

Electricity Network Innovation Competition: 2016 funding decision

Decision

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Overview

We run an annual Electricity Network Innovation Competition (NIC) to stimulate innovation in the electricity networks. Through the NIC, network companies can apply for up to £81 million to fund innovative projects which have the potential to deliver environmental and financial benefits to electricity customers. This document explains which projects we have selected for funding this year.

This was the fourth year of the Electricity NIC and there were seven applications for funding, though one project withdrew part-way through the process. Of the remaining six projects we have selected four projects for full funding under the NIC. This decision is consistent with the recommendations of our independent Expert Panel. We propose to award £33 million to these projects. If the projects go ahead, the network companies and their partners will also provide £8.1 million in funding to the projects.

The successful projects trial innovative practices and new technologies. They have been selected because they will help network licensees understand how to meet customers' changing requirements as Great Britain moves toward a low carbon economy.

Context

Electricity network companies have a fundamental role in supporting the delivery of a low carbon economy while contributing to maintaining safe, secure and reliable energy supplies at long-term value for money to consumers. Innovation is crucial to meeting these outcomes by challenging business as usual and enabling a more rapid pace of change in the sector.

Electricity network companies will need to innovate in the way they design, plan, and operate their networks, delivering the services that customers want. The Electricity NIC is designed to help stimulate this innovation. It provides up to £81 million of funding each year to encourage electricity network licensees to run trials of new technology and different commercial and network operating arrangements.

Electricity network operators will gain understanding from these trials, which they will then be able to apply to the specific challenges they face. This should bring environmental benefits as well as cost savings to electricity customers in the future.

This year's Electricity NIC has been run in parallel with our Innovation Review. As part of which we will shortly be publishing a consultation on proposed governance changes to the Gas and Electricity NICs. None of the proposed measures being consulted on affect our NIC funding decision this year, but some will affect next year's competition should they be implemented.

Associated documents

Electricity NIC Governance Document

https://www.ofgem.gov.uk/sites/default/files/docs/2015/06/elec_nic_2-1_stat_con_clean_0.pdf

RIIO-T1 Strategy Decision

<https://www.ofgem.gov.uk/publications-and-updates/decision-strategy-next-transmission-price-control-riio-t1>

RIIO-ED1 Strategy Decision

<https://www.ofgem.gov.uk/publications-and-updates/strategy-decision-riio-ed1-overview>

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Executive summary

The Electricity NIC encourages network companies to innovate in the design, development and operation of their networks and to engage with third parties in doing so. Network companies compete against each other for a share of up to £81 million of funding for a small number of large-scale innovation projects. Trials financed through the NIC will create knowledge for all licensees that will also be made available to all interested parties. This brings potential environmental benefits and cost savings for current and future electricity customers.

This document contains our decisions on the projects to which we have decided to award NIC funding. This is the fourth year of the Electricity NIC and we received six submissions requesting a total of £46.8 million of the £81 million available funding. We have selected four projects for funding.

Projects Selected for Funding

2016 Electricity NIC Projects	NIC funding awarded
<p>Phoenix – would trial a novel combination of compensation equipment. The equipment would provide a new method of providing ancillary services (such as frequency regulation and voltage control) to the transmission system operator (SO), traditionally provided by large thermal generators. The project would also test how these services can be offered commercially, and investigate the associated agreements that need to be put in place for this to become a business as usual option across the GB network. <i>Submitted by Scottish Power Transmission (SPT)</i></p>	£15.6m
<p>Transmission and Distribution Interface (TDI) 2.0 – would demonstrate how services traditionally offered by transmission-connected generation to the SO (such as voltage stability and thermal capacity) can be provided by distribution-connected energy resources. The distribution company would effectively act as ‘gatekeeper’ in providing some of these services to the SO. The project would also examine how these new services would interact with the existing commercial arrangements. It would investigate the technical feasibility of the proposed approach as well as introduce market-based mechanisms for coordinated network management. <i>Submitted by National Grid Electricity Transmission (NGET)</i></p>	£8.0m
<p>OpenLV – would create a software platform which enables enhanced real time assessment and visibility of low voltage network capacity. This improved visibility would allow the distribution network companies to more actively manage this level of the network, which is necessary as more generation and demand is connected locally. Such an approach would ensure the available capacity is used more effectively, minimising the costs of reinforcement. One outcome will be to enable other parties (eg large users such as councils, housing associations, universities) to investigate ways to make better use of the network. <i>Submitted by Western Power Distribution (WPD)</i></p>	£4.9m
<p>PowerFuL-CB – would develop, and test, two new types of circuit breaker to ease constraints caused by faults on the network and therefore making more capacity available. The aim is to demonstrate that the increased capacity it makes available can aid the connection of distributed generation and district heating in a densely populated urban area. <i>Submitted by UK Power Networks (UKPN)</i></p>	£4.6m

Projects Not Selected for Funding

2016 Electricity NIC Projects	NIC Funding requested
Proteus - would have created a mobile, modular unit which could be rapidly deployed to temporarily ease low voltage network constraints. The unit would have contained reconfigurable power electronics to enable (among other things): rapid connection of batteries; additional ventilation and cooling; and an autonomous control system cells. <i>Submitted by Western Power Distribution (WPD)</i>	£7.8m
Inspire - would have created a new network data handling package which integrates a wide variety of software and data to enable more efficient management of the distribution network. <i>Submitted by Scottish Power Distribution (SPD)</i>	£6.0m

We assessed the project proposals against the evaluation criteria outlined in the NIC Governance Document.¹ In reaching the decision to fund four projects, we were advised by an independent Expert Panel, which reviewed the project submissions, posed questions to the network companies and reviewed the responses. The Expert Panel recommended that four projects should be provided with funding; we agree with the Expert Panel's recommendations. We plan to place additional conditions on OpenLV and PowerFuL-CB to ensure they deliver good value to electricity customers.

