in each of the electricity and gas networks is depleted. We are seeking deeper collaboration with gas distribution on this and will initiate new projects in this area during 2017/18.
8. The following table shows all of the projects which have been active during the reporting period:

	Ofgem NIA Project Ref.	Project Type
Vonaq 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
Modelling Asset Risk	NIA_NPG_006	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
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	SSE led collaboration
Improved Statistical Ratings for Distribution Overhead Lines	NIA_WPD_008	ENA collaboration, WPD lead
Review of Engineering Recommendation P2/6	NIA_ENWL003	ENA collaboration, ENW lead
Reactive Power Exchange Application Capability Transfer (REACT)	NIA_NGET0100	ENA collaboration, NGET lead
Sustainable Multi Storey Communities	NIA_NGN_068	Northern Gas Networks led collaboration

9. 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.
10. 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 a Horizon 2020 funded smart cities activity, the development of new vehicle battery management systems and contributing to regional and sub-regional economic and innovation strategy development. We have also sponsored community energy groups to encourage local innovation by interested customer groups. 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.
11. 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. Again these are not NIA funded but are, nevertheless, innovative activities. 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.

Innovation Strategy Delivery

12. 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.
13. 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
14. 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.
15. All active projects, excepting two, were initiated under ED1 project eligibility governance. Activating Customer Engagement was initiated as an LCNF tier 1 project and the Integrated Substation Condition Monitoring project was transitioned from IFI. Both of these projects are now coming to an end.
16. 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.
17. It was noted in the 2016 report that network flexibility was the innovation area with least activity. Following a review of the output of our own (Customer Led Network Revolution) and other DNO's projects (including New Thames Valley Vision, ARC and Low Carbon London and others) in the context of likely future scenarios we are now actively developing projects in this area. These will be initiated during 2017/18.
18. 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. To facilitate this we have formed a smart grid implementation team whose role is to begin the transition of our network to a more actively managed and agile system.
19. We have continued to support the EIC during 2016/17. 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.
20. Additionally we have initiated the first pan-utility project. This project, Measuring the Societal Impact of Network Activities, was identified through our involvement with the Northern Utilities Joint Innovation Group. This supports the innovation

- needs of Infrastructure North and consists of representatives of Yorkshire and Northumbria Water as well as Northern Gas Networks and ourselves.
21. With NGN we introduced the water companies to the EIC who were engaged to manage the project on the group's behalf.
 22. We anticipate that this pilot project will be the first of several. We have found that we have many areas of general common interest with other utilities and that the level of maturity of technology application is different in each allowing useful cross-learning.
 23. To ensure high level support for innovation we instituted an executive-level innovation steering group during 2016. This continues to meet at regular intervals to ensure that the innovation strategy remains appropriate. The impact of this group is now beginning to tell on the pipeline of projects to deliver the overall strategy. The 2017/18 innovation budget is now fully allocated.
 24. We intended to publish an updated version of our innovation strategy during 2016. This will now occur during 2017. We do not anticipate a major revision since our original thinking remains reasonably unchanged. Whilst the core needs and priorities from the perspective of our customers and stakeholders have not significantly altered some of the priority technologies and general emphasis are likely to be different. Distribution System Operator, as one application for smart grid technology systems, the increasing take up of electric vehicles and IT and comms. will be bought to the fore.

Learning

25. 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.
26. 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.
27. The Beyond Visual Line of Sight project which completed in 2016 was designed to allow network operators to fly unmanned vehicles for asset inspection in a way which is not permitted under current Civil Aviation Authority (CAA) regulations. The successor to the successful first phase of this project is still in design but should be initiated during the second half of 2017.
28. In the meantime benchmarking of other organisations, including Northern Powergrid's parent Berkshire Hathaway Energy, Yorkshire Water, West Yorkshire Police and others, have further demonstrated the large potential associated with unmanned aerial vehicles. We will be developing this learning further during 2017/18 and intend to design further innovation projects to test the possibilities.
29. The Multi-storey Communities project was a collaboration between electricity, gas and water utilities supported by a housing association and a city council. This project completed in the early part of 2017. This has provided insights into the cross-vector approach to energy and its importance in many future energy network scenarios. Additionally the project identified the need to take broad, holistic societal overviews of costs associated with fuel poverty, energy cost reduction and health economics.
30. Modelling Asset Risk is a follow-up project to one completed in early 2015 and enhances our ability to optimise our investment delivery portfolio to achieve target

levels of network asset risk reduction. The Asset Risk Modelling (ARM) Tool delivered by this project now provides an ongoing in-feed into our annual Asset Serviceability Reviews (ASR) which informs the basis of our business plan for capital replacement across a number of key asset categories. The ASR reviews are carried out using both the company data systems (e.g. fault information and condition data on our assets) and feedback from both operational and non-operational staff, to inform a view of significant asset risks that require further detailed investigation and possibly a resultant change to how we manage those assets. In this particular case a technological change has led to the implementation of much broader operational and planning changes. This is the case in many implementations following successful innovation projects and to be truly successful it requires that the implementation is delivered as an integral part of the project. That ensures that the project team remains responsible for roll-out and maintains momentum that can be lost where there is a hiatus between project and roll-out.

31. Our Smart Data and Improved Distribution Load Estimates projects are now both complete. The initial observations made in these projects on the general difficulties in handling large data flows were confirmed in the final conclusions. Not only are large amounts of data difficult to work with the standard methods of dealing with this, such as data aggregation, can potentially introduce serious errors into the derived information. This is an issue that we have anecdotally observed in several other projects, both our own and other DNO's. Further work in this area will be required as we prepare ourselves for smart grid and smart meter rollout if we are to make best use of the opportunities these new technologies will present.

Summary of 2016/17 Network Innovation Allowance Investment

32. 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)	£1,197,310
Eligible Project Spending (internal)	£201,785
Grand Total	£1,399,095

33. Internal spending represents 14% of the total investment. This is below the governance maximum limit of 25%.