In December 2016 we will issue each successful company with a document explaining the terms it will have to comply with as a condition of receiving the NIC funding. The company will have to act subject to the terms of this document before the projects can progress.

We will shortly be publishing our Innovation Review consultation. As part of the separate consultation we are seeking views on proposed changes to the NIC governance arrangements as well the Electricity NIC funding level. The overall aim of the proposed changes is to ensure that the NIC continues to deliver value for money for customers and drives culture change within the network companies that we regulate. Subject to the outcome that consultation, some of the proposed measures would take effect in the 2017 competition and others would be implemented in time for the 2018 competition.

¹ Our Governance Document and criteria have been formulated in line with our principal objectives and general statutory duties.

1. Introduction

Chapter summary

We describe the background and structure of the Electricity NIC, including how we and the Expert Panel have evaluated the projects.

Purpose

1.1. This document explains our decisions on the applications we received for the fourth Electricity NIC.² We assessed the projects against the evaluation criteria in the Electricity NIC Governance Document³ as well as against our principal objective set out in the Electricity Act 1989 and against our general statutory duties.

1.2. We have published other documents alongside this. These are:

- The full submissions for each NIC project, produced by the network companies.
- The Expert Panel's recommendation report on which projects to fund.
- The network companies' answers to questions raised by us, the independent technical consultants (who evaluated parts of the projects) and the Expert Panel during the process.

How the NIC works

1.3. The Electricity NIC encourages network companies to innovate in the way they design, develop and operate their networks. It is an annual competition which provides up to £81 million of funding to a small number of large-scale innovation projects.

1.4. The Electricity NIC Governance Document sets out the scheme's governance and administration.

1.5. The annual competition starts when network companies submit project proposals in the Initial Screening Process (ISP). It is open to applications from all electricity network licence holders.

1.6. During the ISP, we consider whether these proposals are eligible for funding based on the requirements set out in the NIC Governance Document (including low carbon or environmental benefits and value for money for customers). Only eligible projects may progress to the full submission stage.

1.7. At the full submission stage, we appoint an independent Expert Panel to advise us on whether to provide NIC funding.⁴ The Expert Panel consists of people with specific expertise in energy networks, environmental policy, technical and engineering issues, economics and finance, and consumer issues. The Expert Panel assesses each project against the evaluation criteria set out in the NIC Governance Document – a summary is also given in Appendix 1. It then produces a report (published alongside this decision) on

² This document constitutes both notice of and reasons for our decision as required under section 49A of the Electricity Act 1989.

³ https://www.ofgem.gov.uk/sites/default/files/docs/2015/06/elec_nic_2-1_stat_con_clean_0.pdf

⁴ The biographies of the Expert Panel can be found here: <https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-competition/electricity-nic-expert-panel>

which projects it thinks should be given funding. We consider this report, but the decision on which projects to fund is ultimately ours and our decision could differ from the Expert Panel's recommendations.

The 2016 competition

1.8. This year's competition began with the ISP in April 2016. We received seven submissions. We accepted them all; however Scottish and Southern Electricity Networks subsequently withdrew its ReZone project before the full submission stage was completed.⁵ The remaining projects made full submissions by the August 2016 deadline. The combined NIC funding requested was £46.8 million of the available £81 million.

1.9. The Expert Panel reviewed the network companies' submissions. It also met the participating network companies and their project partners twice. Where aspects of the submissions required clarification, the network companies could resubmit their proposals. The Expert Panel made its recommendations based on the final submissions and submitted its recommendation report to us in late October 2016.

1.10. We also appointed Jacobs Leigh Fisher as the technical consultants for this year's competition to support the Expert Panel. The consultants attended most of the meetings during the process, including all the meetings that the Expert Panel had with the companies. The consultants were directed by the Expert Panel to advise, and challenge, the companies on specific technical aspects of each project. We, the consultants, and the Expert Panel also asked questions of the companies throughout the process.

1.11. We assessed the projects, taking into account the Expert Panel's recommendations and the evaluation criteria, to decide which projects should receive funding. Our decision on which projects to fund is contained in Chapter 2.

1.12. The Expert Panel's recommendation report, the full submissions, and the questions and answers are published alongside this document.⁶

⁵ The ReZone project aimed to assess the viability of using embedded third party assets, such as storage or generation, to improve security of supply, avoid reinforcement and minimise the use of mobile generators when faults occur on the network. The ISP is available here: https://www.ofgem.gov.uk/system/files/docs/2016/04/ssepd_nic2016_isp_rezone.pdf.

⁶ All the documents are on our NIC website: <https://www.ofgem.gov.uk/network-regulation-riio-model/network-innovation/electricity-network-innovation-competition>

2. Decision

Chapter summary

We have decided to fund four of the projects for which we received full submissions. We have decided to place additional conditions on two of these projects. In total we are approving just under £33 million of funding.

2.1. This was the fourth year of the Electricity NIC and we received proposals from the Transmission System Operator (SO), one of the Transmission Owners (TOs) and four from the Distribution Network Operators (DNOs).

2.2. The Expert Panel's 'Electricity NIC 2016 Report and Recommendations', published alongside this document, summarises the assessments of each project against the NIC evaluation criteria and should be read alongside this decision document. We broadly agree with the Expert Panel's assessment of all the projects and its reasons and recommendations on which projects to fund and reject.

Our decision

2.3. We have considered the project submissions, the Expert Panel's recommendations, the formal question and answer process, and the views of the consultants against the competition's framework, including the evaluation criteria and against our principal objective and statutory duties. We have:

- Decided to fund two projects, Phoenix and TDI 2.0 as submitted.
- Decided to fund two projects, OpenLV and PowerFuL-CB with additional conditions to be complied with by the network licensee before the NIC funding can be provided. This is to ensure value for money for customers and that their money is being spent efficiently. We explain the additional conditions below.
- Decided that two projects, Proteus and Inspire, will not be funded.

2.4. Below we summarise the reasons for our decisions.

Projects selected for funding

Phoenix – Scottish Power Transmission (SPT): Funding Awarded £15.6 million (without condition), other funding £4.0 million

Overview

2.5. Phoenix would trial a novel combination of compensation equipment to provide a new method of providing ancillary services (such as frequency regulation and voltage control) to the SO. These services are traditionally provided by large thermal generators. The project would also test how these services can be offered commercially and investigate the associated agreements that need to be put in place for this to become a business as usual option across the GB network.

Summary of assessment

2.6. We and the Expert Panel concluded that this was a well presented submission. The project has the potential to deliver real benefits to GB customers. Phoenix satisfied all of the evaluation criteria set out in the Governance Document. Where concerns were raised, SPT responded with suitable adjustments to the submission to mitigate these. We agree with the Expert Panel's recommendation to fund the project as submitted.

2.7. We were satisfied that the project would bring carbon and potentially net financial benefits to customers. The technology being trialled has the potential to effectively deal with the network challenges associated with integrating more renewable generation onto the system. This is important as traditional fossil-fuelled plants are being decommissioned. This greater network stability would be achieved at a lower cost compared with traditional generation.

2.8. We agree with the Expert Panel that this is an expensive project but would deliver good value for money when considered against the current alternative means of providing these services and the scale of the potential benefits. The SPT project team responded well to challenges about the counterfactuals to demonstrate the merits of its proposal. Phoenix has secured an in-kind contribution from each of its non-network licensee project partners.

2.9. The project would generate valuable knowledge. The Expert Panel recognised the learning relating to the equipment itself and to its potential future commercial deployment. The submission provided a detailed knowledge dissemination approach. It identified external engagement with industry and academia as well as the potential impact on standards, codes and practices achieved through the establishment of a dedicated working group. Phoenix would conform to the default intellectual property rights (IPR) arrangements; its submission setting out how this would be achieved with each project partner.

2.10. We agree with the Expert Panel that the project is innovative as this would be the first time the novel combination of compensation equipment has been trialled on the GB network. The project would also provide commercial innovation, with the trial testing the scope for future commercial roll out in the provision of services to the SO.

2.11. The project would involve four partners: ABB, NGET, the University of Strathclyde and the Technical University of Denmark. The Expert Panel raised some concerns regarding the contribution from the main project partner, ABB, given the potential benefits to it should the project be successful. However, SPT provided assurance that it had conducted a rigorous procurement process to select ABB. Further, ABB is taking on some risk through signing a fixed price contract for a turnkey solution, leaving it vulnerable to cost overruns.

2.12. Both we and the Expert Panel consider the project timely as the problems it is addressing will be exacerbated in the future as more fossil-fuelled generation comes off-line. Phoenix's initial analysis suggested around 20 units would be required across the GB network. Through demonstrating the feasibility of the technology the project would enable industry to assess whether this is the best solution in each case.

2.13. Both we and the Expert Panel were impressed with the collaboration between the project partners in the bilateral meetings and were satisfied that they demonstrated there was a robust methodology for delivery.

TDI 2.0 – National Grid Electricity Transmission (NGET): Funding Awarded £8.0 million (without condition), other funding £1.5 million

Overview

2.14. TDI 2.0 would demonstrate how services traditionally offered by transmission-connected generation to the SO (such as voltage stability and thermal capacity) could be provided by distribution-connected energy resources (DERs), with the DNO effectively acting as 'gatekeeper' in providing some of these services to the SO. The project would enable existing DERs to offer essential services for network stability that may otherwise require investment in new reactive compensators.

2.15. The project would also examine how these new services would interact with existing commercial arrangements. It would investigate the technical feasibility of the proposed approach as well as introduce market-based mechanisms for coordinated network management.

Summary of assessment

2.16. We and the Expert Panel concluded that this was a well thought through submission, exploring a very timely topic of greater coordination between the transmission and distribution systems. TDI 2.0 satisfied all of the evaluation criteria set out in the Governance Document and provided us and the Expert Panel with confidence throughout the evaluation process. In particular, the project team demonstrated a firm grasp of the commercial elements of the project necessary for successful delivery. We agree with the Expert Panel's recommendation to fund the project as submitted.

2.17. We were satisfied that the project would bring carbon and potentially net financial benefits to customers. The approach being trialled has the potential to effectively deal with the network challenges associated with integrating more renewable generation onto the distribution system in areas subject to transmission constraints. NGET estimated that the project would accommodate the connection of around 3.7GW of new DERs in the project area by 2050, while saving around £29 million in expenditure compared with network reinforcement.

2.18. We agree with the Expert Panel that the project would deliver good value for money when considered against the current alternatives of facilitating further DG connection in the south east. NGET and DNO project partner UKPN would together provide £1.5 million of funding, exceeding the 10% compulsory contribution from the licensees by £600k. The project would adopt a fully-competitive procurement processes to appoint providers for specific roles in project delivery.

2.19. The project would generate diverse and significant new learning, particularly around the interaction between the SO and DNO in offering the services being trialled by the project. The submission provided a detailed knowledge dissemination approach. The Expert Panel acknowledged the proposed inclusive approach to governance around new products and market development. TDI 2.0 would conform to the default IPR arrangements.

2.20. The submission highlighted four innovative concepts that would be explored by the project:

- i. The technical feasibility of using dynamic response from DERs for resolving complex transmission constraints.
- ii. The introduction of DERs to the reactive power market.
- iii. The DNO providing an additional route to market for DERs, enabling DERs to provide services to both the distribution and transmission networks.
- iv. Introducing market-based mechanisms for co-ordinated network management.

2.21. We agree with the Expert Panel that the project would be both technically and commercially innovative. Apart from innovation funding, there is nothing in the current RIIO price controls, or SO Incentives regime, to directly incentivise such cross-organisational collaboration for uncertain long-term customer benefits.

2.22. The project would be a collaboration between NGET and UKPN, who would between them cover around 15% of project costs. The submission was a result of NGET's invitation for project ideas both to interested external parties and internally within NGET. During the project development, NGET has established interest in trial participation from 12 companies. Providers would be competitively recruited during the project.

2.23. Both we and the Expert Panel consider the project to be extremely timely as it would both: help accommodate connection of further DERs in the south east, and trial a model for the DNO transition to a more active operational role (known as a distribution system operator or DSO). This DNO to DSO transition is the subject of much industry debate currently, including in the joint Government/Ofgem call for evidence on a Smart, Flexible Energy System.⁷

2.24. Overall, both we and the Expert Panel were impressed with the knowledge and collaboration among the project team in the bilateral meetings and were satisfied that they demonstrated there was a robust methodology for delivery. The project has already taken steps to generate interest from potential participants and has well thought through governance arrangements.

OpenLV - Western Power Distribution (WPD): Funding Awarded £4.9 million (subject to additional conditions), other funding £1.0 million

Overview

2.25. OpenLV would create a software platform which would offer enhanced real time assessment and visibility of low voltage network capacity. This improved visibility would allow DNOs to more actively manage this level of the network, which is necessary as more generation and demand is connected locally. Such an approach would enable the available capacity to be used more effectively, reducing the costs of reinforcement. One outcome would be to enable other parties (eg large users such as councils, housing associations, universities) to investigate ways to make better use of the network. One example could be social housing residents making more efficient use of rooftop solar cells. The majority of the benefits are based on adoption of the technology by third parties; the project has undertaken an initial assessment indicating a sizeable market potential.

⁷ <https://www.ofgem.gov.uk/publications-and-updates/smart-flexible-energy-system-call-evidence>

Summary of assessment

2.26. We and the Expert Panel concluded that this was a well presented submission. The project has the potential to deliver benefits and timely learning regarding both substation control and community engagement as more low carbon technologies (LCTs) connect to the low voltage network. We were impressed with the manner in which the WPD project team responded to the queries and concerns of the Expert Panel throughout the process. We agree with the Expert Panel's assessment of providing funding on the condition of the proposed revisions to the successful delivery reward criteria (SDRCs) to produce a comprehensive community engagement plan early in the project.

2.27. We agree with the Expert Panel that this project would accelerate the development of a low carbon energy sector and has the potential to deliver net financial benefits to customers. The enhanced network visibility provided by the platform would create additional capacity for the connection of LCTs without the need for traditional reinforcement. Further benefits could be realised through data being available to community groups and third parties, ultimately allowing more effective use of the low voltage network by the DNO and customers. Overall, WPD has projected that the project could offer £595 million of savings to customers and release 5.8GW of capacity by 2050 if it was rolled out across the GB Network.

2.28. The Expert Panel were satisfied that the project offered value for money and we agree. The Expert Panel were originally concerned with the relatively high costs being charged by the main project partner, EA Technology Limited (EATL), given it could be the long term beneficiary if the platform were to be rolled out across the GB Network. However, EATL would contribute 8% of the total project costs through in-kind contributions and was able to further reduce its cost following Expert Panel questioning. During the project, further external funding would be sought for the development of software applications for community and third party participation. EATL engaged with a number of potential providers for each project role in advance of the submission.

2.29. This project would generate valuable knowledge which may be relevant to all DNOs in GB. We agree with the Expert Panel that the key learning generated by the project would be the appetite for communities and third parties to interact with the low voltage network in new ways. The project included a detailed knowledge dissemination approach. Following Expert Panel questioning, the resubmission supplemented this with a dedicated resource to help ensure the learning would be meaningful to other prospective users post-trial, to support wider roll-out. OpenLV would conform to the default IPR arrangements.

2.30. We agree with the Expert Panel that the project would be innovative. In addition to providing a new method for monitoring and control of the LV network, a key aspect of the innovation would be the provision of network data to user groups and third party software application ('App') developers. We were satisfied that the project could not be undertaken as part of business as usual. This would be the first time these solutions would have been trialled on the GB network so there is not an evidence base for a business case without significant commercial risks, while the principal beneficiaries would be customers.

2.31. We noted that WPD had sought ideas from third parties within the context of its priority areas for this year's NIC. As a consequence, the sole project partner, EATL, would be leading the project. The named project suppliers would be Nortech and Lucy Electric GridKey, while the project team would competitively recruit further providers during the project. Overall, the Expert Panel were satisfied that the project had recruited

a good selection of project collaborators, including the involvement of a community engagement specialist. Project supporters would include universities and local government.

2.32. Both we and the Expert Panel consider the project timely as increasing numbers of LCTs are being connected to the low voltage network. This increase in LCTs, combined with the smart meter roll-out on the network, is likely to be accompanied by an increase in customers' interest in how they interact with the local network to make the most effective use of their LCTs and/or reduce their energy costs. We also note that the project would be well-placed to build on the learning from other recently completed innovation projects.

2.33. We share the Expert Panel's concerns regarding the likely extent of customer and third party appetite to interact with network data. These concerns were partially allayed by WPD's commitment to fund the development of one App through its corporate social responsibility budget should no third party came forward during the trial. WPD's initial assessment indicated sizeable market potential.

2.34. Nevertheless, we agree with the Expert Panel's recommendation of awarding the funding subject to the project developing a revised approach to community engagement. This is because the Expert Panel felt that insufficient attention had been paid to this element of the project given how critical it is to its overall success. Therefore, we will include an SDRC that requires the project to produce an updated community engagement plan (including the approach to pre-planning, trial structuring and early consultation work) within a year of the project start date. Alongside this, we will revise the existing SDRC on the assessment of market potential so that an interim report is produced to the same timescale. These additions will help to ensure that the potential benefits of the wider adoption of the technology are fully captured by the project.

PowerFuL-CB - UK Power Networks (UKPN): Funding Awarded £4.6 million (subject to additional condition), other funding £1.5 million

Overview

2.35. PowerFuL-CB would further develop, and test, two new types of circuit breaker to ease fault level constraints on the network and therefore make more capacity available. One of these circuit breakers, developed by ABB, would be designed to operate at substations, while the other, from Applied Materials (AMAT), would be located at the point of DG customer connection. Both would be smaller and cheaper than traditional circuit breakers; they would release additional fault level headroom to enable more DG connections and district heating in a densely populated urban area.

Summary of assessment

2.36. The Expert Panel thought that this project is timely, well thought through and has the potential to deliver benefits to customers. Through developing two new technological solutions to network fault level constraints, the project would allow more DG to connect to constrained urban networks. We were impressed with how UKPN reacted to feedback from the Expert Panel during the meetings to ensure the project would deliver value for money to customers.

2.37. We agree with the Expert Panel that the full benefits for the project would only be realised once it is possible to deploy the new circuit breakers without conventional circuit

breakers as a back-up. We agree with the Expert Panel's assessment of providing funding on the condition that there is an additional SDRC. The SDRC would require the project to develop a safety case covering the development of the circuit breakers until they can be rolled out without being installed in series with a back-up circuit breaker.

2.38. We agree with the Expert Panel that this project would accelerate the development of a low carbon energy sector and has the potential to deliver net financial benefits to customers. The new types of fault limiting circuit breaker that the project would test would enable more connections of DG to constrained urban networks, in particular combined heat and power plants (CHP). UKPN estimated 462MW of capacity would be released by 2050, facilitating the connection of DG which would help enable the roll-out of low carbon heating and electricity generation. The Expert Panel commended the project for the low cost of the proposed circuit breakers and potentially quick payback: only three ABB units or one AMAT unit respectively would need to be deployed to recoup the customer investment in each method.

2.39. The Expert Panel were satisfied that the project would offer value for money to customers, in particular DG connecting to the network, who would be the main beneficiaries if the technology is rolled out. We agree with this and note the extensive scope for rollout with around 20% of GB primary distribution substations potentially becoming constrained due to fault level violations by 2020. UKPN has taken a bottom-up approach to estimating costs and would conduct competitive procurement to recruit the safety case provider, a significant cost of the project. Of the £6.2 million total project cost, over £1 million would be funded by a combination of project partners and an extra contribution from UKPN.

2.40. The Expert Panel were satisfied that PowerFuL-CB would generate knowledge relevant for all GB DNOs, but particularly those with constrained dense urban networks. The learning would cover technological deployment, safety issues and customer engagement. The submission provided a detailed knowledge dissemination approach, identifying external engagement with industry, regulators, customers, academia, other manufacturers and local authorities. PowerFuL-CB would conform to the default IPR arrangements; its submission set out different scenarios for potential commercial deployment.

2.41. This project is innovative as this would be the first time the two new types of circuit breakers have been tested on the GB network. The project proposes to develop the fault limiting circuit breakers into technologies that have been tested and proven on the network. The Expert Panel noted that, although several novel fault current limiters have been investigated under other innovation projects, we are yet to see the emergence of a technology which can be installed within size constrained urban substations. We agree with the Expert Panel's assessment that the project is innovative.

2.42. We and the Expert Panel were satisfied that UKPN had recruited appropriate partners for the project. Both ABB and AMAT have vast experience in this field. The Expert Panel originally had reservations about providing customers' money to fund the development of technology which could offer significant commercially benefits to the third party technology developers. Following discussions, the Expert Panel were pleased to see ABB increase its contribution to the highest proportional amount it had contributed to an LCNF/NIC project (£500k) and were likewise satisfied by the contribution made by AMAT (£388k). The project has support from other DNOs, the Greater London Authority and Imperial College London.

2.43. The Expert Panel considered this project timely owing to the expected ramped increase in the deployment of CHP across urban networks in future in response to the challenges of decarbonising heat. We agree with this assessment and note that the alleviation of fault level constraints is a challenge for licensees operating within densely populated urban areas. As the two types of circuit breaker are at different levels of technological readiness, UKPN envision that the AMAT circuit breaker would be able to be installed by other licensees before the end of RIIO-ED1 (the current price control period), with the ABB circuit breaker ready for deployment during RIIO-ED2.

2.44. The Expert Panel were satisfied that UKPN had put in place a robust methodology for the delivery of the project. They were impressed that the project had engaged with DG customers in the target area and had learnt lessons from previous innovation projects.

2.45. However, the Expert Panel were concerned that, as a safety measure, the new circuit breakers would be run in series with conventional, larger equipment which could potentially limit the number of locations where the new technologies could be installed. Therefore, we will include an SDRC that requires that the project publishes a report which outlines the technological and operational safety case to the time where the circuit breakers can be deployed as business as usual without being installed in series with a back-up circuit breaker.

Projects not selected for funding

2.46. We have decided not to fund two projects. While they were aiming to address critical problems, they did not perform sufficiently strongly against the evaluation criteria set out in the NIC Governance Document. We did not consider that we would be able to resolve the concerns we have by placing further conditions on funding. These projects and are reasons for not funding them are described below.

Inspire - Scottish Power Distribution (SPD): Funding Requested £6.0 million

Overview

2.47. The project would have created a new network data handling package which integrated a wide variety of software and data to enable more efficient management of the distribution network.

Summary of assessment

2.48. Both we and the Expert Panel had concerns about this project's ability to meet some of the evaluation criteria set out in the Governance Document. We did not consider that all of the concerns raised during the evaluation process were adequately addressed in the resubmission and did not think that our concerns would be mitigated by additional conditions. This meant we did not believe this project should be funded with customers' money. Most notably we were concerned with its performance against the following criteria: "(a) low carbon/environmental/financial benefits", "(b) value for money", and "(g) demonstrates a robust methodology".

2.49. Although the Expert Panel were satisfied that new network software would eventually be needed in the transition to a smarter grid, they had a number of concerns with this project. In particular, the Expert Panel believed that the software should be

developed as part of business as usual as it would directly benefit SPD. The Expert Panel also had concerns regarding the likely rollout of the package to the bespoke IT systems used by other DNOs, and that the software might be superseded before the projected break-even of 2026. We agree with their assessment and recommendation not to fund. We will therefore not fund Inspire this year.

2.50. SPD claimed the project could reduce carbon emissions by 2,230kt and deliver £93 million of savings to customers by 2050 if rolled out across GB, potentially breaking even by 2026. Both we and the Expert Panel were not persuaded by this; owing to the proprietary nature of the platform we did not believe there would be sufficient appetite from the other DNOs for this to become reality. We believe that it is more likely each licensee will develop its own bespoke software to best incorporate its legacy systems. While there was potential for some financial, capacity and carbon benefits, we felt that the majority of this value would accrue to SPD rather than to the GB network customers funding the trial.

2.51. We also shared the Expert Panel's concerns regarding the likelihood of the platform still being a viable solution in 2026/2028 (the break-even points forecast by SPD). Given the pace of software development, we were concerned that the platform would be superseded by a more up-to-date product such that any benefits from this project would cease to flow to customers before this breakeven point.

2.52. Based on the concerns outlined above regarding the uncertain benefits to GB customers overall, both we and the Expert Panel did not consider that the project represented good value for money. The Expert Panel also noted the relatively high day rates being charged by some of the project partners combined with a high number of days. The Expert Panel explained these concerns to SPD during the bilaterals and, in response, both SPD and project partners increased their contributions. However, we and the Expert Panel still felt that customers would not receive good value for money from the £6 million to fund this project.

2.53. We agree with the Expert Panel that the project could have created useful information for other licensees with relation to the challenges of trying to create such an IT system, even if they opted not to adopt the platform at the end of the project. The submission provided detailed methodologies for learning capture and dissemination, identifying multiple potential audiences.

2.54. Both we and the Expert Panel were unconvinced of how innovative this concept is as it would predominantly be making better use of existing data/systems. We understand there are numerous complexities around integrating multiple data sources and that such a system has not been proven on the network. But we also feel that the type of software platform that Inspire would have created is likely to be the type DNOs would adopt anyway when upgrading their operating systems to make the most efficient use of their networks in the continuing transition to a smarter grid. Owing to this we did not fully-recognise the claim made by SPD that creating such a system would expose customers to a disproportionate risk if the project was undertaken without innovation funding.

2.55. SPD recruited five project partners: CGI, Smarter Grid Solutions, Nortech, the University of Strathclyde and NGET. The Expert Panel thought that the selection of these project partners would have enabled the project to leverage their respective expertise and proven track records in creating IT systems for network operators. All of the partners would have provided external funding, amounting to around £800k in total. The largest contribution would have been from CGI, though we and the Expert Panel feel this

could have been higher given the level of its involvement in delivering the project and the potential commercial benefits from rollout at the end of the project. SPD also proposed to invite all network licensees, energy suppliers and interested academics to a collaborative work group run as part of the project.

2.56. The Expert Panel were convinced the type of platform proposed by the project will become the business as usual solution to these challenges and thus it was timely to study this area. We agree with this assessment, but were not persuaded that innovation funding is the correct mechanism to develop this.

2.57. We share the Expert Panel's reservations regarding whether the project's methodology was the best way to solve the problem for GB network customers. Although SPD intended to set up a working group with other DNOs, we agree with the Expert Panel that a more suitable approach would have been to run the project as a collaboration with other DNOs to explore the challenges of creating a single platform to control legacy systems. Such an approach may help create a strategy for the long term application of such systems.

2.58. We also share the Expert Panel's concerns that SPD had not allocated enough of its proposed budget as contingency funding. While we appreciate SPD had requested the option of making use of an additional 5% of funding should it face cost overruns, we felt more resources could have been allocated to mitigate for the well-known complexities of creating new IT systems. The SDRCs, though, were detailed and linked to key project milestones.

Proteus - Western Power Distribution (WPD): Funding requested £7.8 million

Overview

2.59. Proteus would have created a mobile, modular unit which could have been rapidly deployed to temporarily ease low voltage network constraints. The unit would have contained reconfigurable power electronics to enable (among other things): rapid connection of batteries; additional ventilation and cooling; and an autonomous control system.

Summary of assessment

2.60. Both we and the Expert Panel had concerns about this project's ability to meet some of the evaluation criteria set out in the Governance Document. We did not consider that all of the concerns raised during the evaluation process were adequately addressed in the resubmission and did not consider that our concerns would be mitigated by additional conditions. This meant we did not believe this project should be funded with customers' money. Most notably we were concerned with its performance against the following criteria: "(a) low carbon/environmental/financial benefits", "(b) value for money", (f) "relevant and timely" and "(g) demonstrates a robust methodology".

2.61. We and the Expert Panel were not convinced that there would be sufficient demand for this solution with the possibility of it becoming obsolete as alternative solutions emerge before the problems to be addressed arise at scale. We were also concerned that having such a unit could reduce the likelihood of more proactive network planning to address the problems in a strategic way. In addition, the proposed methodology contained some notable shortcomings, not least in the technical feasibility

of the project. We agreed with the Expert Panel's assessment and recommendation not to fund. We will therefore not fund Proteus this year.

2.62. WPD claimed that the project could deliver £407 million of financial benefits to customers along with carbon savings of 7.1ktCO₂ by 2050, based on the assumption of 550 of these units being rolled out across GB. The project would enable DNOs to trial a variety of different solutions to constraints on the network before selecting the most appropriate solution to the issue. We and the Expert Panel shared a number of concerns about the assumptions used to derive these projected benefits:

- i. The incremental benefit may be overstated given existing temporary business as usual solutions and lower cost innovative techniques can already be included among longer-term solutions.
- ii. The assumptions of DNO rollout appeared optimistic given the existing options available and the potential disruption of having temporary vehicles parked in neighbourhoods for several weeks at a time.
- iii. Furthermore, over time, as common problems emerge on low voltage networks, a more strategic approach involving pre-emptive action may be a more cost-effective option, particularly given the projected scale of the issue (projected to affect tens of thousands of networks).

2.63. Overall, we shared the Expert Panel's reservations as to whether Proteus would ultimately contribute to the acceleration of the development of a low carbon energy sector, while having the potential to deliver net financial benefits to customers.

2.64. We and the Expert Panel were not convinced that Proteus could deliver value for money. As outlined above, the Expert Panel were not able to overcome their concerns that the units would become obsolete as other, lower cost solutions were developed before the benefits for customers were realised. The Expert Panel were also concerned whether the project's key concept of packaging a number of network solutions into one mobile unit warranted funding, feeling that a fully-modular approach would at least provide more enduring flexibility.

2.65. The Expert Panel expressed concern regarding the high cost of certain aspects of the project. The lead project partner, Ricardo, would have been engaged at a day rate that both we and the Expert Panel considered high, particularly given it would be delivering the majority of the work. The Expert Panel noted that, following challenge, Ricardo proposed to reimburse customers up to 120% of customer funding, using 5% of the revenue from Proteus units sold.

2.66. The Expert Panel were satisfied that Proteus could create new learning regarding both the deployment of some solutions currently untested on the low voltage network and for the integration of existing techniques. The project included a detailed knowledge dissemination approach and WPD had recruited another DNO to peer review the project as it progressed.

2.67. The Expert Panel recognised the innovative nature of the project, including the automatic operation of the temporary equipment and the size reduction for a mobile unit, while maintaining requisite functionality. Furthermore, some of the solutions within the toolbox are not yet proven on the low voltage network. We agree with the Expert Panel's assessment and that the project would be innovative and sufficiently risky to warrant applying for innovation funding.

2.68. We were pleased that WPD had sought ideas from third parties within the context of its priority areas for this year's NIC. As a consequence, Ricardo would be leading the project. Other project partners would be Turbo Power Systems, Imperial College and ASH Wireless, all of whom have experience of network innovation projects. Overall, the Expert Panel were satisfied that the project had recruited a good selection of project partners, who between them would provide around 6 per cent of project funding through in-kind contributions. Further providers would be recruited on a competitive basis during the project.

2.69. WPD made the case that the number of overloaded low voltage networks will increase with greater penetration of LCTs, highlighting the need to develop the solution in advance of the system requirement. While we acknowledge that Proteus would build on existing innovation projects, we share the Expert Panel's fundamental concern with the relevance and timeliness of the solution. The Expert Panel felt that a significant demand for Proteus would not emerge for about ten years, by which time alternative, potentially more cost-effective and proactive solutions might be available.

2.70. While the submission included a project plan and detailed risk register, we shared the Expert Panel's concerns regarding some key elements of the proposed approach that were not fully-addressed during the assessment process:

- i. The feasibility of shrinking flexible transformers to the size proposed.
- ii. The effectiveness of some of the solution's mitigation techniques and their automation, with a lack of evidence to provide confidence on this point.
- iii. Whether the neighbourhood safety issues had been fully thought through given the potential for the solution to be in place in residential areas for several weeks.

2.71. Furthermore, the SDRCs lacked requisite detail and their links to the key project milestones were unclear. We agreed with the Expert Panel that the project methodology was not sufficiently robust.

Feedback from this year's competition

Expert Panel Feedback

2.72. The Expert Panel provided both general and project-specific views on the quality of the submissions in its 2016 recommendation report. Their general views include:

- It should be clear within the full submission that the counterfactual case is based on the actual alternative technologies (including any being developed in live trials) available to the licensee rather than simply assuming the issue would be resolved through traditional reinforcement.
- While the Expert Panel was pleased to see more consistency in the presentation of overall benefits this year, that could be usefully supplemented by a breakdown by each method (as appropriate), including break-even points.
- To enable the Expert Panel to better assess the appetite for other licensees to implement the solutions being trialled by a project, they would like to see – in place of generic letters of support – evidence that other licensees have been consulted on and/or allowed to shape the project.

- If a project is addressing an issue relating to the day-to-day operation of a network company the Expert Panel would like to see more collaboration between the licensees. This would enable them to feel more comfortable about the long term buy-in of other licensees for the solutions being developed.
- The Expert Panel was pleased by the increased involvement of third parties in the NIC process this year. They were especially impressed by the 'call for ideas' run by WPD to identify project partners for this year. We agree with this and are advocating a similar process within our Innovation Review. However, the companies should be able to demonstrate that the costs of all partners (particularly those with a lead role) are reasonable.
- If there is the potential for the third party partner to benefit significantly from the product developed by the project, the submission should include a transparent profit sharing arrangement to ensure the customers funding the project obtain value for money.
- Finally, they noted that one submission in particular had demonstrated a robust approach to addressing the challenges of establishing commercial contracts as part of an innovation project. They would welcome the same level of diligence for future submissions.

Ofgem Feedback

2.73. We were generally pleased with the project ideas brought forward and agree with the views of the Expert Panel above. We urge the companies to ensure that their submissions are clearly written and subject to detailed review before submission.

2.74. In the submissions for next year's competition we would encourage companies to demonstrate better how the project fits in with other innovative work and how this links to a wider strategy for the future of the electricity networks. We will set out further thoughts in this area shortly as part of our Innovation Review consultation.

2.75. We expect the network companies to consider this feedback, and the more general messages from the Innovation Review, when developing submissions for next year.

3. Next Steps

Chapter Summary

Funded projects will each receive a project direction in December 2016 and will receive funding from 1 April 2017. We will publish the dates for next year's competition in early 2017.

Future competitions and our Innovation Review

3.1. This year's NIC has been run at the same time as our Innovation Review. We will shortly be publishing a consultation on the proposed governance changes to the Gas and Electricity NICs. None of the measures being consulted on affect our NIC funding decisions this year. However, we expect that some of our proposals would (subject to consultation responses) come into effect for next year's NIC, if they are implemented.

3.2. We will be holding an Innovation Working Group meeting on 11 January 2017 to discuss our proposals, including any interactions with the NIC submissions for next year's competition. There will also be an opportunity for network companies to provide feedback on this year's process. If you are interested in attending the meeting please email networks.innovation@ofgem.gov.uk.

3.3. We will look to confirm the Initial Screening Process and full submission deadlines in early 2017. Currently, we expect that they will be similar to the deadlines in 2016.

Funding of selected projects

3.4. Before funding a project, we issue a project direction explaining the terms that the funded network company has to comply with as a condition of receiving NIC funding. If complied with by the network company, we will issue a funding direction to specify the amount of money to be recovered from network customers next year, through their network charges, to fund the successful NIC projects. We will issue the funding direction by end of December 2016.⁸ We expect the funded projects to start as soon as possible, according to the terms in their respective project directions and the NIC Governance Document.

Monitoring of projects and dissemination of learning

3.5. We will monitor each project to ensure it is implemented in line with its project direction. Each project will have to provide regular progress reports, in line with the requirements of the NIC Governance Document. These will be published on the companies' websites to make project learning available to all interested parties. Learning from the projects should also be made readily available and shared according to the projects' plans.

3.6. The Energy Networks Association has a portal which holds information and learning from innovation projects, including from the Low Carbon Networks Fund (LCNF)

⁸ Detail on the funding direction can be found in of the Electricity NIC Governance Document.

and the Gas and Electricity NICs, and we expect learning from this year's projects to also be made available through the portal.⁹

3.7. Finally, network companies have an obligation to hold an annual conference, open to all, where they present what they've learned from their projects (including previously funded NIC schemes). The conference is called the Low Carbon Networks & Innovation Conference. Further information can be found on its website.¹⁰

⁹ <http://www.smarternetworks.org/>

¹⁰ <http://www.lcniconference.org/>

Appendix 1 – NIC evaluation criteria

This appendix contains a summary of the evaluation criteria outlined within the Electricity NIC Governance Document.

The Expert Panel base their recommendation on each project on the different strengths and weaknesses across all the NIC criteria set out below. They may also consider how the potential project would impact on the overall portfolio of innovation projects funded by Ofgem. We also use these criteria.

Degree to which the project:

- Delivers **environmental and financial benefits:** Accelerates the development of a low carbon energy sector and/or delivers environmental benefits whilst having the potential to deliver net financial benefits to future and/or existing customers.
- Provides **value for money** to electricity customers.
- **Generates knowledge** that can be shared amongst all Network Licensees.
- **Is innovative** (ie not business as usual) and has an unproven business case (meaning it cannot be funded through another RIIIO mechanism) where the innovation risk warrants a limited Development or Demonstration project to demonstrate its effectiveness.
- Demonstrates a **robust methodology** and readiness of the project.
- **Involves other partners and external funding.**
- Is **relevant and timely.**